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MORE DISINTERESTED EVIDENCE.

"Science Abstracts," issued under the direction of the Institution of Electrical Engineers and the Physical Society, of London, publishes regularly abstracts from the leading technical journals of the world on all subjects related to applied science. In the issue of December 26, 1901, eleven indexes are given to the subject of automobiles. Of these eleven indexes five, or nearly one-half, are credited to "The Horseless Age." No other American automobile journal is mentioned.

The Influence of the Automobile on the Improvement of Gas Engines.

It is a well-known fact that the demands of marine service and the efforts of marine engineers to satisfy them have led to great improvements in steam engine construction generally, especially in the line of economy. As in transatlantic and other long distance services a large part of the vessel's carrying capacity is claimed by the fuel required, the highest economy possible was a very important aim of marine engine designers, as this factor greatly influences the usual carrying and, consequently, the earning capacity of a vessel. Similar results were to be obtained by the reduction in weight and bulk of the power generating plant itself. These considerations led to the design of high pressure, condensing, triple or quadruple expansion engines of vertical construction, which are now also being adopted in large stationary power plants.

The field of the explosion motor, as far as can be judged at the present time, is more particularly the generation of power in small units, and the number of stationary gas and gasoline engines in use in this country is probably considerably above the 100,000 mark. These engines are especially employed where the load is constant, or approximately so, as in small pumping plants, accumulator charging plants, etc. That in this work they are entirely practicable is attested by the large numbers of them in use; but that there are certain details in which improvement is possible, and, indeed, quite desirable, is known to every gas engine operator. And that the fuel economy, the reliability of operation and the specific power are still capable of increase is a fact about which there is no doubt among engineers.

Now, when an article has reached a state of commercial practicability there is comparatively little incentive to further improvement. And to this cause we may ascribe the apparent conservatism among stationary gas engine builders. Practically all the inventive effort expended in recent years in the improvement of explosion engine details—carburetors, igniters, governors, etc.—has had for its direct object to improve the motor for automobile use. In automobile service the requirements are in every particular far more exacting than in stationary service, and it may be said that while at the time of the beginning of the automobile movement the gasoline engine was entirely practicable (from a commercial standpoint) for stationary use, it was far from being so for vehicular use. Thus, while improvement in the stationary engine was desirable, in the automobile engine it was absolutely necessary, and this explains why practically all inventive efforts in the explosion engine line have been directed toward the perfectioning of the automobile engine.

But the stationary engine will profit indirectly from the activity in the field of automobile motor improvement. It is, of course, not probable that the stationary engine will ever be built exactly along the same lines as the vehicle motor; but whatever improvements are made in the attachments of the latter, such as carburetors, igniters, etc., are nearly always applicable to stationary engines also. Generator ignition, for instance, although practiced in some rare instances before the time of the automobile movement, gained its present popularity and its perfection in connection with automobile motors, but is now also extensively used on stationary engines. Further, the constant level carburetor is now used in connection with stationary engines, and the adoption of the variable spark, at least in the smallest sizes of stationary engines, seems a probability of the near future.

Our Communications Department.

In the first four numbers of the present volume of THE HORSELESS AGE there appeared in all forty-seven communica-

tions from readers and in the last number alone seventeen. These communications came from readers in all parts of the country, as well as in Europe, and covered a great variety of subjects. Among our correspondents were manufacturers, dealers, engineers, experimenters and users of automobiles, the interests of all whom THE HORSELESS AGE represents.

We believe that the Communications department is one of the most interesting in the paper, and that it is closely scanned by our readers is evidenced by the many references to letters which have appeared in it. Users of automobiles are always much interested in the experiences of their fellow users, and many of them have favored us with accounts of particularly interesting incidents of their experience. There have also been general discussions on the flexibility of the gasoline motor, the flash boiler, internal combustion in steam generation and other timely subjects. In fact, practically all the questions of the day in the automobile world have been touched upon.

Nothing, probably, can conduce more to the progress of the movement than a free discussion of the problems that present themselves, and this applies at present especially to problems brought up by the experience of users. Every user has his difficulties in the early days, and, naturally enough, these difficulties are a good deal the same in every case. Few, for instance, are the users of steam carriages who have not been bothered by the breaking of water glasses until they devised some improved means for packing these glasses which allowed for the raking to which the vehicle body and the parts mounted thereon are subjected on rough roads and at high speeds. And few are the users of gasoline carriages who, unless they were acquainted with that part of gasoline motors at the outset, have not been puzzled and worried by some trifling disarrangement of the ignition mechanism and circuits until they devised or learned of a systematic method of testing for faults. Thus, when a user discovers a method of overcoming difficulties like the above he can confer a favor upon his fellow users by telling them about it, and to this end the use of our Communications columns, which are at his disposal, is, we believe, the most efficient means. Many kinks and ideas from users have appeared in these columns from time to time and the users among our readers have undoubtedly profited by them.

We wish to thank our correspondents who have so liberally contributed to this department in the past and have thereby helped to render the paper more valuable to its readers; and we hope they will continue to avail themselves in future of this opportunity of communicating with automobile manufacturers, dealers and users whenever they have something to say to any of these classes.

Queries pertaining to automobile subjects are also invited and will, as far as it is within our power and when they are of general interest, be answered in these columns.

A "New and Useful Improvement."

Among the patents issued on January 14 is one granted to Karl Schiller, of Zizkow, Austria-Hungary, on an "automobile car." If the title of the patent is somewhat curious the patent itself, or the alleged invention it covers, is much more so. The invention, according to the specification, is based upon the principle that "by small efforts considerable hydraulic pressures are obtained." The inventor conceived the applicability of this principle to the propulsion of automobiles and has invented a mechanism to embody this principle, applicable to vehicles which may be described as follows:

The vehicle is provided with a tank containing a fluid, a motor which may be operated by this fluid, a treadle-operated pump by which the fluid is forced from the tank to the motor and gearing between the motor shaft and the road wheels. To propel the car the operator works the pump treadle, forces the fluid to the motor—and the motor does the rest. It would probably be impossible to argue with the inventor that he would not get much propelling power in that way, because the invention is based on the well-established principle that "with comparatively small efforts considerable hydraulic pressures can be obtained."

For an invention to be patentable the law demands that it be new and useful and that it be of such a nature as to have required an effort of the inventive faculty, or words to that effect. Now our patent department is known for making a thorough search as regards novelty when application is made for a patent; but apparently nothing is done to ascertain the usefulness of the invention that a patent application is made for; in fact, the term useful as applied in this case seems to be synonymous with harmless, for otherwise it is hard to see how inventions of the above order could pass the department.

It is true that as regards invention, usefulness is less definite than novelty, but Patent Office examiners may if they doubt the practicability of the invention, demand a model. And this is, we think, what should have been done in the present case. If the inventor could have proved by a practical demonstration that by working his pump treadle he could move about with no more effort and at the same speed as by other means, then it might have been considered that his invention deserved the characterization "useful."

The question of fuel consumption, so important in countries in which the price of gasoline is high, has thus been solved at a single stroke. But this is not all. Another, almost equally important question—that of vibration—has found its solution in the same invention. The inventor is evidently of the opinion that when he bears down upon his foot treadle the vehicle will move off with a jar. To lessen or avoid this jar he interposes between the piston rod and the pitman a coiled spring to take up the jar and prevent its transmission to the vehicle. It would seem that this flexible connection between piston and crank might influence the operation of the valves, but, of course, the inventor does not bother with such trifling matters as valves.

Steam Carriage Patent Litigation.

It appears now that the "steam end" of the industry will shortly be involved in a patent suit similar in scope to the Selden suit, which the hydrocarbon branch is defendant in, though rather different in its aspects. That there has been a great deal of copying in steam carriage design is a well-known fact, being quite obvious from the great similarity of many of the patterns upon the market, which in some cases cannot be distinguished from each other except by the name plate. But who the originators of the various features were has been less certain, and this and also the extent to which these features are covered by patents will undoubtedly be cleared up by the suit just instituted by the Whitney Motor Wagon Company, owned by the Locomobile Company of America, particulars of which are given on another page of this issue.

We are informed on good authority that a short time ago steps were taken to or-

ganize a steam vehicle trust, but that the plans fell through. This suit to test the validity of an alleged fundamental patent, coming so soon after the attempt at consolidation, makes it appear that vigorous steps are proposed to end or abate the competition in the steam carriage line. The developments in this case will be looked to with interest, and we venture to predict that a good portion of the steam vehicle industry will join hands to fight the case, especially if it has to be carried by the defendants to the higher courts.

While we have compared the suit to the Selden infringement suit, the patent in question seems to be considerably narrower than the Selden patent. Gasoline motor vehicles, which would not be affected by the decision in the Selden suit, have been manufactured only in the smallest sizes and are unfit for general work on our country roads. It might be quite possible for steam carriage manufacturers to get around the Whitney patent, if upheld, but great changes in design would in most cases be necessary.

Terminology.

In a recent issue of the New York *Times* a correspondent protests against the word chauffeur as applied in this country to the driver or operator of an automobile. He states that this French word signifies fireman or stoker, as the English would say, and is therefore entirely inappropriate, aside from the inadvisability of foisting foreign words upon our language.

The protest is exceedingly timely. Opposition to this term has been expressed not only in this country and in England, but even in France, where it originated. No historical records remain of when and how this word was first used to designate motor vehicle operators, but it must have been in the early period of automobilism and may have been used, in the first place, to ridicule rather than for practical purposes. The want of true significance of the term has been completed in France by limiting its use to owners. Hired drivers there are referred to as *mécaniciens*. In this country the use, so far, of the term chauffeur has been the direct opposite. While it is not limited to hired drivers, it is used more particularly to designate them, and in speaking of the chauffeur in case an automobile owner is driven by a hired driver it would invariably apply to the latter.

The term has, therefore, no definite internationally recognized meaning—another reason why it should be discarded. In the English language we have the words driver and operator, which are definite and appropriate, and either can be used at discretion, the former having the advantage of brevity. There is, therefore, no need to adopt a foreign word, and there is great objection to it when the foreign word is very unsatisfactory even in its own language, as is the case here.

Motorman has also been proposed, and would not be unacceptable, but seems less suitable than the above two.

Lines of Standardization.

By Albert L. Clough.

In the drawing up of specifications for a standard system of control for gasoline carriages, which it is devoutly hoped some organization may soon be moved to undertake, and which may be known, perhaps, as "association control" and enjoy a deserved prestige, many difficulties will be encountered. There are certain points of practice, however, about which there is at present disagreement of a purely fanciful nature, which such a movement would do much to set at rest, without involving serious hardship for anyone.

One such matter is that of the position of the operator—whether it shall be upon the right or left hand side. Strangely enough, there is still a diversity of practice upon this point, the majority of vehicles requiring the operator on the right, but still quite a number of well-known makes providing for the chauffeur's seat on the left. This feature is extremely confusing to an operator who undertakes to manage carriages belonging to both these classes, as he is forced to change the hand with which he is accustomed to operate the clutch levers, and in case of lever steering machines the hand with which he steers as well.

A man can operate an automobile successfully when seated upon the side intended for him, no matter which it may be, but it seems ridiculous that it should not be decided once for all which side is to be the accepted one. If some organization possessing prestige could make a recommendation upon this point alone a beginning would have been made.

It might be that when this point came to be authoritatively passed upon the general tendency toward driving on the right would be disregarded and the left side standardized on the ground that, the left being the side presented toward the majority of other vehicles on the road, the operator would be able to have an unobstructed view of all carriages met, in the interest of safe driving.

After either the left or right side is definitely approved as the operator's position it would be natural to make recommendations as to the position of the clutch levers in order to settle, once for all, which hand is to be generally employed for gear shifting in approved vehicles. If the left side should be approved for the operator, it might be natural to recommend that the gear changing lever or levers be placed upon the extreme left side of the carriage in position to be conveniently manipulated by the left hand of the operator, thus never requiring him to remove his right hand from the steering mechanism, where strength and dexterity are most required.

It would seem that there would be little difficulty involved in effecting a standardization of the method of throttle control, as the established American manufacturers seem mostly in favor of the foot button, operated by the right foot, a downward pressure upon which speeds the motor and which returns to the minimum speed position upon the withdrawal of the foot.

As to standardizing spark control, it is believed that this will be unnecessary, if not inadvisable, as the regulation of the spark is not a function vital to the safe operation of an automobile; and further, the crude methods of manual spark timing are almost sure to be superseded by automatic spark control actuated by a governor.

As to brakes, it is conceivable that the recommendation adopted might embody such an idea as this:

The brake customarily used in the control of the vehicle should be operated by a pedal convenient to the right foot of the operator and act directly upon the rear axle. It should by its operation absolutely disconnect the motive power.

The right foot is specified advisedly, so that the throttle and brake cannot be operated at the same time.

It might not be necessary to specify in regard to the emergency brake further than that it must be absolutely independent of the ordinary brake.

The gear changing devices, as has been remarked elsewhere, offer the greatest difficulties to attempted standardization. While there seems to be a strong tendency toward securing the gear changes by the sliding of gears, there are so many of the best carriages which still employ separate clutches that it might prove premature to proceed upon the assumption that the sliding pinion or Panhard system is to prove the practice finally to be adopted. If only the Panhard system is taken into account it would not be difficult to standardize it, as it would only be necessary to prescribe the relative position of the clutch and gear changing levers and to specify the order in which the different speeds shall follow each other in a specified direction of motion of the gear lever, and that the two levers shall mutually interlock.

With the separate clutch system the variation in method is so great that standard-

ization might not be able to go very far. Possibly it might be found practicable to recommend that all speeds shall be obtained by the motion of a single lever, and that its different positions shall give speeds in the same order as adopted for the standard in the sliding pinion system.

Perhaps the standardizing body might have to rest content for the present with separate recommendations covering these two classes of gear control mechanism, with the idea of later ruling in favor of one or the other.

At any rate, it will probably be found, when standardization is attempted, that something of genuine value can be accomplished without anyone's interests being hurt.

Working Drawings of a Steam Carriage.

By T. Hyler White.

Part XX.

The two levers, Figs. 146 and 147, described in the last chapter, are keyed on to the steering pivots in the position given in Fig. 148. In this view the levers and steering arms are shown as they would appear to anyone looking over the dashboard at the axle below, the connecting rod which couples the levers together being in front of the axle. The forward arms of the levers are set 10° out of square—that is, at an angle of 80° to the front hub spindles. The keyways in the coned ends of the steering pivots are marked out from the keyways already cut in the levers. The levers require very careful setting to place before marking out the keyways in the pivots.

One method of doing this is to block up the pivots on the marking out table, setting them parallel to it by the aid of the level gauge and centres drilled in them. The hub spindles are to be vertical. Next a piece of sheet metal (zinc or tin) is to be cut with one side at an angle of 10° to the other. This is applied to the hub spindle by one edge, and to a square standing on the table by the other. Thus we shall have the spindle at 80° to the table. With the level gauge a line representing the centre line of the key bed can now be marked on the coned end of the spindle. In Fig. 148 the sheet metal gauge is shown applied to the left-hand pivot by dotted lines. Now set the levers carefully to the lines just scribed and mark out the keyways. The keys are to be made of steel, and should be ⅜ inch square by 1¼ inches long. They are let into the spindles deep enough to correspond with the dimensions given for the keyways in Figs. 146 and 147. There should be ⅛ inch of the cone surface beyond each extremity of the keys. A method of cutting these keys ways was given when describing the keys for the balance gear wheels. Nothing but perfect fitting will do for these keys, as, if there is only a trace of slackness, in a very short time this will develop into a serious amount.

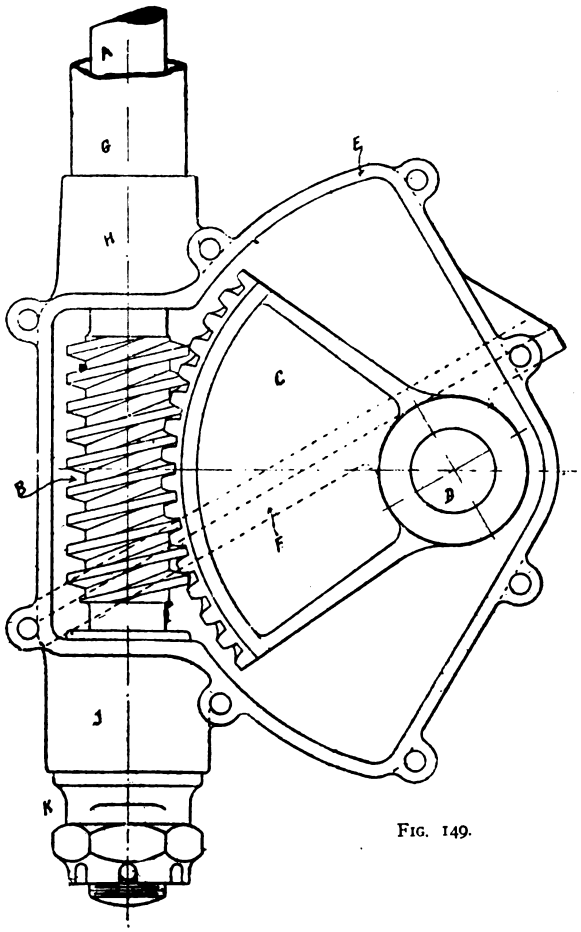


Fig. 149.

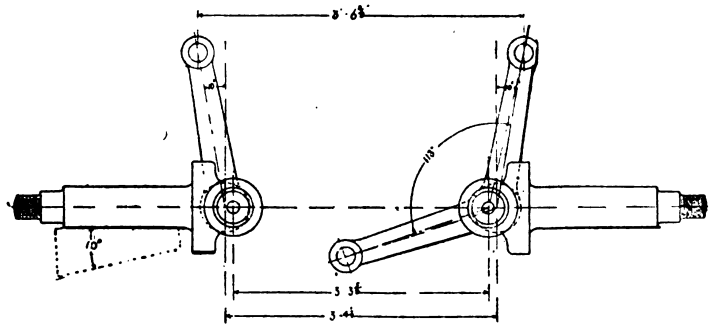


Fig. 148.

In the earlier forms of motor vehicles the steering gear was usually direct—that is, no reducing gear was interposed between the hand wheel or lever and the road wheels. A notable exception was the Benz vehicles. These had a small pinion gearing into two racks, and the steering was remarkably easy to control. The Bollée tricycle, with a pinion and one rack, was also very easily handled. The old style of tiller steering, with direct connected levers, was very tiring to the wrist and arm of the driver, and for fast running was dangerous unless in the hands of an expert driver.

Modern carriages, whether large or small, are fitted with some form of reduction gearing which not only gives the driver a big mechanical advantage in steering, but also prevents the roughness of the road from deflecting the wheels and reacting on the helm. The best form of gear to employ is that shown in Fig. 149. The

steering column A has formed on it at its lower end the double threaded worm B. This gears into the worm wheel segment C, which is keyed on the shaft D. This shaft is carried in bearings in the gear box E, which is bolted to the frame of the carriage by the flange or foot F. The shaft D projects from the bearing on one side of the gear box far enough to receive the boss of a lever, whose lower end is connected to the double lever, Fig. 146. The steel tube G, forming the steering post, is brazed into the boss H on the gear box, and carries at its upper end a ball thrust bearing. The boss J is bushed to form a bearing, and also acts as an abutment for the belt thrust bearing K, carried on the lower end of the steering column. It will be seen that this gear is very powerful and is non-reversible. Hence, no matter how rough the road or how deep the ruts the steering wheels get into, no strain will be communicated to the driver. By using a double-threaded worm, the gear is made more rapid in action without sacrificing too much power. As is well known, worm gear involves a considerable amount of end thrust, and it is to meet this that ball bearings are introduced; but they are not absolutely essential, and may be omitted and plain thrust washers substituted. The ball bearings will make the gear much easier to operate, and should be used if a first-class job is to be made of the carriage.

With regard to the actual manufacture of the worm gearing, the steel worm itself can be cut on a screw cutting lathe; but the wheel segment will have to be gashed on a gear cutting machine, and have the teeth finished with a hob. A hob is practically a duplicate of the worm, with grooves cut across the threads similar to a screw tap. This, when revolved in contact with the wheel segment, cuts the teeth to the correct form.

Patterns and Core Boxes for the Hyler White Steam Engine.

By W. O. Anthony.

Part II.

Following the order of parts as outlined in the article already published, we come next to the top and bottom cylinder and valve chest covers. One pattern, if made with removable bosses, will answer for both top and bottom covers in each case.

We will first make the top cylinder cover shown by Fig. 9, page 419. It is to be machined all over, so allowance must be made in every dimension. Since malleable iron is recommended, not so much allowance is necessary for machining. Where with cast iron we would allow 3-32 inch to ⅛ inch upon each surface, probably 1-16 inch will be found sufficient with a malleable casting, as the scale is not so hard nor so deep on malleable as on cast iron. We will assume that the pattern will be made accurate enough, so that 1-16 inch on each face or ⅛ inch on the thickness and diameter will suffice for machining.

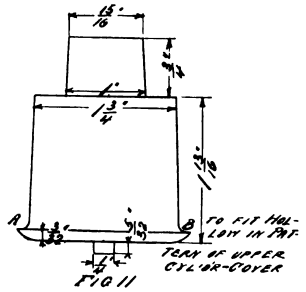


FIG 11

Now take a piece of ¾-inch stuff 5 inches square. Plane one side quite smooth and true. Find its centre by means of intersecting diagonals. If a perfectly true screw chuck for the wood lathe is available, screw the planed piece firmly upon it, having the planed side next the plate. Turn the part which enters into the cylinder end first, to 2 9-16 inches diameter and 5-16 inch thick. Now turn the portion next the plate to 4⅜ inches diameter for its whole thickness. These two edges should be given very slight draft, so that the whole pattern will be in the drag—that is, have the larger diameters on the sides toward the lathe plate or screw chuck. Sandpaper and remove from the chuck and reverse, running back on the screw in the same hole as at first. If the screw chuck is perfectly true this will insure good work. If not, then a hole must be bored in a block upon it, to take the projecting piece upon our pattern very snugly, and turn the remainder by this. Face back the outer side in its new position to 11-16 inch from the plate. Now turn out the dish-shaped portion as shown, making its largest diameter about 2 3-16 inches, which will allow of its finishing as shown. The bottom of this hollow part should be 5-16 inch below the outer surface surrounding it. Sandpapering completes the lathe work upon the upper cylinder cover.

To lay off the portions of the edges to be removed, draw a line through the centre of the pattern entirely across it. Measure off from one side of this line and at right angles to it 1 19-32 inches, and upon the other side 1 13-16 inches. Through these points draw lines parallel to the first line. Saw away the outside portions and plane with slight draft, in the same direction as the draft upon the turned part. This completes the upper cylinder cover.

Since the lower cylinder cover is to have the stuffing box cast upon it, we may take the pattern just completed and drill a ¼-inch hole squarely through the centre. Take a piece of pine 4 inches long by 1⅞ or 2 inches square. Centre the ends and mount in the lathe between centres. Turn this piece to the shape and dimensions shown in our Fig. 11. The bottom part A B in this figure is turned to fit nicely into the hollow portion of our pattern.

The print portion must be given draft about as shown, to facilitate setting the core. The body of this piece must be given very slight draft.

A print for the under side is now required. This is tapered like the larger print and is of about the same length, ¾ inch. It has a dowel pin of ¼-inch diameter by 5-32 inch long turned upon its under side, as shown by Fig. 12. This dowel should be a snug fit to the ¼-inch hole, while the upper one should be just loose enough so the piece will drop off by its own weight.

The diameter of this smaller print is, as shown by Fig. 12, 11-16 inch at its larger end, where it joins the pattern. The dotted lines in this figure show the shape of

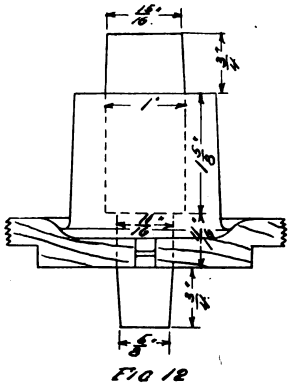


FIG 12

the core and its dimensions. After turning and sandpapering these two print pieces, we may proceed with the core box. This is best made up of four pieces glued together. Take a piece of ¾-inch stuff 4 or 5 inches long by 1 inch wide. Plane one edge very straight and true and exactly square with its sides. Treat a piece of 1 inch by 1⅝ inches stuff 2 or 3 inches long in the same manner. Also a piece of 11-16-inch stuff of the same length and width. Now indicate the centre of the length upon the planed side of each piece at one of its edges. With these points as centres describe semicircles upon the sides, of the following diameters: For the 1⅝-inch piece, 1 inch diameter; for the 11-16-inch piece, 11-16 inch diameter; and on one ¾-inch piece (the long piece having been sawed in two) describe a semicircle 1 inch in diameter upon one side and squaring across the edge through its centre, using this point upon the other edge as a centre, a semicircle of 15-16 inch diameter. Do the same with the other ¾-inch piece, only make one semicircle 11-16 inch in diameter and the other ⅝ inch in diameter. Connect the ends of these semicircles by lines and use these as guides in setting the saw table for sawing out. The other two pieces are sawed out square. Use a very sharp and well tightened saw and do not crowd the work into it.

These four pieces are now to be assembled, as shown in Fig. 13. They should be

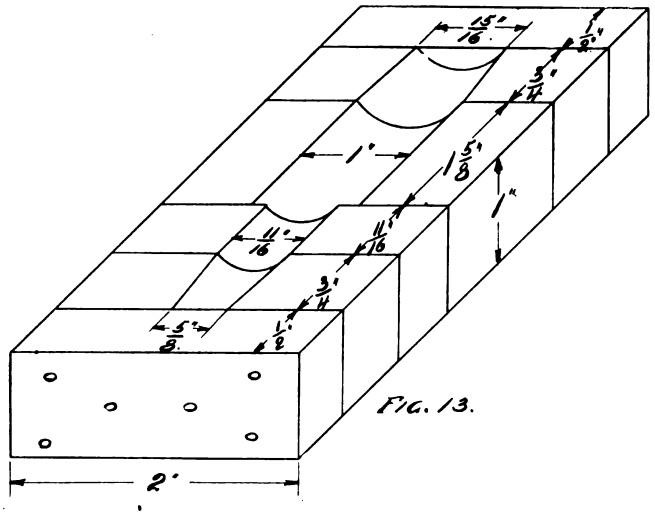


FIG. 13.

laid with the sawed or open edges down upon a plane surface and pressed firmly together while the glue is fresh. If lines are squared from the centre of each semicircle before sawing, down one side and across the opposite edge, these lines may be used as guides in correctly locating the pieces when assembling.

In Fig. 13 end strips ½ inch thick are shown, nailed to the ends of the glued-up blocks. After sawing through the whole piece, thus truing up the side as shown, pieces ½ inch or ⅝ inch thick should be glued and nailed over them, thus binding together the ends of the blocks securely. Only one such half box is necessary, as the molders will make two such pieces in sand and paste them together.

For the valve chest covers two patterns had best be made. Taking the upper one first, a piece 1 1-16 inches thick is cut, 4 inches square. The centre is located and the block is run upon the screw chuck. The boss for the exhaust pipe is first turned. Like the cylinder covers, these are to be machined all over. Allowances must therefore be made for this. Turn this boss to 1⅝ inches diameter and 9-16 inch long, giving it slight draft and making a neat fillet where it joins the other part of the pattern. The upper side is to be faced off quite true and the outside edge turned to 3½ inches diameter, giving it draft in the same direction as the boss. There is no real need of a dry sand core for the exhaust pipe opening, as a green sand core will do as well and dispense with prints on a core box. Therefore, after turning the outside edge, with a narrow chisel, say ⅛ inch, bore a taper hole of ⅞ inch diameter at the outside end and having a fair amount of draft. This will sever the pattern from the screw chuck.

Now turn a wooden mandrel between centres having the same taper as this hole, and force the pattern upon it, leaving the edge of the pattern 11-32 inch thick; square down into it to 1¾ inches diameter for 3-32 inch in width. Follow this cut down to the mandrel. This little projection forms the guide which enters the valve chest and must be given draft in the opposite direction from the rest of the pattern. Draw a line across the centre of this hole on the back and clear across the pattern. Lay off a point at right angles to this line and 1 5-32 inches from it. Through this point draw a line parallel to the first line. Saw off the small part and plane with slight draft in the same direction as the exhaust boss.

For the lower valve chest cover take a piece ½ inch thick by 4 inches square. Put upon the screw chuck and turn to 3½ inches diameter and 13-32 inch thick. Give it a slight amount of draft. Remove from the chuck and drill a ¼-inch hole through the screw hole. Now take a piece 3 inches long by 1¾ inches square, centre the ends and mount between centres. Turn to the shape and dimensions shown in Fig. 14, which shows the pattern complete, without the piece removed from one side. The shape and size of the core are also shown here.

It will be noted that this pattern is made of four pieces; the upper print and the stuffing box boss one piece, the flange in another, and the lower print and the guide piece, which are glued and nailed to the other two. A guide or dowel pin ¼ inch in diameter is turned upon the upper piece, simply to centre it readily in the ¼-inch hole. The thin flange at the bottom may be sawed from ⅛-inch stuff to the given diameter, giving it a little draft, and the print, with its ¼-inch dowel pin extending through this piece and ¼ inch or 5-16 inch beyond, is glued to it.

At a point 1 5-32 inches from the centre of the main flange piece draw a line parallel to a line through the centre, and at right angles to the radius to this point. Saw off here as in the other pieces,

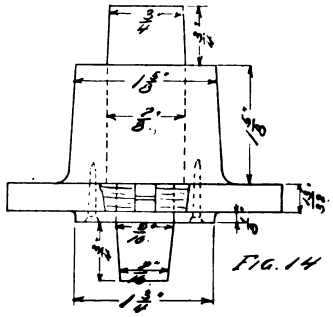


FIG. 14.

giving the edge draft in the same direction as the stuffing box boss. The core box for this piece is identical with the box for the lower cylinder cover, except as regards dimensions, and these may be obtained from Fig. 14; so a repetition of this process is hardly necessary.

The stuffing boxes and lock nuts now demand attention. It is stated that these are to be machined all over, so provision must be made for this in our patterns. The writer would very strongly advise, however—unless the lathe is provided with an index head or some other form of spacing or gear cutting attachment, or unless some machine for just this class of work is available—that the spanner slots be cut out in the patterns. This can be very nicely done upon the scroll saw and will leave only the least amount of filing to simply remove the roughness and square out the corners. Of course, a little more care will be necessary in chucking, and the castings should be trued diametrically by the bottoms of the slots.

It is hardly necessary to make core boxes for these boxes. A green sand core will work all right, if the centre bore at the inner end is machined and not cast. This is easily done, and on the whole a green sand core is best. Take a block 1⅜ inches thick and 2½ inches square. Centre and run upon the screw chuck. Turn to the shape and dimensions shown in Fig. 15, giving draft upon every part in the same direction. The ⅜-inch hole in the bottom will have to be sawed out or drilled after removing from the chuck. The advantage of casting this hole is rather doubtful. After facing across the inside of the casting, a drill may be readily started and run through true for this short distance. On the other hand, this opening, when casting, forms a vent for the gases formed during casting and tends to make a cleaner casting, free from blowholes. The builder may use his own discretion in this respect.

Upon the outer edge of the large end, which is 2¼ inches in diameter, space off with dividers points 1⅛ inches apart. Bisect the distance between any two points and space from here around the edge again. This will divide the edge into twelve equal parts. Describe a circle 2 inches in diameter within and concentric with the outer edge. Mark off points 3-16

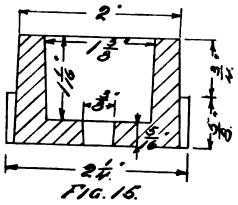


FIG. 15.

inch from those already made all the way around the edge, and draw lines from these in to the inner circle. The spaces inclosed by these lines represent the notches in the box. Saw these out, giving slight draft. Finish up smoothly and then this pattern may be shellacked.

The stuffing box for the valve chests is identical in all but dimensions, and is made in the same way, to the dimensions given in Fig. 16. The 3/8-inch hole in the bottom of this box would be too small, if cast, to be of much benefit, and had best be drilled from the solid. The patterns for the lock nuts are best turned from 3/8-inch stuff upon the screw chuck to the dimensions given in Fig. 17, which shows both the cylinder and valve chest nuts. The spacing and sawing of the notches is the same as for the caps of the two stuffing boxes. The holes in the centres of the lock nuts are cut out, after turning the edges in the lathe with a narrow chisel, and this releases them from the chuck. It will be obvious that where work is thus cut through to the plate of the chuck, some protection upon the latter is necessary to prevent ruining the tool. For this purpose a round piece of wood, say 1/2 inch or 5/8 inch thick, may be screwed on the plate and faced off from time to time, as the surface becomes roughed or cut up.

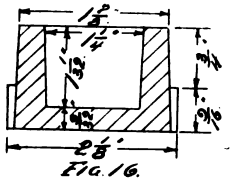


FIG. 16.

The glands and bushings are to be made from cast rod. This is carried in stock in all sizes by most foundries, so a pattern is unnecessary.

The piston pattern is next in order. As shown, the piston is made in identical halves, so that one pattern answers for both. This being of cast iron, a little more allowance is to be made for machining, for in working cast iron it is very important that the first or roughing cut should keep the tool well under the hard scale, or it will dull continually and require eternal sharpening.

Take a piece 5/8-inch thick and 3 inches square. Centre and run upon the screw chuck. Face off 1-32 inch from the surface and turn to 2 9-16 inches diameter. Now at 3/4 inch from the chuck turn down to 2 1/4 inches diameter the rest of the way, giving a very little draft.

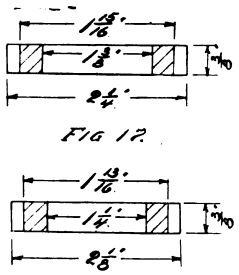


FIG 17.

The annular recess is now to be turned out. There being no machine work to this piece, it will be made the finished size in the pattern, or 1 11-16 inches in diameter for the outside, 7/8 inch for the inside and 3/8 inch deep. This depth is figured for the removal of 1/8 inch from the inner joint in the casting and in machining the balance this edge should be worked from. The walls of this annular recess must have draft, though it may be very slight, and the corners should be nicely rounded.

For the piston ring bushing a pattern built up from segments is the only one that can be recommended. The writer will describe his own method of making these bushings, which has given excellent satisfaction in over two years' continuous use. By this method the bushing may be gripped tightly in the chuck for machining, without springing. Take a piece 1/8 inch thick and 3 inches square. Centre it and describe a circle 2 13-16 inches in diameter. Figuring upon six rings from a bushing, we will saw our segments from 3/8-inch stuff. To get the template from which to work them, describe an arc of a circle 2 13-16 inches in diameter. With the same radius lay off two points in this arc. Now from the same centre describe an arc parallel with the first, having a 13-16-inch radius. From the centre draw lines to the points in the outer arc. Now saw this segment out very carefully, sawing a very little outside the straight end lines. Plane these straight ends upon a shooting board, exactly to the lines drawn.

With this template lay off thirty-five of these segments upon 3/8-inch stuff by means of a sharp pointed scriber, being careful to have the grain run in the length of the segment, leaving a little, about the width of the lines, upon the ends of the segments.

At this point we may as well make a simple "shooting board," as there will be more or less work requiring its use. It is shown in perspective in Fig. 18. It consists of two pieces of board nailed together as shown, and across one end of the upper is nailed a strip, about 1/4 inch thick, not quite flush with the edge A. An iron block plane, very sharp, is well adapted for this work. It is laid with its side upon B.

Place the template used for laying out the segments against the piece C, with its edge just flush and parallel with edge A. While in this position nail a small piece D against the back of the template. Place the segments one after another in this position, running the plane along B, upon its side, until the lines indicating the ends of the segments are just removed. The edge A must be perfectly square to B. Now glue the segments together, six to each layer, having the outside coincident with the 2 13-16-inch circle. The ends should be glued as well as the under side. If necessary, to prevent slipping while clamping, drive 1/2-inch brads into the edges at a slant, two to each segment, leaving the heads project enough so they may be readily withdrawn before turning the pattern. If the 3/8-inch stuff is quite uniform in thickness the layers may be built up thus until six deep without other treatment. Otherwise each layer, after clamping for five minutes or so, should be lightly planed to remove any high places. After the piece has thoroughly dried withdraw the brads and mount upon the screw chuck, depending, however, upon the screw only to centre the piece, and driving in four or five 5/8-inch brads through the 1/8-inch back, near its edge; or, if enough stock is allowed outside the 2 13-16-inch circle, the brads may be driven through this part, and this is probably the better way. Turn at very high speed to the di-

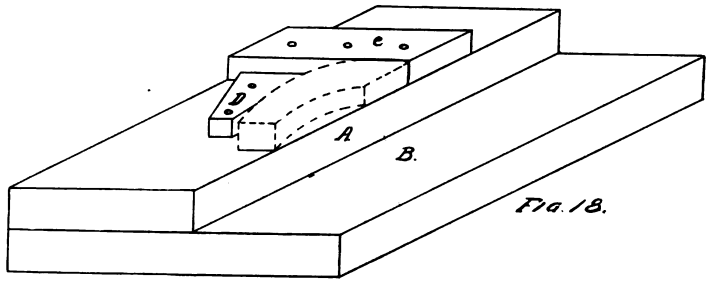


FIG. 18.

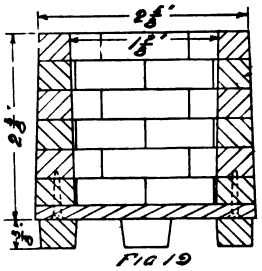


FIG 19

mensions shown in Fig. 19, a section through the centre. It will be understood that the joints between the segments must

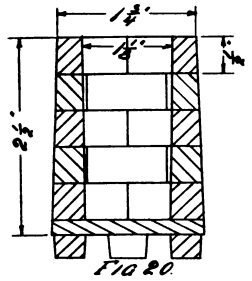


FIG 20.

be broken, as in bricklaying, to secure the requisite strength.

Four lugs for gripping in the chuck are now required. They may be of ⅜-inch stuff, say ½ inch long and ⅜ inch wide. These are shown on the bottom in Fig. 19. If a three-jawed chuck is used, three lugs should be put on.

The pattern for the valve rings is made in the same manner. If we make our bushing for these so we have two rings to spare, it will be too long to work conveniently; so if we desire the extra rings it will be better to have two castings from one bushing, or plan for just the four rings, as they are of generous cross section and not liable to be broken.

This latter alternative will require a bushing of the dimensions given in Fig. 20. Upon so small a bushing, it is hardly necessary to cut six segments to each layer, as three will do if a very sharp tool is used in turning. It may be advisable, even, to turn so small a bushing from the solid with prints, at either end, one print —that at the larger end—being loose. This will allow of molding and casting on end, which is the only way to secure sound castings free from blowholes in this class of work. With this method the stiffening effect of the bottom piece will be lost, but the pattern will hardly suffer thereby, being so small.

Taking the body or central part of the piston valve next, this will have to be molded on its side; or if on end, the sides must be made straight and machined down, or a core box be made for a ring core. The last method makes much extra work, as does the second method, in the machine work; so, all things considered, probably the best way is to make it a split pattern, having a print at either end, which is to be molded and cast upon its side. If properly vented the chances are good for a sound casting. Fig. 21 shows this pattern complete with prints. For this pattern two pieces, each 4 inches long, 1¾ inches wide and ⅞ inch thick, are required. Plane one side of each and glue together with a thickness of newspaper between. Let dry under pressure for an hour. Turn to the sizes given, being careful to give the ends and shoulders a little draft. Drill ¼-inch holes through the prints for dowel pins. Split with a broad chisel blade, fit the pins and shellack.

A core box will probably have to be made for this core, as it is very unlikely that any foundry will have in stock a 27-32-inch core. This may be built up of blocks sawed semi-circular, or a hole of 27-32 inch diameter may be bored with a Forstner bit, or a sharp expansion bit, into the end of a block 3 3-16 inches long, and this sawed in two pieces lengthwise, not quite in the middle, and the larger piece planed down to the centre. Such a comparatively small hole can hardly be sawed on a band saw, and this method is probably the best, all things considered. If a better job is desired in coring out this piece, which is not machined, two of these half boxes should be made and doweled together, so that the core may be rammed solid, the ends being left open; or if you are expert with the bit you may glue or dowel and clamp two blocks together and bore through them both, central with the joint.

A word of caution is in order here. If pieces glued up for split patterns are left too long, when an attempt is made to separate them great pieces of the wood are frequently torn out, as the glue finally

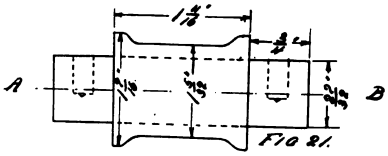


FIG 21.

works entirely through the paper, and at times makes such a joint actually stronger than the wood, if the best glue is used. The writer considers genuine Le Page's glue the proper thing for pattern work.

The ends for the piston valve require but one pattern. This is shown in Fig. 22 in central section, with the core in place in the finished casting. The two vertical dotted lines indicate the 3-16-inch web between the two openings cut in the section, as shown. This pattern is turned between centres to the dimensions shown in this figure. It is given draft in one direction from the print and down to line A B, and the curve at this point, of course, gives back draft; but the molder will part down to this line without trouble.

For the core box for this piece take a piece of ⅞-inch stuff 2½ inches square. Set the saw table at the same angle to the saw blade as that of the sides of the print

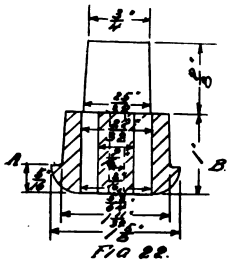


FIG 22.

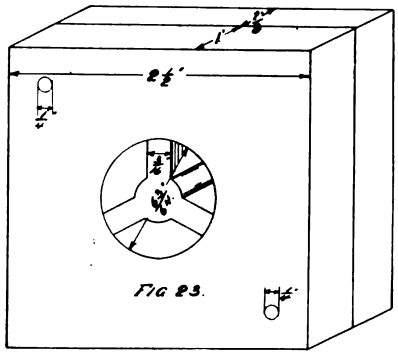


FIG 23.

to its axis. Describe a circle upon one side of the block 2 5-32 inches diameter. Drill down upon this line a very small hole in which to enter the saw blade—a very sharp one, by the way—and saw out the piece, sawing in a direction which will make this the larger opening. It requires some practice and not a little skill to get a true frustum of a cone. Another way would be to mount upon the screw chuck and bore out, using inside calipers frequently to get the correct angle. For the core itself the box will be sawed from 1-inch stuff, and if sawed nicely, with a little draft, the piece forming the 3-16-inch webs or arms may be left solid with the box, which simplifies the work; or the hole may be bored upon the screw chuck, giving it the least bit of draft, not over 1-64 inch. Then the piece forming the arms and central boss may be sawed from 1-inch stuff, its outside diameter being just an easy fit in the hole just bored. It cannot be given draft, except upon the sides of the arms. The outside should be sawed square and 53-64 inch in diameter, so it will slide into the smaller side of the hole. Now place the two blocks together, having the 27-32-inch side of the body portion next the 25-32-inch side of the print portion. Get them exactly concentric, the one with the other, and clamp in this position while two ¼-inch dowel pin holes are drilled through the ⅞-inch pieces into the 1-inch piece and pins fitted not too tight. Fig. 23 shows a perspective view of this box complete, looking at the open side.

The pattern for the bronze crosshead is next in order. As suggested, this pattern is best made of mahogany, this being a soft, easy working wood—that is, if the pattern is to be made in the orthodox manner by whittling or gouging. It is a weakness of the writer, however, to follow the easier and quicker method of sawing upon the scroll saw for such fine work, and in such a case good, soft pine will answer perfectly. This is best made a split pattern and two pieces are gotten out of ⅛-inch stuff 3x2½ inches. Upon one of these lay out the side elevation of the crosshead from Fig. 23 on page 486, adding, however, 1-16 inch to either working edge, which edges are to be machined. Saw this out with a little draft, and mark

from it the other piece, sawing the latter with draft in the opposite direction. Now tack these together temporarily in correct relative positions with two brads. Now turn up between centres two bosses ½ inch long and 1⅜ inches diameter, having a core print upon each ⅝ inch diameter and ⅝ inch long. Having laid off the centre hole upon one side of one of the ⅛-inch pieces, drill a hole, or drive a small brad through both pieces, which will locate the other side correctly. Now describe about these centres circles of a little over 1⅜ inches diameter, to assist in gluing the bosses in their proper position. Glue one upon either side, and when dry drive a couple of ½-inch brads through into them.

Now get out four pieces 5-16 inch thick by 9-16 inch wide and 2½ inches long each. Lay these side by side, flat side down, with the ends in line. Square a line across the centres of the four pieces. Having tacked them down to the bench in this position, drive a ⅝-inch brad through the centre of each and countersink the heads a trifle below the surface; proceed with a sharp plane to work the ends down to a thickness of ¼ inch, tapering from the centre toward either end. Glue these into place, having the flat sides outermost, and flush with the outer working edges of the crosshead. When dry secure by two ½-inch brads in each, driven from the inner sides. The little pieces which form stiffening ribs between these and the wristpin bosses may be cut from ¼-inch stuff ⅜ inch wide and of a shape to fit nicely into the open space and glued into place.

All that remains now is to make and fit the pieces forming the piston rod boss. Glue together, with paper between, two pieces 2 or 3 inches long, 1 inch wide and ½ inch thick. Turn to ⅞ inch diameter at one end and taper to about 1 inch at a distance of about 1 inch from the end. Separate the parts and plane off ⅛ inch from the inner side of each. Allow 1-16 inch to project beyond the ends of the working edges for machining. Where the other end meets the wristpin boss fit it by sawing and glue into place, so that the two ends are in their correct relative positions. Drill a 3-16-inch dowel pin hole through the piston rod boss at one end and the ¼-inch web at the other. Before taking apart, sandpaper the edges, giving them the minimum amount of draft and give the other parts a neatly rounded form, where they meet. Wax up any sharp corners and glue in the dowel pins, after separating the parts. Shellac and this pattern is complete. As most foundries carry in stock ⅝-inch cores, a core box will hardly be needed.

The Automobile Company of America Tangle.

Following the recent dismissal for incompetence of Albert T. Otto and Alexander Fischer, the first business manager and the second superintendent of the Automobile Company of America, a number of attachments have been filed against the company, apparently at the instigation of the former officials, and the sheriff is nominally in possession.

Mr. Beekman, of Philbin, Beekman & Menken, attorneys for the defendants, says: "One of these attachments—for $12,500—was secured by a lawyer named Turner who had acted as counsel for the company under the old management, but had not submitted his claim. Turner also induced a man named West to secure an attachment for $5,000 upon an alleged contract to deliver stock."

On January 23 John H. Flagler and half a dozen other leading stockholders of the company met and voted $100,000, if needed, to see the company through its present difficulties and put it on a solid manufacturing basis. Mr. Flagler states that the recent management, by its incompetence and extravagance, has plunged the company into debt, and brought about the present difficulties, but that the directors have full confidence in their product and in the ability of the present manager. He further said:

"The suits now pending are the legacy of the late management, being for advertising, experimental work, and also in connection with the American Motor Company, whose debts Otto and Fischer are endeavoring to saddle upon the Automobile Company of America."

The suit to set aside the attachments came to a hearing in the Circuit Court at Jersey City on Monday morning, January 27, when a motion was made by Mr. Parker, acting attorney for the Automobile Company of America, to quash the attachment, and this was argued by counsel on both sides, Mr. Parker stating that both claims had no foundation in fact.

Indianapolis Show—A Gravel Pit for Testing Power.

Contracts for the erection of the incline for the Indianapolis automobile show, the third week in February, have been awarded. It will reach from one side of the Cyclorama Building to the dome. It is to be completed within a week and thoroughly tested. Each exhibitor will have his machine sent up the incline.

The show will begin with a grand opening that will be novel. When the doors are thrown open, all of the bells and whistles in the big room will be started. Then all of the gasoline machines will be turned on and their explosions added to the din. One of the late entries is a concern that will send a gasoline engine weighing only 20 pounds.

Work on the gravel pit and other devices to test the powers of the different machines will begin the first week in the month. The pit will have a smooth approach, over which the automobiles will be sent without difficulty, but when they get in the gravel they will sink almost to their hubs. Then will come the test, for it requires great power to pull an automobile out of the "mire" and drive it up the bank that leads out of the pit.

New Repair Shop in Philadelphia.

The Daimler Manufacturing Company, we understand, have established a repair shop in Philadelphia to do the repairs required by the Daimler delivery wagons in use in that city. This shop maintains a sort of emergency wagon subject to the call of its customers. When a wagon out on service gets into trouble the driver telephones to the repair shop, whence the extra is sent out.

This extra carries a mechanic and tools. The disabled wagon is unloaded. The extra wagon delivers the goods. Then, if necessary, the extra hauls the disabled one to the repair shop. Of course, the drivers will go to great pains to avoid the anguish of a tow through the city.

As a further convenience, the user may continue the extra wagon in daily service until the repairs are completed. It is not necessary to explain that for all this a reasonable charge is made, but the great point is that the user has no other trouble than to pay the bill.

Two Nearly Killed by Automobile.

Senator William A. Clark's Panhard automobile ran into the wagon of John Laffan, at Dobbs Ferry, N. Y., last Monday, breaking three of Laffan's ribs and injuring him internally. An old man, who was riding with Laffan, was also thrown out and his shoulder dislocated. Both are reported to be in a serious condition.

The chauffeur is said to have been driving at a fast pace when the collision occurred. The men in the automobile, Julian Faron and Alexander Peterson, escaped injury and were at once placed under arrest. Peterson had charge of the machine. The men had been to Tarrytown and were on their way to New York. Laffan was going south also and a carriage was coming north. The teams were just passing each other, thus occupying the entire roadway, when the automobile came up, going so fast that a collision was unavoidable with one rig or the other.

The men were locked up until H. Frankfort, of Yonkers, went to Dobbs Ferry and furnished bail for them.

It is reported that the Chicago Motor Vehicle Company will soon introduce a number of its gasoline motor stages in the Western metropolis.

Albert T. Otto and Alexander Fischer, formerly managers of the Automobile Company of America, have opened an office at 143 Liberty street, New York, and announce their intention of manufacturing gasoline machines after their own designs.

NEW VEHICLES AND PARTS.

The White Steam Carriage.

A number of articles have been printed in THE HORSELESS AGE on the White steam carriage and on its parts during the past year. But after the Endurance Contest there was a brisk demand for the numbers containing these articles and the supply was exhausted long before the call for them subsided. So we have decided to give in the following a complete description of this carriage, which differs from those of other steam carriage manufacturers in almost every detail.

Fig. 1 is a front view of the new model of this carriage, a side view of which was shown in our issue of January 15.

The special features of the carriage are the running gear construction, the burner, the automatic fuel regulator, the boiler, the automatic feed, the throttle, the control lever arrangement and the brake, and these will be described in succession by the aid of the drawings.

The vehicle is considerably heavier than most steam carriages, weighing with supplies about 1,300 pounds. In the new model the wheel base has been lengthened 6 inches and is now 70 inches. All four wheels are of the same diameter, 28 inches, are of steel spoke construction and shod with 3-inch pneumatic tires.

RUNNING GEAR CONSTRUCTION.

The front and rear axle are composed of tubular arches, the front axle having no straight part as has the usual construction of steam carriage running gear. These arches are joined by two round hickory reach bars, which give the running gear the necessary flexibility. The engine power is transmitted, as usual, to a differential gear sprocket located midway on the rear axle, and the latter is therefore a live axle in two parts, mounted on ball bearings, two arranged close to the wheel hubs and two close to the differential gear, one on either side.

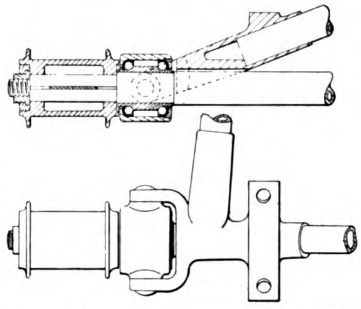


FIG. 2. REAR AXLE AND BEARING CONSTRUCTION.

That the two bearings of the same part of the axle may always remain in alignment, the bearing near the hub of the wheel has a pivot support, as shown in Fig. 2. The rear axle sleeves are provided at their outer ends with fittings forked in the same manner as front axle ends, these fittings serving to support the axle bearings and to fasten the reach bars to. The forks embrace the ball bearing housings and receive the pivots by which these bearings are supported in the arched rear axle. The housing or non-rotating member of the ball bearing, forms a solid part with the rear axle sleeve. One of the cones of the ball bearings is slidable lengthwise on the axle between a shoulder thereon and the hub of the adjacent wheel. When the vehicle passes over a rough road the tubular rear axle arch will straighten out more or less and this would result in a binding of the bearings, if this pivoted support and sliding cone were not provided to prevent it.

THE BURNER.

The burner is of the usual flat cylindrical shape, with air tubes extending through it vertically, expanded into the two heads. The upper head is formed with a series of concentric circular corrugations, the air tubes being arranged so their centres coincide with the centre lines of the depressions and the high ridge of the corrugations being slitted normal to its direction with a large number of fine saw cuts, through which the hydrocarbon gas issues, these slits taking the place of the numerous small drill holes around the air tube in the common form of burner. The air tubes are of ½ inch diameter.

The gasoline arriving from the tank (under air pressure) is led through a vaporizing coil bent into a number of loops in the space between the burner and boiler; then through the auxiliary vaporizer, in series with the former and located over the pilot burner. By this time it is transformed into a gas by the heat of the flame surrounding the two vaporizers, and it now passes through the hand controlled fuel valve, an automatic regulator and an injector into the burner casing, drawing in with it a considerable amount of air owing to the pressure with which it issues. The hand controlled valve can be operated from the seat. The auxiliary vaporizer is heated in the first place by means of a subburner consisting of a little pan, into which some gasoline is let run by opening a valve. When the auxiliary vaporizer is hot enough this burner is turned low and is kept burning continuously, whether the main burner is on or off. The time it takes to get the main burner ready to operate is said to be from three to five minutes.

THE AUTOMATIC FUEL REGULATOR.

The fuel feed is automatically controlled by a thermostatic regulator shown in Fig. 4. This regulator, as shown, includes a tubular casing, which forms the connection between the lowest and the next to the lowest coils in the boiler, so that the steam is always flowing through this casing. At one end the casing is closed by a cap, and at the other end by the head. Within the casing and secured to this head is a tube of copper, which is closed at its outer end, and within which there is a rod of iron or steel. Secured to the head is a casing in which is pivoted a bell crank, against

FRONT VIEW OF THE NEW WHITE MODEL.

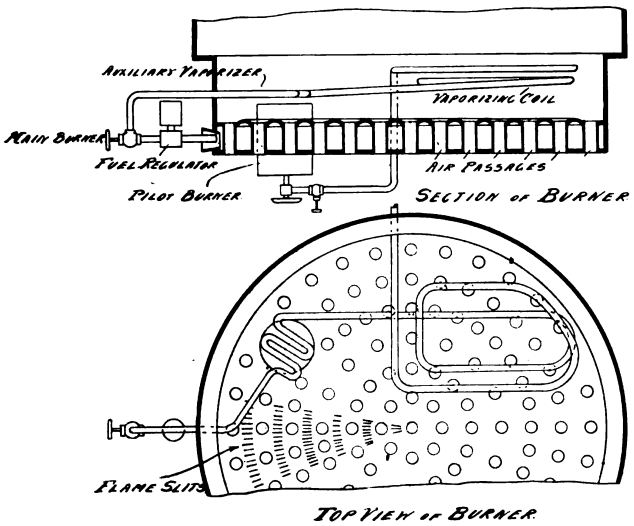


FIG. 3.

which the rod may abut. The casing leads by a tubular opening to the burner, while into this opening is a passage from the casing containing the main needle valve.

Within the tubular opening is a plunger, having a reduced lower end extending below the passage, and adapted to close or vary the opening to the burner, thus constituting a valve for the hydrocarbon. On the upper end of this plunger are adjustable nuts, which form a shoulder bearing on the upper edge of the bell crank, wherefore the bell crank supports this plunger.

When the thermostat is not regulating the fuel the plunger is above the opening, and the hydrocarbon flows to the burner. Now the thermostatic tube being made of copper, a material of relatively high expansibility, and the rod within it of steel, of relatively less expansibility, when the two are heated by the steam the end of the tube will draw back from the bell crank lever more than the rod will expand in length, wherefore the rod will be moved backward from the bell crank lever and the latter will allow the plunger to descend, thereby partly or wholly closing the opening to the burner. This is what takes place when the temperature of the steam reaches a predetermined point, the fuel being gradually turned off as the steam temperature approaches a maximum.

THE BOILER.

The boiler is of the tubular flash type, with forced downward feed. It consists of thirteen vertically superposed horizontal spiral coils of ½-inch seamless copper tubing, with the exception of the lower or superheating coils, which are of steel. These coils are separated from each other vertically by narrow separating pieces, which also prevent a relative displacement of the coils. They are inclosed in a thin sheet iron case covered with asbestos. All the coils are alike and the course of the water or steam is the same in them all—from the inner end to the outer end. The inner and outer ends of all the coils are carried upward vertically and are connected by horizontal pipes in such a manner that the outer or outlet end of each coil communicates with the inner or inlet end of the coil immediately below it. The entire boiler forms, therefore, a single pipe circuit. The heating surface is equal to 30 square feet.

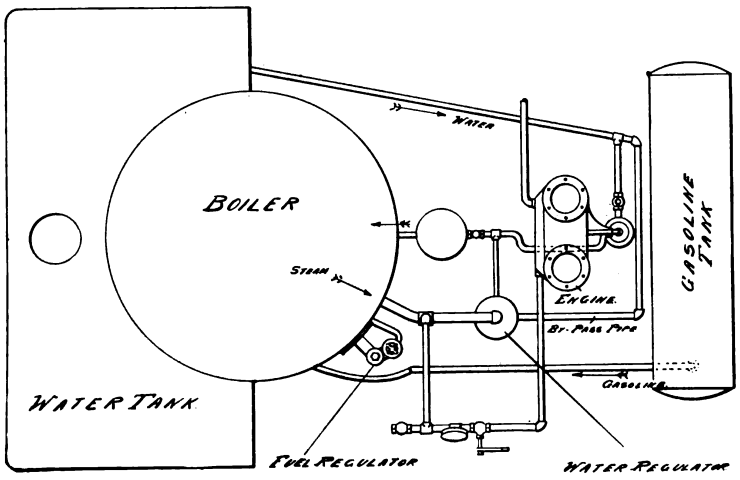


FIG. 4. DIAGRAM OF PIPING.

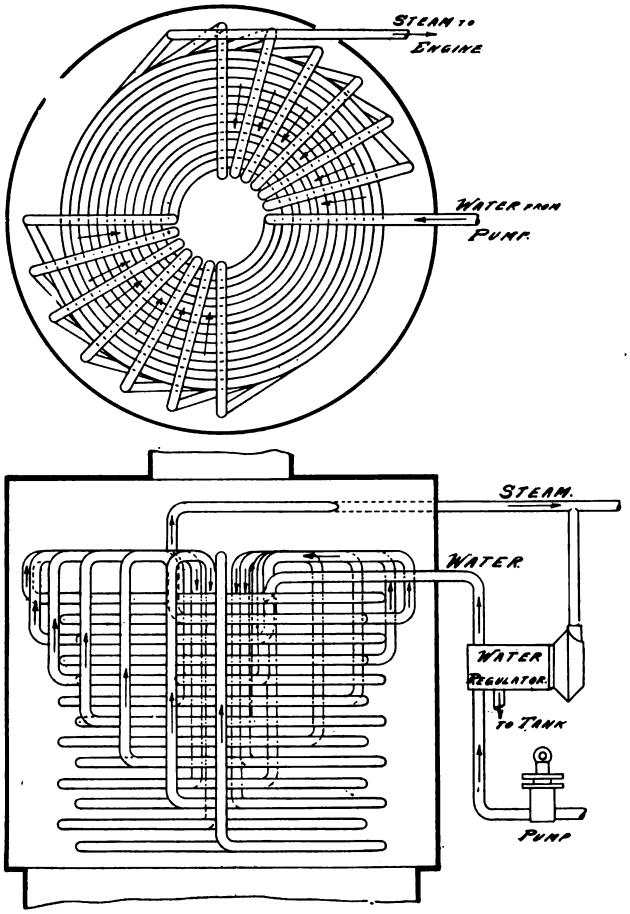
The water circulation in the boiler is maintained by a plunger pump actuated from the crosshead of the engine through a link and lever, and the water is delivered into the inner end of the top coil. After passing through this coil it passes up through one vertical pipe, through the horizontal connecting pipe across the top of the coils, down again and into the second coil. It thus passes through all the coils in succession, until it finally emerges from the outer end of the bottom coil as superheated steam, and is led from there to the engine.

The water is turned into steam at some point in the lower coils, the coils above this point serving for heating the water and the coils below it to superheat the steam. This point is obviously variable and depends upon the conditions under which the boiler is working at that particular moment. It is said that under normal conditions this point is sufficiently high up in the coils to insure the steam being superheated to about 800° Fahr. The boiler is fitted with a steam gauge, but, of course, no water glass.

THE AUTOMATIC FEED REGULATOR.

The feed in the White boiler is regulated by a pressure controlled diaphragm device similar to the fuel regulator in ordinary steam carriages, but by-passing the flow when not required instead of interrupting it as do fuel regulators. When the amount of water in the boiler decreases, the pressure rises and then closes the by-pass valve, when all the water pumped is fed into the boiler. If this should give an excess of water in the boiler the pressure drops and the by-pass opens again. The diaphragm spring is adjusted to keep the boiler pressure normally in the neighborhood of 200 pounds, but the safety valve is set to 500 pounds, which it is said the boiler will safely stand.

Generally there is a little water left in the boiler from the last run, but if this should not be the case a little is pumped in by means of a hand pump operated from the seat. This is done after the main burner has been turned on for some time. The water pumped into the boiler flashes at once into steam and the steam gauge hand will swing violently back and forth over a range of 50 pounds or more, but will presently come to a stop near the 200 pound mark, which is determined by the setting of the water regulator. Whenever the throttle is shut the pressure will immediately increase to 350 pounds or more, but



THE WHITE FLASH BOILER.

will instantly drop again when the throttle is reopened, for the reason that the automatic feed regulator has opened the bypass and no water is fed to the boiler.

THE THROTTLE VALVE.

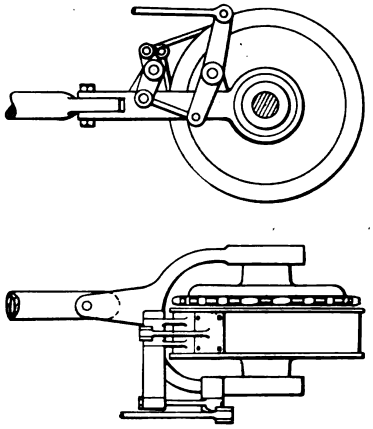
The throttle valve is a hollow casting having an internal tapered valve seat upon which the tapered valve rests. The valve has a downwardly extended stem by which it may be turned. Through the valve extend two elongated holes, the lower openings of which are normally closed by the tapered wall of the valve seat. Two nearly vertical holes extend through the valve seat, with their upper opening of such a section and so located as to coincide exactly with the holes in the valve when the latter is brought to the corresponding position. By means of a crank lever convenient to the operator, a shaft extending vertically downward therefrom, a lever arm at the lower end of this shaft and a link connecting this lever arm to a lever arm on the valve stem, the valve can be rotated on its seat and the openings on the tapered valve surface and the tapered valve seat surface be made to overlap more or less, thus providing a greater or smaller passage for the steam to the engine—in other words, throttling to any desired degree. Crank operation of the throttle valve is, we believe, an original feature of this vehicle.

THE ENGINE.

The engine is the usual two-cylinder, upright, double acting, simple, slide valve construction used by the great majority of steam carriage manufacturers. The cylinders are 3x3 inches, and the rating—6 horse power—is rather above the usual, probably on account of the high pressure and highly superheated steam which it operates on. The slides and crossheads are hardened and ground and lubricated by automatic oil cups. The engine bearings are of the ball anti-friction type (both main bearings and eccentrics), and the reverse is effected by means of a link motion, which is controlled in the following novel manner:

THE REVERSING MECHANISM.

A rock shaft extends transversely about half way through the upper forward part of the vehicle body, journaled in bracket bearings fastened to the body. On a point along the length of this rock shaft, exactly in the centre of the carriage, is fastened to it a lever arm, and the outer end

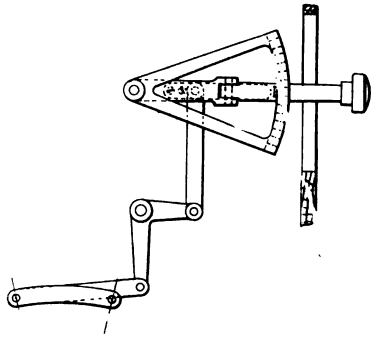


THE BRAKE.

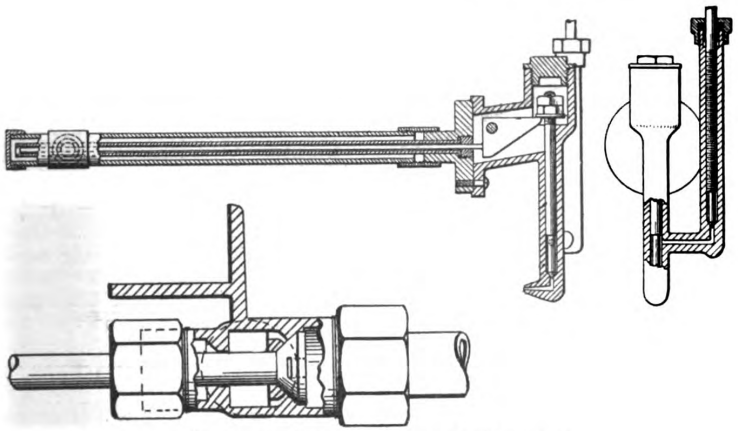
of this lever arm is connected by means of a link to one arm of the usual bell crank pivoted on the engine, the other arm of which connects by a rod to the slotted links of the engine. The rock shaft also carries another lever arm on the opposite end and this lever arm has a handle bar pivotally connected to it at its outer end. This handle bar extends horizontally forward, and a knob at its end projects through a slot in the knee board, as seen in Fig. 1. To the carriage body is attached a quadrant, with notches cut into it in an axial direction. The handle bar is pivoted to swing in a horizontal plane and is pressed by a flat spring behind it into engagement with one of these notches. When it is desired to reverse the engine the spring must first be pressed back to disengage the handle bar from the notch, and then the reversing motion can be made. With this arrangement there is no danger of the engine reversing accidentally, and the reverse lever is out of the way.

THE BRAKE.

A double acting band brake is provided, acting on the differential gear. The two ends of the brake band are connected to the ends of the two arms of a bell crank respectively. This bell crank is fastened to a shaft journaled on the forked strut or chain tightening rod. A double armed lever is also pivoted on this strut, some



THE REVERSING MECHANISM.



AUTOMATIC FUEL REGULATOR AND THROTTLE.

distance to the rear of the bell crank. One arm of the lever is joined by a link to an arm on the bell crank shaft, and the other end has the brake operating rod fastened to it. This brake is applied by means of a pedal.

The gasoline capacity is 8 gallons and the water capacity 20 gallons. The tanks are arranged as usual, as shown in Fig. 9.

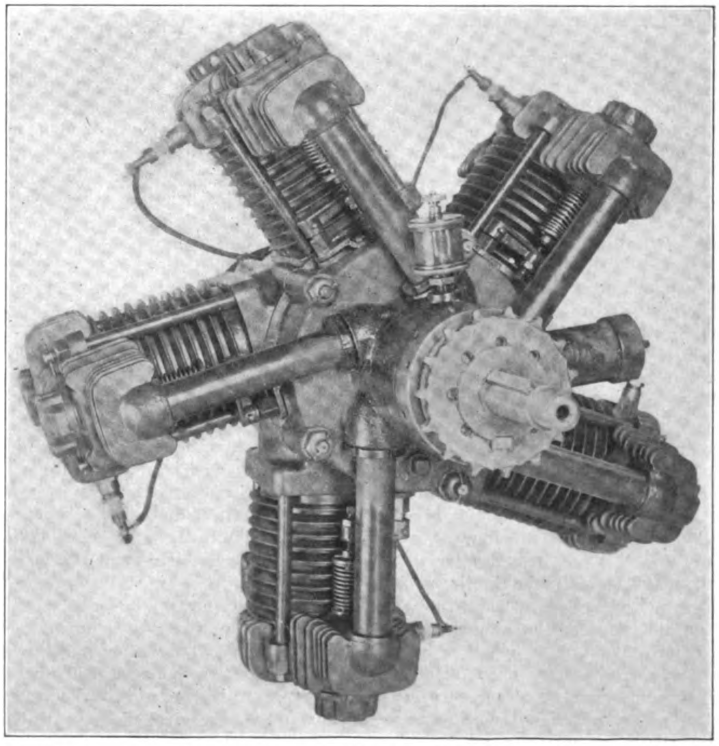
The Balzer Revolving Cylinder Gasoline Motor.

In the Balzer motor, recently perfected, a number of radical departures from current practice may be found in the absence of a flywheel, in the stationary crank shaft, in the rotating cylinders, and in the position of the cylinder axes relatively to the crank shaft. The latter is held in place by the frame of the vehicle by means of a suitable casting, into which the keyed end of the engine shaft fits.

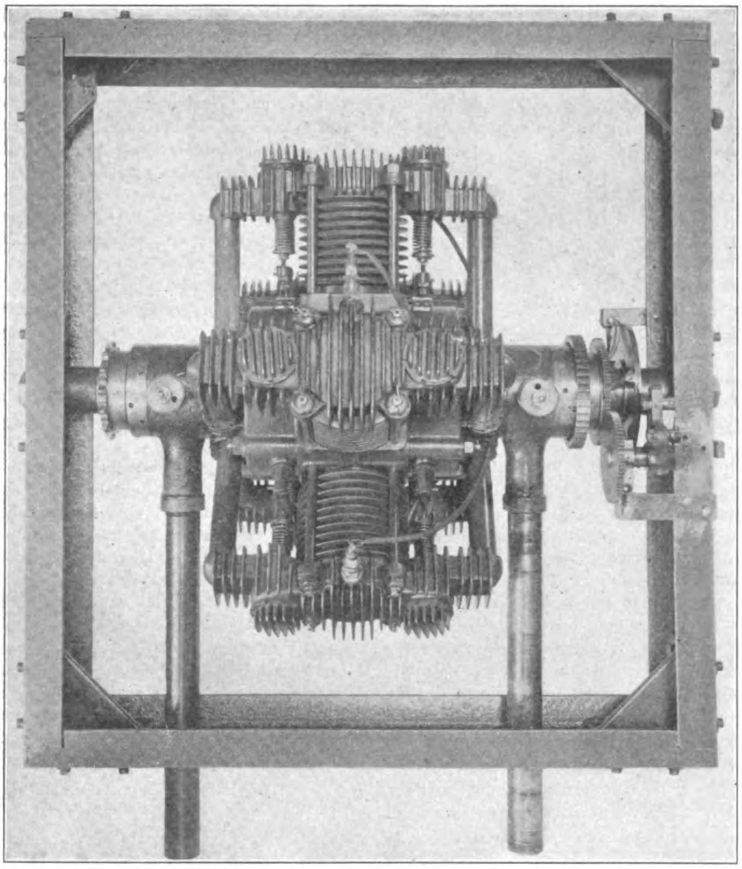
It is obvious that the ports of all the cylinders must have terminal connections in a casting that embraces the cylinder; also that the wires that run to the sparking plugs must be attached to a commutator at their other ends, which in turn is connected to the secondary winding of the coil, inasumch as jump spark ignition is used. Of necessity, the wires that effect communication between the plugs and the commutator are surrounded by metal for the distance of several inches along the shaft and must therefore be properly, i. e., completely insulated in a better way than that generally employed. The Balzer Company has apparently found an insulated wire in the market which is said to give every satisfaction in the way of strength, durability and insulating qualities.

Our illustrations show two views of the five cylinder 10 horse power motor, the largest type built at present, the smaller engine being a three-cylinder prime mover of similar bore and stroke. This motor has a normal speed of 500 revolutions per minute, which speed can, however, be greatly accelerated without exceeding reasonable maximum piston speeds. The axes of the cylinders are not radii drawn from the centre of the crank shaft, but are tangents to an imaginary circle of approximately the same size as the throw of the crank. The shaft has a diameter of 1½ inches at the journals and a crank pin of the same size, and is machined out of a solid forging. The connecting rods are attached to segments that are clamped to the crank pin by suitable caps. There are no wrist pins in the pistons which have suitable sockets into which the balls at the ends of the rods fit, so that slight inaccuracies in alignment, which are found in all engines, are automatically compensated for. Owing to this construction, the pistons may turn in the cylinders, which the manufacturers claim does away with eccentric wear of pistons and cylinders alike. The former have eight piston rings and two bull-rings, each and all of novel construction. The bore of the cylinders is 3½ inches and the stroke is the same. Neither the cylinders nor their heads are water-cooled, but have heat radiating ribs, which are disc-shaped in the case of the cylinders and are located in such a way in connection with the heads as to be parallel with the plane in which all the cylinder axes lie, and thus to afford the free circulation of air between them. The heads are not cast integral with the cylinders, and have posts at opposite sides for the admission of the mixture and the exhaust of spent gases. All the main valves are mechanically operated and are located symmetrically to the cylinders.

The exhaust valves and port connections are on that side of the motor on which the driving sprocket is shown in the cuts. All the individual inlet and exhaust pipes are of 1⅛-inch tubing, and are tapped into the cylinder heads and fitted into their respective bosses in the crank case, where glands and packing keep them in place and prevent leakage. The main valves are of ample size, and are made of nickel steel. There are two stationary cam discs, each with two cams, which operate the valves. The contact breaker, which is attached to the vehicle framework and is driven by spur gears at the same speed with the engine, consists of two cams and all the



THE BALZER REVOLVING CYLINDER MOTOR.



TEN HORSE POWER BALZER MOTOR MOUNTED IN FRAME.

other parts that are used in connection with such devices.

A coil without buzzer transforms the current from a low potential to a high one. The commutator is secured to the revolving sleeve that embraces the shaft, and the driving sprocket is held to a similar sleeve at the opposite end by a number of screws with countersunk heads. A carburetor of simple design, without float and operating parts, furnishes the mixture, which is controllable by a small crank, and which governs the speed of the motor in conjunction with the spark shifter.

In consequence of the relative position of the cylinders to the crank shaft there is little likelihood of "kicking back," even should there be a premature ignition at any time when starting up. Lubrication of all parts is effected by four sight feed cups. Two of them feed into the hollow crank shaft, so that the lubricant flows to the crank pin. Eventually the oil works out on the sides of the connecting rods and drips down. The cylinders revolve and catch the oil drop by drop. This is said to be the only simple and effective way of lubricating the pistons of such an engine as this, the splash system not being adaptable for obvious reasons. The other two oil cups attend to the lubrication of the revolving sleeves, which, surrounding the crank shaft, are cast integral with the crank chamber, and drive the commutator and contact breaker on one side and the sprocket on the other.

The engine weighs about 300 pounds complete, over two-thirds of which revolves in a circle of 23 inches. The over-all length of the shaft is 34 inches.

The Stanley Brothers New Steam Carriage.

BY A. L. CLOUGH.

The new steam carriage manufactured by the Stanley Brothers, of Newton, Mass., embodies some novel and very interesting features. Chief among these is the new boiler, which is of the water tube type, designed to combine perfect safety, high economy and freedom from burnouts. Its chief claim to novelty, however, rests upon its peculiar property of generating highly superheated steam without the usual recourse to intensely heated coils or tubes of short and uncertain life. To accomplish this end a very interesting thermodynamic principle is resorted to.

It is well known that the lack of water economy in steam carriages has proved a considerable drawback to their successful use, and has resulted in a lack of fuel efficiency, an unduly short radius of action, necessarily large pump capacity and a conspicuous exhaust as well as the bother of frequent stops to fill the tank. This lack of water economy is largely attributable to the very large amount of priming or entrained water which is carried over from the boiler to the closely connected engine.

The amount of priming from carriage boilers in hard service is stated to be at times as high as 25 per cent. Not only does this mean the useless expenditure of one-quarter of the water carried, but it results in the throwing away of heat energy equal to the heat contained in this quantity of water at approximately 300° Fahr., and, furthermore, entails the danger of broken pistons or cylinders from the effect of "water hammer."

The Stanley Brothers have bent their energies to the production of a boiler which should produce not only perfectly dry steam but steam with a large degree of superheat, and to accomplish this without the use of any heating surfaces carried at a temperature higher than that corresponding to saturated steam at the gauge pressure.

To effect this end the principle of re-evaporation through expansion has been brought into use. In order to make this clear, conceive of an ordinary boiler having a throttle allowing steam to pass from it into a coil of pipe of considerable length which is located in the water space of the boiler. The other end of this coil is brought out of the boiler and passes to the engine. If the throttle be slightly opened steam will escape from the boiler into the inclosed coil laden with the entrained water due to the ebullition which is taking place, and, if the coil is not closed, expansion of the steam will take place down to a pressure much lower than that of the boiler. With a boiler pressure of 300 pounds the pressure in the coil might fall to 50 pounds. With this large lowering of the pressure, re-evaporation takes place, and the heat which has hitherto existed in the entrained water would be utilized to evaporate a part of it into saturated steam at the lowered pressure. As the steam in the immersed coil, owing to its decreased pressure, is at a much lower temperature than the surrounding water of the boiler, an exchange of heat takes place from the water to the steam in the coil, resulting, if the coil be properly proportioned, not only in the evaporation of what moisture may still remain, but in the superheating of the steam to a temperature about equal to that of saturated steam at 300°. The steam is therefore not only perfectly dry, but possessed of superheat which may be imparted to the expanding vapor in the cylinders, and thus in great measure prevent cylinder condensation.

The boiler of the Stanley Brothers consists of a seamless steel water leg, provided

at top and bottom with T's, into which are brazed the copper circulating pipes. These pipes are wound spirally about the water leg, with their ends connected respectively to the upper and lower T's, and are "staggered" in such a manner as to insure a circuitous path to the hot gases. The distribution of these gases is assisted by baffling plates. The outside of the boiler, just inside the casing, consists of a continuous coil of copper tubing, which is virtually a feed water heater, and which further acts to prevent much of the usual radiation from the exterior of the boiler. Inside the water leg is the expanding and superheating coil already referred to. The water is pumped into the lower end of the feed water heater coil, flows through it and enters the water leg. Circulation and steam generation take place in the circulating pipes and water leg. The throttle is located at the point where steam is taken from the upper end of the water leg, and from the throttle a pipe leads immediately into the water leg and into the superheating coil, the termination of which passes through the hot gases, and thence to the engine. In a recent test of this boiler, supplied with hydrant water at the low temperature at present prevailing, it is stated that 180 pounds were evaporated into intensely superheated steam within the hour.

In the Stanley Brothers boiler no expanded joints are depended upon at any point, and it is claimed that it may be allowed to run dry without the least injury. At the same time no part of the heating surface is required to be maintained at an abnormally high temperature, and thus long life may be predicated. The normal gauge pressure is about 300 pounds and the initial pressure at the engine about 50 pounds.

The engine of this carriage is of considerable interest. It is of a very substantial and rigid construction and still of light weight. Ball bearings, with specially hardened races, are used throughout. The balls are of large size and adjustments are provided on all the cones. Especially interesting is the ball bearing crosshead, which runs on its guides upon a single large steel ball on each side and is yet remarkably rigid. Special attention has been paid to reducing the radiation from cylinder and steam chest. The fit of the pistons in the cylinders appears to be very perfect. In the presence of the writer, the engine was blocked and steam admitted to both cylinders, but there was no leak past the pistons, which are provided with very broad and perfect packing rings. Friction has been very nearly eliminated in this engine, which is of the regular double cylinder type, with Stephenson link motion.

The feed pump which is provided on this carriage is of the crosshead type and of good size, but is capable of a variable throw and may be adjusted in this regard to suit the different classes of roads upon which these carriages happen to be used.

Messrs. Stanley Brothers state that owing to the quality of steam used and other causes the average consumption of water in this carriage does not exceed 40 pounds per hour, and as the water tank holds about 20 gallons a very large radius of action is assured.

The gasoline supply system is the well-known one originated by these inventors, and does not necessitate the carrying of any pressure on the main gasoline tank. A supply of 14 gallons is carried, and a fuel economy of 13 miles per gallon is claimed under average conditions. This is equivalent to a run of 180 miles without refilling.

One feature of note is the method of cylinder lubrication. This is by means of a mechanically forced feed lubricator actuated by a step by step device attached to the engine. The oil tank holds a supply estimated to be sufficient for 1,000 miles of running.

The wheel base of this carriage has been lengthened to 6 feet, and the rear axle has been strengthened by an underrunning truss, which preserves the differential gear mechanism from undue strain. The carriage is intended for two or four passengers, as desired, and weighs 600 pounds.

Lever steering and pedal operated reverse, together with a double acting brake, are features of the controlling mechanism.

The "Beasley Elastic Tire."

The Beasley elastic tire, which is the invention of William F. Beasley, and is placed on the market by the Standard Anti-Friction Equipment Company, of New York city, is a cushion tire of novel construction and is made in suitable sizes and sections to fulfill the requirements of bicycles, horse drawn and motor vehicles of light or heavy construction. A set of 28x2½-inch tires is shown, which it is stated has been used on a light steam carriage for over 4,000 miles. This particular set of tires was made of a low grade of rubber and was worn down to the fabric, but to all appearances could still be used for a short time. With a new tread it ought to give further service. The cuts show the general construction in its most improved form.

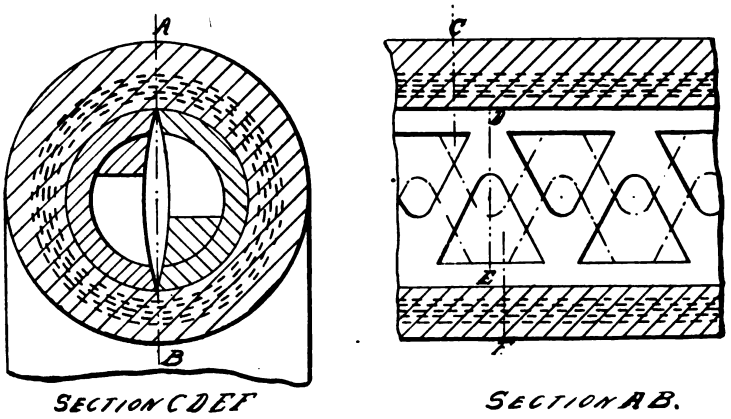
Although the patent covers several modifications of cell tires, this particular design, with its V-shaped ribs, has been adopted by the manufacturers. In a circular issued by the inventor these ribs are termed the "elastic section," and the "principle of construction" is that of the "truss bridge," which is said to give the tire strength, durability, resiliency and to secure the integrity of the rubber used for the elastic section. The "elastic sections" (two of them enter into the construction of a tire) are produced in a suitable circular mold, so that they have no ends. The sections are then set together and wrapped with five or more layers of fabric, according to the size or duty that a tire is to perform, and then the whole is vulcanized. The "elastic sections" do not touch each other and are not vulcanized together, but are held in the proper relative positions by all the material that surrounds them. Wherever the vehicle rests on the tires the rubber is compressed and the "elastic sections" are spread apart. Owing to the fact that radical "transverse walls" are not used, but walls that are secants to the tire, this make of tire is said to be as resilient as is required for automobiles.

In the case of front wheel tires the "elastic sections" or "transverse walls" are located directly opposite each other. Rear wheels are shod with tires in which these walls are staggered, as shown by the dash dotted lines in one of the cuts.

The manufacturers claim that "the most important feature of the Beasley tire is the absolute certainty of transportation which it secures to users of rubber tires. It may and doubtless will be punctured, but nothing short of its total destruction will disable it so that it cannot be used for safe transit."

At present only 28 x 2½-inch and 28x3-inch tires are being manufactured, but a regular line comprising all sizes available for motor vehicles will be produced in the near future.

The Beasley tire is used in rims origi-



THE BEASLEY ELASTIC TIRE.

nally intended for single tube pneumatics. High grade "Para" rubber enters into the manufacture of these tires exclusively, it is claimed.

The "Ajax" Runabout.

The Ajax Motor Vehicle Company, New York city, are placing on the market an electric runabout with a number of patented features. In general appearance it resembles the earlier types of steam carriages, because of the piano box body and the tubular running gear that enter into its construction.

The body rests on an angle-iron frame, to which are bolted the three elliptic springs that suspend the whole. Under the seat, which is 34 inches wide, the batteries are located, so that the steering and driving wheels carry their share of weight. The 1½ horse power motor is hung to the frame and rests on rubber cushions or buffers that compress when the motor begins to revolve and drive the carriage. Another set of cushions prevents jerky action when the motor is reversed. A pinion is keyed to the motor shaft and engages with a large spur gear, which is mounted on the same shaft, to which the driving sprocket is keyed. A second speed reduction is provided by the chain drive, there being a small sprocket on the countershaft and a large one attached to the differential case. Spur gear compensating devices are employed exclusively.

The battery consists of twelve cells, the make of which is optional with the purchaser. At the rate of 14 to 15 miles per hour this machine, it is said, will cover 60 miles on one charge.

The running gear is built up out of extra heavy seamless steel tubes and drop-forged fittings, and the springs are made of oil-tempered steel. The wheels of the suspension type are shod with 28x2½ inch Goodrich single tube pneumatics. The rims are not brazed together, but welded electrically at the ends. Two band brakes are provided, the pedal operated one being on the differential's drum and the other brake actuated by the controller lever, being clamped to a pulley on the motor shaft when the control lever is brought back into its neutral position. Steering is accomplished by operating a lever that is attached to a column on the left side of the body. The operator's left hand grasps the control lever and his right foot rests on the brake pedal, centrally located in the floor of the body.

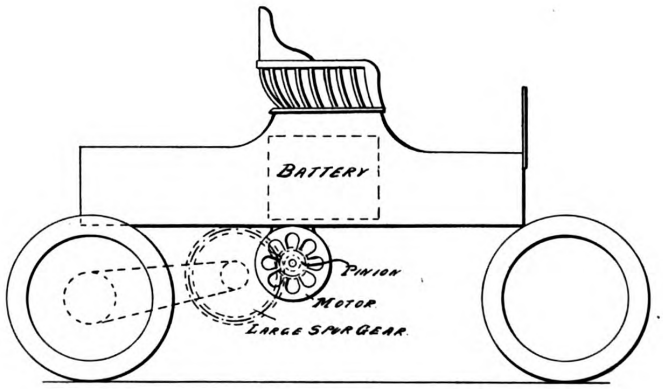
A number of patent applications have been filed, covering various features, such as the controller, the combination control and brake lever, the method of motor suspension, etc.

The Apperson Touring Car.

The Apperson Brothers Automobile Company will manufacture touring vehicles with two sizes of engines—16 and 24 horse power. These engines are fitted with variable lead contact spark ignition and can be run up to 1,200 revolutions per minute. The ignition current is furnished by a magneto. The weight of the vehicle will be 2,250 pounds. It will have a wheel base of 7 feet 2 inches, standard tread, 36-inch wheels, 4-inch clincher tires, wheel steering and tonneau seats to accommodate four if necessary. The front seat will accommodate three if necessary.

The transmission is by a new system of gearing giving three speeds ahead and one reverse, all controlled by a single lever. A single friction clutch is used only. Brakes are placed on each end of the rear axle and also on the differential gear. The axle brake is composed of two brake bands acting independently, one on each end of the axle, so that braking on the differential does not affect the certainty of steering and does not tend to cause skidding. The differential gear is of the spur type.

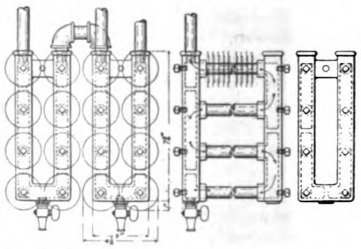
The company expect to turn out one of these machines every two weeks, or about twenty-five per year. The first vehicle will be ready for testing in February. They will also build a standard road machine of 12 to 14 horse power, with engine in front.



THE AJAX MOTOR SUSPENSION.

Bliss-Chester Radiating Coils and Discs.

The Bliss-Chester Company, of 31 Mathewson street, Providence, R. I., manufacture radiating coils for gasoline carriages and the parts of such coils—viz., discs of copper, brass or bronze, seamless copper or brazed brass tubing, brass header castings and nipples, elbows, plugs and drip cocks. Copper discs are recommended for greatest cooling effect. When the discs are round they need not be soldered to the



tube, but when square they should be soldered.

The illustration shows a one-section coil. When the tubes between the headers are 23 inches long this section will cool a 4 horse power engine, it is stated, when a pump is used. For an 8 horse power engine a two-section coil is used, etc.

The New Torbensen Gear.

Torbensen Gear, Incorporated, with temporary offices at 141 Broadway, New York, who succeed the V. V. Torbensen Company, of Newark, N. J., will soon put on the market a new gasoline running gear differing essentially from those in use at the present time. It is especially designed for the gasoline motor, but may be used also to advantage with the electric motor. Unlike running gears now offered—which are practically nothing more than two axles connected by an old-fashioned reach—this gear is built in such a manner that the transmission, variable speed and differential gears, brakes, steering and control form integral parts of the construction itself, thus obviating the necessity of special technical knowledge in mounting, as any suitable motor can be readily attached and connected up, and equipped with a body of whatever style desired. It has no chains and the rear wheels are driven directly from the hubs. The transmission is direct, with no idle gears in motion when running at high speed. All gearing and clutches are inclosed in oil tight casings and no working parts are exposed to dust and dirt.

Automobile Stables.

Edmund C. Stout, of the firm of Hill & Stout, architects, New York, have undertaken a new form of speculative building in the erection of five automobile stables on the lots 168 to 176 East Seventy-fifth street.

...COMMUNICATIONS...

Device for Removing Burnt Gases from Cylinder an Old Idea.

NEW DORCHESTER, Mass., January 27.

Editor HORSELESS AGE:

In a recent issue you illustrated and described the construction of a device for removing all burnt gases from the cylinder after explosion, consisting of a spring pressed auxiliary piston, etc.

It may be of interest to the party who has the device to learn that Dr. Otto used the same thing in 1881, and that Chauvan, in a work on gas motors published in 1890, illustrates and describes the device of Otto. A. W. FOWLER.

Splash Lubrication of Superheated Steam Engines.

CHICAGO, Ill., January 23.

Editor HORSELESS AGE:

I cannot agree with the recommendation of H. G. Chatain to use water in the crank case of a superheated steam engine, to form an emulsion, as this would make a rather unpleasant noise when splashed over the hot cylinder surface, a fact not generally known among steam engineers. This, of course, does not happen where low pressure steam, not superheated—say below 400°—is used. CHAS. F. RUBY.

A Balky Engine—Engine Query.

CLEVELAND, Ohio, January 18.

Editor HORSELESS AGE:

I have operated a gasoline automobile for two and one-half years successfully with no trouble; but a few days ago, when starting the four-cycle engine, it worked as well as ever, at 1,000 revolutions per minute, giving full power. After running a little while it began to slow, miss fire and finally stop. After leaving it stand quiet for a couple of minutes it would start the same way and finish the same way, for at least 100 times. I have examined and had others examine the machine and found everything in good working order. The valves are timed right, springs are good and there are no leaks. The piston and rings are good and there are no hot bearings. The motor is well oiled with good gas engine oil. Sometimes it will run very slowly with the throttle wide open for ten minutes before it stops. There are no premature explosions. The mixture is very good.

The intake works by suction and the exhaust by cam. I have brand new batteries, coil and plugs. One thing I have noticed is that the exhaust pipe gets red hot. I do not know if it did this before. Kindly give your opinion of the trouble through your Communication columns.

What are the correct dimensions of an 8 horse power (actual brake test) gas engine four-cycle bore and stroke, flywheel, intake and exhaust valves, revolutions per minute and weight of flywheel?

CONSTANT READER.

[The fact that the exhaust pipe gets red hot would point to very late ignition or a choked exhaust pipe.

There is no such thing as "the correct" bore, stroke, flywheel, etc., of an engine of a given power.—ED.]

Explosion Motor Query.

MILWAUKEE, January 20.

Editor HORSELESS AGE:

Would you kindly answer the following questions through the columns of your paper?

Would a double cylinder, balanced engine, diameter of cylinder being 6 inches, stroke 8 inches, compression space one-third piston displacement, running at 400 revolutions per minute, develop 25 horse power?

If not, what should the diameter of cylinder be, leaving stroke as above mentioned, to develop the given power?

A SUBSCRIBER.

[Each cylinder will have to develop 12½ horse power, corresponding to $12.5 \times 33{,}000 = 412{,}500$ foot pounds per minute; there occur 200 explosions in it per minute, and the travel of the piston for the 200 working strokes is $200 \times 8 = 1{,}600$ inches, or 133 feet. The mean piston pressure must therefore be

$$\frac{412500}{133} = 3094 \text{ lbs.}$$

The piston has a cross sectional area of $6 \times 6 \times .78 = 28$ square inches, approximately, and the mean pressure per square inch would therefore have to be:

$$\frac{3094}{28} = 110 \text{ lbs.}$$

But it is found in practice that the mean pressure per square inch in gasoline engines is only 70 pounds per square inch, and to develop 25 horse power the piston must therefore have a cross sectional area of

$$\frac{3094}{70} = 44.2 \text{ square inches,}$$

which corresponds to a diameter of

$$\sqrt{\frac{44.2}{.78}} = 7\tfrac{1}{2} \text{ inches, appr.}$$

We would mention that 7½x8 inches is not a very good proportion.—ED.]

Self-Starting Gasoline Engines.

PORTLAND, Me., January 19.

Editor HORSELESS AGE:

When writing my letter of January 5, I overlooked that you referred to the "self-starting motor of the Otto cycle," which, I must admit, looks very reasonable, as far as practical use or economy is concerned, but it would not be a very difficult problem to arrange a motor of the Otto cycle to start itself by adding some complications in the shape of valves and valve gear to be used for starting, which, however, seems undesirable. The present method of starting appears to be quite satisfactory and very simple, which is especially desirable for carriage use.

I note the article on the Brayton cycle in the issue of the 15th inst., and it is evident that the efficiency would be low, as the pressure must be low, and there must be great losses from radiation, and loss of air pressure at the time of admission to the explosion chamber. If the motor now nearly completed is successful, and the patents are all allowed I will give a description of its construction, as it is different in several ways from any known to me.

The introduction of power to propel carriages in everyday practical use has done a great deal to stimulate improvements in power generators, and it is certain to bring about some radical improvements that will be useful and conduce to higher economy in all kinds of power generation, as it is evident that a great many able men are giving their attention to the subject, while mechanics are studying the different problems of economical power generation in the smallest space more than ever.

The writer hopes to be able to bring out a different method of steam generation in the near future, which, unless it is another case of "nothing new under the sun," or a dead failure, should reduce the weight of the boiler one-half at least and add appreciably to the economy. A reduction of one-half in boiler space and an increase in economy of 10 per cent. would, I think, be a most valuable improvement.

H. J. WILLARD.

An Amateur's Motor Cycle.

BROOKLYN, N. Y., January 21.

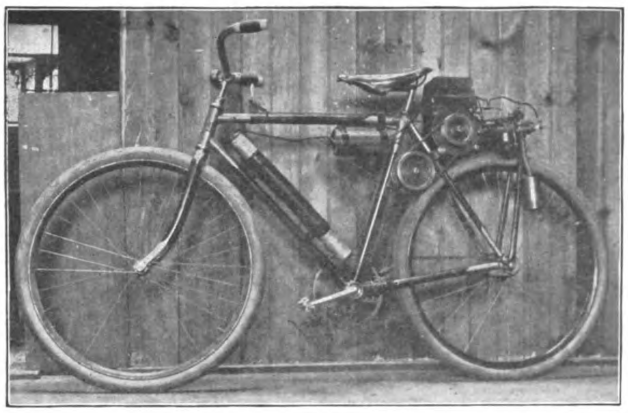
Editor HORSELESS AGE:

I herein inclose a photograph and description of a motor cycle which I built and have used for nearly two years, and I have ridden the same up to date over 2,000 miles with very satisfactory results.

The inclosed photograph shows a regular road wheel with coaster hub brake (weight about 24 pounds), which is equipped with a 1 horse power type B gasoline motor, driving on to the rear tire by a friction wheel; a P. T. automatic gasifier, muffler and spark plug; a Dow three-wire coil and a set of four cells of Excelsior dry batteries, mounted in a pasteboard tube in the lower bar of the frame. The upper gasoline tank, which is mounted over the water tank, holds a little over 2 quarts, which I find sufficient for a run of about 60 miles.

I built the entire motor on a 9-inch Star foot lathe, without the use of any special tools, and I find the castings very simple and easy to machine up.

While my method of driving may seem very crude and is open to criticism, I used



AN AMATEUR'S MOTOR BICYCLE.

the same to obtain a simple, flexible drive without making any changes or alterations in the bicycle in any way.

The friction wheel is pivoted on the clamps that support the motor on the rear stays, and it is held against the tire by a helical spring, the other end of which is fastened to a clamp around the bottom bracket. A lever on the top bar with a Bowden wire serves to bring it against and to draw it away from the tire. The friction wheel has also a little lateral play to permit a good bearing on the tire if the wheel or tire is not true. A 5-inch flanged pulley, driven by a 1-inch flat belt, connects the friction wheel to a similar wheel on the motor shaft.

The motor is controlled entirely by a single lever, the vaporizer or gasifier being automatic, requiring no adjustment whatsoever, not even to turn on or off the gasoline. This single lever holds the exhaust valve open, raises or lowers the same, and at the same time gives the circuit breaker a lead or lap, and thus regulates the speed. It also turns on and off the electric current at the proper time. This feature is, I think, original with me, although I have noticed lately that three makers of motor bicycles claim they are the originators of it.

The machine can be started in two ways —either by pedaling a few feet and then dropping the friction wheel, or by a hand crank on the motor shaft, like all large gasoline automobiles are started. In crowded city streets I find my driving device a great advantage over belt or chain device, as, when I get in a tight place, I raise my friction wheel, let the motor run idle and pedal slowly, and as soon as I see my way clear I drop the friction wheel and away I go.

I can climb a 6 per cent. grade without any slip of the friction wheel, and on a level road the speed of my motor cycle is from 12 to 15 miles per hour. A. P.

Endurance Run Specials, September 11 and 18, 10 cents each.

Affiliation Plans.

BROOKLYN, N. Y., January 23.

Editor HORSELESS AGE:

As a subscriber to and interested reader of your valued publication I have been greatly entertained in watching the workings of your editorial brain, as variously demonstrated in these columns, on the matter of the proposed affiliation of the automobile clubs of the country.

When the A. C. of A. first put forth its decidedly un-American scheme, you took it up at once for favorable comment. Later, when some small opposition was voiced, you declared that the counter propositions (made by the protesting clubs) were unreasonable, and you endeavored to argue yourself into the belief that they were. Again, later, when that opposition became general, you evidently discovered some weaknesses in your former arguments and really admitted that affiliation having as a basis representation might be a good thing. Still, however, there was the mighty question of foreign sanction. Why, pray, should the liberty loving automobilist require foreign sanction or approval? The yachtsman, golfer, tennis player, bicyclist and football player has managed to exist without the stamp of official approval placed on his national organization by France, England or Scotland. Why, then, need the automobilist quail before this terrible spectre raised and shaken by the A. C. of A.?

Foreign touring and racing associations and clubs will only too gladly extend recognition to a truly national association of automobilists. This also should be readily appreciated alike by you and by the powers that be in the A. C. of A. There is no jealousy of the A. C. of A. The clubs of the country are all standing, not on their dignity, but for a strictly American principle, viz., government by representation. Again, the clubs of the country desire the A. C. of A. to take its place at the head, where it should be by right of age, prominence and all those qualities which make it what it is—the premier club of America.

Your conversion to the broad scheme of organization seems to be gradual, but none the less sure, and I, together with many another of your subscribers and readers, will watch with great interest your editorial expression under date of January 29, 1902.

CLUB MEMBER.

[What we have said in favor of the affiliation proposal of the A. C. A. applied to the idea of affiliation generally and could not possibly be construed as an indorsement of the exact terms submitted (which have never been officially communicated to us). Further, we have never declared any proposed modifications of these terms to be unreasonable, and our correspondent probably refers to a passage on page 813, issue of December 18 last, in which the statement is made that the A. C. A. regarded certain proposals as preposterous. As to our idea of what the terms of affiliation should be, we stated on page 3, January 1 issue:

"Democratic institutions must prevail in an amalgamation of this kind, if it is to fulfill its mission and avoid factional disruption."

The counter proposition which we think to be unreasonable is a scheme, widely heralded in the press of the country, to start an organization in the West antagonistic to that proposed by the A. C. A. We believe that, as admitted by our correspondent, the clubs of the country desire the A. C. A. should take its place at the head of the proposed organization, and our correspondent will therefore agree that the ambitions of any other club to take the place should be discouraged.

Otherwise our position is simply this: The organization should be founded upon justice and equal rights to all of the clubs as far as practicable; and the general plan of affiliation should be encouraged in every possible way and not be threatened by stubborn antagonism and jealousies. This has been our standpoint from the beginning and we have not been converted to it. We cannot express a more definite opinion because, as stated, we have no official information of the dealings now on.—ED.]

The Relation Between Manufacturer and Purchaser.

BRIDGEPORT, Conn., January 23.

Editor HORSELESS AGE:

The sentiments you expressed in last week's issue in regard to manufacturers and the purchasing public found an echo in many minds without doubt. The time has passed now when the maker can simply talk of generalities and make vague promises. The automobile public has had experience, some of it sad and all of it instructive, and it wants to know the exact truth about the product under discussion.

Any manufacturer or salesman who says that a machine will not need repairs during a whole season, or can be operated by a little child, will simply get the merry ha-ha

or be treated with distinct coldness. Many manufacturers, I should judge, seem to think that all they have to do is to get rid of their machines, never mind how, but get rid of them. They seem to forget that a satisfied customer is the best advertisement they can have.

The men in the trade who have been frank with their customers, explaining what parts will have to be watched or most often repaired and what possible breaks or disorders may occur, are most likely to win out in the long run.

The public to be attracted to an automobile now demand something more than a drawing of a wagon emanating from the brain of some clever draftsman. For instance, look at the inclosed cut, which is part of a page ad. It is not a photograph of a wagon, for no one would ever think of building one with such springs, reaches, etc. They wouldn't hold up a sulky. F. W. BOLANDE.

Danish Automobile Exhibition.

COPENHAGEN, January, 1902.

Editor HORSELESS AGE:

Referring to a letter addressed to you in November last by the Danish Automobile Club and the Industrial Society of Copenhagen regarding the automobile exposition to be held April 11 to 28, 1902, we take the liberty to herewith inclose a blank to be filled out by prospective exhibitors and would call attention to the fact that applications for space must be made previous to February 1, 1902, and should be addressed "Industrie-foreningen, Copenhagen B." (Not January 15, as stated in our previous letter.)

With regard to the exhibition of automobiles, motors and bicycles organized by a bicycle club of this city together with several merchants, to be held in March of this year, we take this occasion to state (having been requested to do so) that our exhibition is altogether special, entirely reserved to automobiles and automobile accessories and that there will be in its connection no concerts, no lottery or anything of that kind.

No space rent is asked from the exhibitors, nor will they have any other expenses except the cost of transportation and fitting up of their stands, the committee placing at the disposition of the exhibitors its hall, which is specially designed for exhibition purposes, as well as its equipment, and insuring the exhibits against fire risks during the time of the exhibition.

THE JOINT COMMITTEE.

The Question of Automobile Organization.

READING, Pa., January 24.

Editor HORSELESS AGE:

The question of automobile organization is one to be decided on its merits, having in mind the successful future of the industry. A few of us have foreseen for years the coming of this method of locomotion, and foresee to a small extent the many benefits it will confer upon civilization. It is unfortunate, however, that a large proportion of the public do not look so far ahead and therefore oppose the movement, in many ways hindering it by their lack of interest and because of lack of education along these lines. The manufacturer has a financial interest in promoting the industry, but at the present time, and for several years to come, he will be fully occupied by making vehicles, and will therefore allow the users to fight their own battles, and to build their own roads, as it were.

The users, therefore, are the ones to consider in the matter of an organization, and they may be divided into two classes—the club members and the unattached. While it is true that mankind is gregarious and clubs seem to be the outcome of this fact, it is also true that the majority of motor vehicles in use to-day are not found tin the hands of club members. There are less than fifty clubs in the whole United States, and probably their membership does not include one-fourth the users of motor vehicles, so that the clubs cannot, and certainly have not, provided for the needs of users of automobiles. This fact, admitting no argument, should leave no room for discussion as to the value of a national organization of users.

That the numerical, moral, legal and educational support of an organization is of value to each individual user no one denies, and it need not be discussed here. The question therefore narrows itself down to an organization of users sufficiently broad in scope and liberal in cost as to include all users; or an association of clubs including, at most, but 20 to 30 per cent. of the users. Of the possible value of either of the two but little need be said. That organization which includes the most members can, if directed with the same skill and energy, do the most work, and great value may be found in the fact that by protecting the helpless individual unable to protect himself many disagreeable precedents may be avoided, and work done that would not be done were the individual user left to fight his battles alone.

Regarding the possibility of conflict between an affiliation of clubs and the American Motor League, it would seem that there is absolutely no cause for alarm. The objects of the league and the clubs thus far are different, and there is no more reason why a man may not be a member of both than there is why he should not be a member of two social clubs in his own town. The American Motor League has not attempted to push itself before the public until the time seemed ripe for such an organization. That time now having arrived, there is no reason why it should not move forward and do the work not being done by others but contemplated by this organization. The dues are quite small and the benefits to each individual user in the form of insurance against adverse legislation, lawsuits for damages, etc., are many times the amount of the cost.

It is a well-known fact that many people of moderate means are afraid to buy automobiles to-day because of fear of damage suits, too expensive for their means, which might be decided against them in spite of their being blameless and having done all within their ability to prevent damage. A league with a good attorney and a large number of members will do much to remedy this state of affairs, and for this one reason alone, if for no other the American Motor League, with a popular membership and a large number of members, should be encouraged.

CHAS. E. DURYEA.

Self-Acting Clutch—Standardization —Touch and Jump Ignition.

ROME, N. Y., January 24.

Editor HORSELESS AGE:

In your issue of November 27 last "A Crank" states that a young man expounding the points of his gear stated that the clutches needed no adjustment for wear; he seemed to think, and probably with cause, that this was wrong. There is, however, a self-adjusting clutch patented that has been used several years on very heavy work, which has never had any adjustments made, and it is still as good as new. This clutch is soon to be applied to a transmission gear for automobiles in such a way that one lever will answer all the purposes usually requiring two or more levers or a lever and two or more pedals—that is, starting, speed changing and reversing.

In your issue of the 8th inst. Albert L. Clough enters a plea for the standardization of controlling mechanisms, and rightly too. The most taking point (aside from the power) about the steam automobile is the one lever control of starting, speed changing, reversing and stopping. The one lever for starting, speed changing, reversing and stopping will eventually supersede all other methods now in use on gasoline automobiles. Then anyone used to a steam vehicle can get into a gasoline vehicle and be perfectly at ease, as the means of control would be the same as in the other vehicles.

Your editorial in the issue of the 15th inst. on touch and jump spark ignition I have to take exception to, as the book on "Electric Ignition of Gas, Gasoline and Oil Engines," written by me, shows how the hammer break, or touch spark, as you call it, can be made to operate at as high speeds and with as sure ignition as the jump spark can; the said book also anticipates Mr. Clough's article in your last issue on spark control, as means by which the lead of the spark can be controlled by using a governor are shown therein, and the writer used this method of governing the lead of the spark by the rotative speed of the engine several years ago. The governor should be adjusted to give a negative

lead for starting and increase to nearly 45° lead at a speed of 1,500 revolutions per minute. Intermediate speeds will then be right.

The hammer break sparker is more reliable than the jump sparker, and all parts, coil, plug, wiring, etc., are much simpler, easier understood by the novice, and if broken in any way, more easily fixed. When the high tension coil is broken down in the insulation it is usually cheaper to buy a new coil than to try repairing the old one. A properly constructed primary coil should never break down; it needs no condenser and has fewer connections to look after. The writer predicts that before many years the jump spark will be entirely superseded by the hammer break sparkers on engines of all speeds and for all purposes.

HARRY B. MAXWELL.

Spark Control.

NEW YORK, January 24.

Editor HORSELESS AGE:

I have read with a great deal of interest Mr. Clough's article on spark control; but it strikes me that he is wrong in one point, and that is, that automatic control of the sparking position is better than manual control. The main point that leads him to this conclusion is the assumption that the correct position for sparking is determined solely by the speed of the motor. A little reflection will show that this is not the case, but that there is a second factor to be counted on, i. e., the rate of combustion of the charge. This second factor is dependent also on two sub-factors—the quantity of charge, that is, the degree of compression, and the quality or composition of the charge. In other words, the position of the throttle, the quality of the fuel and the state of the atmosphere all act to determine the correct position of the spark for maximum output. It will readily be seen that no practical automatic spark controller can be constructed to take account of all these factors.

For this reason it would seem that a manually operated spark control intelligently handled would give far greater efficiency than an automatic.

While I know that much may be said as to the bother of manipulating an extra controlling device, yet personally I believe that, everything considered, this is more than offset by the extra complication and necessity of cleaning and adjusting such a sensitive piece of mechanism as an automatic spark controller must necessarily be.

HAROLD H. BROWN.

An Engine on the Brayton Principle.

CHICAGO, Ill., January 22.

Editor HORSELESS AGE:

Several recent articles in your paper point out the impracticability of the Brayton engine, but some opinions contained therein are based on misunderstanding.

I have a power outfit constructed on the Brayton principle, and which consists of a combustion tube, provided with air cooling flanges and lined with about 2 inches of refractory material, which forms another tube inside the iron tube. The inside of this inner tube is filled with flaky material, treated with oxides of the rare earths, the same as used in the manufacture of gas mantels. Of course, I compress all the air used for combustion, but do so after it has been carbureted, and with this compressed air I fill a reserve tank, which is connected with the combustion tube. The steam engine continually compresses air in the reserve tank, the amount being automatically regulated by the power required of the engine. A double cylinder, double acting and reversible engine, built specially for highly superheated steam, is used. This engine runs exceedingly well, is very simple, and, although as yet no very accurate economy test has been made, it seems to work even more economically than an Otto cycle engine.

CHAS. F. RUBY.

Explosion Engine Queries.

MORRISTOWN, N. J., January 25.

Editor HORSELESS AGE:

I would like to know how three wires are connected to an electric induction coil. I thought there had to be two primary and two secondary connections.

Why do not manufacturers of motors give the sizes (stroke and diameters of cylinders) of their engines with the revolutions per minute they are expected to make to develop their horse power?

What is a buzzer?

E. LAWS.

[One terminal of both the primary and the secondary coil is frequently grounded—that is, connected to some part of the engine casting. In that case these two terminals are connected to the same binding post on the coil and a single wire leads from this post to the engine.

Manufacturers now, as a rule, give any desired information in regard to cylinder dimensions and speed of their motors, and if anyone does not, we do not know what may be the reason.

A buzzer is a circuit breaker attached to the coil, operated by the magnetism of the core of the coil.—ED.]

Light Motors.

NEW YORK, January 27.

Editor HORSELESS AGE:

In THE HORSELESS AGE of January 15 an item appeared having reference to the production, by French firms, of two gasoline motors weighing respectively 6 pounds and 4 pounds per horse power. There must be many readers of THE HORSELESS AGE besides myself who would consider a description of these motors, if available for publication, most interesting. The distribution of 4 pounds of metal per horse power in such a manner as to produce a gasoline motor that will stand up to its work and give reasonable satisfaction in practical use, must involve methods of construction different from those usually employed. Cannot the Editor give us a sermon on the subject of extremely light motors? It certainly would be extremely interesting, and I am sure would be very much appreciated by THE HORSELESS AGE readers.

I would like to ask if anyone has ever turned out a gasoline motor of the rotary or turbine order, that is, one which would rotate enough to be of any practical use.

HOWARD GREENE.

[The two motors referred to are intended for flying machines, and would not do for the propulsion of automobiles. Also the motors are of comparatively large power; 40 horse power in one case.

Many rotary gasoline motors have been invented and described, but we have never seen one in operation, nor have we ever heard of one in practical use.—ED.]

Automobile Stages Wanted.

DALLAS, Tex., January 22.

Editor HORSELESS AGE:

Can you furnish me with the following information? What companies are furnishing horseless omnibuses or stages, such vehicles as can haul, say, thirty or more passengers? I should like to get in correspondence with the factories making such stages, with a view to organizing a company to operate a mobile stage line here which can compete with street cars. Would like to know in what cities such stages are now being operated and names of the companies.

LEWIS WOOD.

Indianapolis Electric Cab Service.

Four of the new electric cabs of the Indianapolis Transfer Company are equipped and in service. Others will be put on as soon as the batteries can be placed in position. These cabs accommodate only two persons, but two others now in the course of construction by the Woods Motor Vehicle Company, Chicago, will be of the brougham or demi-coach style, and will carry four persons. A charging station is almost completed, in fact far enough along to supply the few cabs now in service. The rates will be the same as the regular carriage rates for theatres and parties, but for pleasure riding the rate will be $1.50 per hour, an advance of 50 cents over the price for horse cabs.

Automobile racing is destined to be one of the coming season's amusements or sports in Indianapolis. The Newby Oval has been secured and the arrangements are being made for a big opening meet on Memorial Day. Chauffeurs from other cities and Cincinnati have consented to contest. The card will probably consist of an event for gasolines and one for steam machines, with a 10-mile speed trial between some of the fast motor cycles to lend zest to the entertainment. It is believed at least twenty-five entries will be had for the event.

LESSONS OF THE ROAD

700 Miles in a Four-Wheeler.

By Chas. E. Duryea.

The mere suggestion of a trip from New York to Buffalo in the Endurance Run so enthused the women folks that much disappointment reigned when it seemed evident that two vehicles could not be gotten ready in time; and this enthusiasm was not abated by the prospect that the run would probably be a race (as it actually became), and therefore not suitable for ladies to seek enjoyment in.

After the entries had closed a four-wheeler was found so nearly finished as to be runable, although without top or mudguards, and a proposal to drive this to New York, accompanied by wife and six year old boy, met instant approval. The starting day was left open subject to the finishing of the vehicle, and each inquiry as to "when" was met by "to-morrow we hope; get ready to start without warning."

When the 12 o'clock whistle blew Thursday noon several men were still working around the vehicle, and in the hope of finishing it they continued to work. The necessary running details were completed, however, and, gathering some material, I decided to finish the job on the road, or wherever convenient, and start after dinner. The short trial trip to my home indicated that the carriage would run, at least. A hasty meal was eaten and before 2 o'clock we were headed southward, toward Philadelphia.

A short stop at the express office, to dispose of our luggage, a slow drive through the city, because of the sprinkled streets, and the long winding climb over the Neversink Mountain began. Here the road rises 200 or 300 feet, in one long gradual ascent, eventually becoming too steep for the trolley cars, which switch back at the White House and continue climbing in another and more easy direction. The mountain rises abruptly on one side and falls abruptly to the railroad and river below on the other. The long winding descent relieved the motor, but tested the brake, while the rough and rutty level stretch of a mile or two at the bottom made a good test for the whole vehicle.

At the Schuylkill we passed through a covered wooden bridge, quite dark inside, and up a short hill beyond. Part way up one sparker quit work, so we turned into a grassy spot and proceeded to fix the trouble. Three or four minutes sufficed for this, and we again proceeded. With the exception of a few short rises, generally quite steep, over the canal or the railroad, the remainder of this road, as far as Pottstown, 19 miles, is fairly level, pleasant, picturesque driving. The hills on either side, the winding river and the stagnant canal, with an occasional sluggish boat, together with two bustling railroads, make an interesting drive. We passed through Birdsboro without stopping and continued on the west side of the river to Douglassville, where we recrossed on another dark wooden bridge.

A good level stretch of toll road led us into Pottstown, the last mile, however, being a dry, dusty, cinder and sand surface several inches deep. We passed straight through without stopping and soon met a surrey drawn by a single horse and loaded with young ladies, who, being more scared than the horse, proceeded to tumble out on both sides, two grasping the horse while the other two hurried to the fence. The horse seemed surprised at this treatment, but showed no fright at the automobile.

PRECAUTIONARY INSPECTION.

A little further under a shady tree we stopped to investigate the condition of the motor and ascertain if the oil cups were properly feeding. Finding everything satisfactory we again wound our way over a good road, somewhat rolling, but without steep hills. Large stone barns, good houses, with well fixed surroundings, marked this portion of the trip. Several smaller places were passed without even inquiring their names, water being secured at a farm house having a handy horse trough.

Near Collegeville a trolley line was being constructed, and the road was a succession of holes, broken rock, loose cinders and other varied assortments. So roughly did the vehicle seem to run that wife was asked regarding the tire on her side. She reported it apparently all right, and so another half mile was driven before a stop was made for investigation. By this time the valve had been torn from the air tube and the tire more or less damaged. Being a double tube it was easily removed, however, the valve stem cemented in place, the offending horseshoe nail extracted and the first hole visible patched. Inflation indicated another, however, so another search was made, until four holes in all had been fixed up—total time, one hour. The permanence of the repair, however, was tested by the fact that this tire ran through to New York and then to Rochester without further trouble. At Collegeville we stopped, inquired our way, got a drink and admired the fish in the watering trough.

We crossed the Perkiomen River and turned to the right toward Germantown, leaving the trolley for Norristown on the left. The road gradually became better, and before dark we found ourselves at the entrance of Fairmount Park. Not seeing a policeman we drove into the park, stopping a little later to light a lamp, and were soon at the lower end, from whence we crossed over to Broad street, where we stopped at an automobile establishment.

"THE IGNOMINIOUS PUSH."

Supper, some business, sleep and breakfast ushered in another day, and 8 o'clock found us winding our way along a crowded street, badly torn up for underground improvements, toward the Camden Ferry. On this we were required to stop our motor, and when we attempted to start again we found the magneto driving shaft disconnected. We were therefore obliged to push off ignominiously, but with the light weight vehicle this was easily done, and a few minutes made the proper connection and saw us on our way.

A long freight passing a grade crossing held us fully fifteen minutes, and before we had left Camden another sparker spring had gone wrong. This looked like a bad beginning, but being a little matter was soon remedied, and a better ending hoped for. We had inquired persistently as to the best way to New York, and been advised to go into New Jersey, because of the bad roads in Pennsylvania. Of two roads running from Camden to Burlington we took the most direct one and headed northeast.

After a few miles we were stopped by a toll keeper, who dilated largely on the bad condition of the road beyond and advised, by all means, that we take a cross road for a mile or two, over to the other road which follows the river. We took his advice and found a good stretch of road to Riverside. Here we were uncertain which way to go, so inquired of two different people: "Is this the way to Burlington?" and were only prevented from asking a third time by wife's query, "How often do you need to ask that?" The road was good, but the direction did not seem quite right. Thinking, however, it would again turn toward the north we continued. Instead of this, however, it continued more toward the south, and, after going nearly down to Moorestown, 8 or 10 miles to the south, we met a colored man driving a heavily loaded team. We seized this opportunity to again inquire, and the puzzled look on his face excited our suspicions, so we stopped. He then asked if we really wanted to know the way to Burlington, explaining that he thought us joking. We assured him that this was our desire and that we would thank him for any information. He then said we were headed exactly the wrong way, and that if we continued we would land back in Camden. We therefore turned around and retraced our tracks to Bridgeboro, where we were delayed by an open draw for some time, during which we took advantage of a convenient pump and water pail to replenish the water tank.

A SANDY STRETCH.

At Burlington we inquired how to reach New Brunswick, and were fortunate in finding a livery man who knew something about the roads. He advised by all means to cross over into Pennsylvania, because the roads were much better on that side. We were strongly opposed to going back to Pennsylvania when we had chosen the Jersey route for this same reason. He then advised going to Columbus, 8 miles,

over a level, but sandy road, at which point a splendid macadamized road would be found to Trenton, and this we did. That the road was level is true enough, but it was also sandy. In fact, all sand. Ruts 6 inches to a foot deep were found whereever the sand was not so loose that they partly filled up. Our large tires and ample power carried us along as fast as we could steer, but the constant shifting of the wheels, first to one side and then to the other, in the loose sand rendered steering difficult, while several scary horses made stops necessary. All told, it was the worst stretch of sandy road the writer has ever experienced. This portion of New Jersey is largely devoted to fruit and truck raising; and peaches, watermelons, etc., were seen in profusion.

From Columbus to Trenton the road is excellent, and not many teams were in view. No attempt at speed was made, however, because of the newness of the vehicle and the desire to find out how fast 12 or 15 miles an hour really was.

At Trenton we feared to take what seemed to be the right road, lest it be the wrong one, so drove down into the city for information and something to eat. Here no one, however, seemed able to give directions, and we lost much time driving in circles and figure eights, trying to find the way out of town. We gradually were guided in the right direction and finally headed toward Princeton.

Between Princeton and New Brunswick 6 or 8 miles of rocky, rough and somewhat sandy roads were found, with little traffic and some woods. At a shady spot we again decided to look over the motor and tighten up

A LOOSE CONNECTING ROD.

A threatening cloud to the northward looming up, promised us a shower, so we quickened our speed to New Brunswick. Here by diligent inquiry we found the address of friends formerly living at Peoria, Ill., and proceeded to their house for a short call. An hour or more passed and we again started northward, taking advantage of a hose on the pavement to fill the tank with water.

From New Brunswick to Perth Amboy, by the way of Metuchen, over a good road, a 15-mile gait was easily maintained. The cool of the evening and the beautiful scenery made the ride most pleasant.

FERRY EXPERIENCE.

At Perth Amboy we were fortunate in finding the ferry without waiting, and were soon headed north through Staten Island, making the distance from shore to shore in fifty-five minutes, which we afterward learned was faster than our proposed 15 miles. Here we were obliged to push on to the ferry and learned of McKinley's assassination.

At South Ferry we drove to the Hamilton Street Ferry entrance, intending to cross to Brooklyn, but after waiting for a boat we were denied admission through the gates, and were obliged to go up to the bridge and over this at 6 o'clock, the busiest time of the day, completing a most pleasant ride of 170 miles in a day and one-half, and practically without trouble. The confidence given us in our machine by this ride left few fears as to our ability to go to Buffalo without trouble, but it is the unexpected which happens.

THE ENDURANCE RUN.

Monday morning found us at the start, ready to follow the crowd and see the fun. Our passenger, a press representative, was late and had had no breakfast; so everybody had left before we got away. Wife and boy wished us a pleasant trip, and we started northward well behind everybody. Before we had left Central Park we overtook a Panhard, which was laboring badly and soon stopped. Within another mile, however, our trouble had begun, and a dry piston warned us that we were not getting proper

LUBRICATION.

We stopped, "worked in" some oil, adjusted the oil cups, and thought we were ready to proceed.

During this stop the Panhard had passed us and kindly inquired if we were broken down. We soon were going, however, and ere long caught the Panhard replacing a chain. We fired their question back at them in a most aggravating manner, and did not see them again.

Slowly we began to catch up with other laggards, and the trip was promising to be interesting from a rear end view. The various side roads quite frequently held a vehicle which had stopped for some tinkering, and hoped by getting off the main line to avoid observation. The frequency with which this was done the first day or two was laughable, but as the days went by each driver learned that his were not the only troubles, and less attempts were made at secrecy while making repairs Before reaching the noon control we caught up with the three-wheeler entered and found that it, too, was having bearing troubles. Loosening the box and feeding oil freely bettered this, so that the afternoon run was entered with greater confidence. Information as to the hill climbing contest was scarce, but the three-wheeler entered started out soon after the leaders with explicit instructions not to exceed the limit of 15 miles per hour, lest disqualification result. We then drove the four-wheeler out toward

NELSON HILL,

only to find the road blocked with farmers' teams trying to get both ways, and automobiles of all descriptions, both contestants and spectators.

Not being entered, and wishing to see the contest, we slowly worked forward past the various contestants until we were clear of the starters. Here we drove slowly, trying to let several vehicles ahead get out of the way and yet keep out of the way of the vehicle following. The result of this maneuvring was that we came to the steepest part of the hill and found two machines stopped just above us, blocking the way and forcing a stop. With a powerful brake this made no trouble, and the offered help of several bystanders was pleasantly refused, with a suggestior that the vehicles ahead be watched against backing down into us. Finally, one got over the thank-ye-ma'am and permitted the next to move up, after which we followed. Again those in front stalled, and again we stopped on the steepest part, but soon the second one passed over, and with one hand on the control and both feet on the box we started up and coasted to the top, exciting a cheer of admiration from the crowd. Here we stopped and watched the remaining climbers, after which we again started northward.

Not having the official time, we were a little in doubt as to when the entered three-wheeler should arrive at the night control, and as we neared that point our worry increased lest the driver had already run in ahead of time. We therefore speeded up and finally caught him, again cautioning him to drive slower, as several minutes had yet to elapse to get his speed under 15 miles per hour, if our estimation was correct. At the night control we learned that no penalty was provided for exceeding the speed limit, and this relieved further worry on this point.

The machines were looked over carefully, bearings adjusted and the dust cleaned out as fully as possible. A supply of gasoline was found next morning and we made ready for another day. Little of interest except good driving over good roads was seen. Some bad thank-ye-ma'ams, some broken machines, and at one place a severe pelting by apples thrown by a gang of young hoodlums. We had not started early, wishing to avoid the rush and danger and dust of the crowd, so did not arrive early at the noon control.

After dinner we started after most of the others, and had scarcely gone 2 miles before

A HOT PISTON

had everything sizzling around the motor. We drove to a farmhouse, cooled it down with water, "worked in" oil fully and carefully, and again started on, much behind most of the others. We had a pleasant afternoon drive, barring the fact that a slight shower fell, which, however, did not wet us objectionably, but agreeably laid the dust. The paved streets of Albany were rendered slippery by this, but with our heavily loaded rear wheels and lightly loaded front ones we had no fear of skidding. We climbed the State street hill easily and were soon at the rink.

Here we were warned to speed up, because the floor at the entrance was a foot deep. We rolled through this with our large tires and light weight without trouble, however, and were assigned a place by the side of the three-wheeler, which had come in before the opening of

the control. No troubles outside of overheating had occurred, and the shower of rain promised freedom from dust. We ate a big supper at the Ten Eyck and went to bed feeling at peace with the world.

The next morning we visited the express offices, expecting confidently to secure a supply of lubricating oil ordered from the factory. A fruitless search sent us back to the stable after most of the starters had gone. Here we secured a much thinner, lower fire test oil than our regular and started onward, and again our troubles began. We were hardly out of town before this

THIN OIL,

freely applied, had crept out of the crank case and gotten on to the flywheel and magneto driving pulley. The result was insufficient electric current and a faulty spark. We stopped and cleaned the flywheel, washed the pulley with gasoline, coated it with dry dust and went on our way nicely.

A few miles out, at the bottom of a steep hill, the first severe shower met us. Most of the vehicles were already near Fonda and escaped the many miles of mud left by this drenching. We stopped, put up our umbrellas and waited till the worst passed over. So violent was the downfall that most of the dust was washed away, leaving a fairly hard surface, slippery at some places, but not very muddy. We therefore reached the noon control pretty late, but reasonably clean. Our troubles had continued in the shape of oil on the flywheel and magneto pulley, and no dry dust for the pulley could be found anywhere.

A PINCH OF SAND

occasionally applied to the surface of the pulley served temporarily, but another result, unexpected, soon manifested itself. The sand, while it made friction enough to drive, cut away the pulley so rapidly that its diameter was much reduced, rendering the slipping trouble worse instead of remedying it. Believing, however, that the rain was over and that our troubles would be less frequent, we continued, stopping frequently to doctor the ever-troublesome pulley.

We did not overtake the three-wheeler at the noon control, nor see it during the afternoon, and when darkness overtook us in the rough, hilly, woody country near Little Falls, we abandoned the idea of reaching Herkimer that night and stopped at Little Falls instead. Here we were advised that the three-wheeler had passed through about dark, and supposed it had accomplished the 7 miles to Herkimer long before the close of the control. We cleaned up as fully as possible, ate a hot supper and tumbled into bed, too tired to think of anything except the hope of better weather to-morrow.

Daylight found us out filling the tanks with water and gasoline, cleaning up the vehicle a little and applying new leather, cut with a knife in a more or less circular shape, to

THE MAGNETO PULLEY.

We started about 6, expecting to get breakfast at Herkimer, and had hardly gone a mile before we found the three-wheeler backing out of a barn. Inquiry developed that the same trouble had been found on the three-wheeler, and that because of this, coupled with slippery roads and lack of a light, no driving had been done after dark—a fact which cost a control only 6 miles away and otherwise easily made.

Herkimer was reached in due time and here a set of

BATTERIES

carried on the three-wheeler for an emergency were connected up so as to provide against further trouble on that machine from the magneto pulley. They were found on trial to be so thoroughly wet, however, that the current was dissipated through their wet covers, and were pronounced worthless and abandoned. New leathers, again cut with a knife, were fitted to the pulleys and the express office searched for the hoped-for cylinder oil. None having arrived, but another train being due between 10 and 11 o'clock we waited for this, hoping to secure the oil and end our trouble. It did not arrive, however, and a further supply of thin oil was purchased, only to aggravate our worry.

(*To be continued.*)

Steam Carriage Patent Suit.

A patent infringement suit in which the entire steam carriage branch of the industry will be interested has just been brought by the Whitney Motor Wagon Company against Francis E. and Freeland O. Stanley, of Newton, Mass. The Whitney Company seeks to enjoin the Newton firm from making its present steam carriage, and also seeks to recover damages. The contention is that the Stanley wagon is an infringement of the original Whitney wagon, which was first constructed in September, 1896. In that year Mr. Whitney turned out what is alleged to have been the first steam carriage made in this country. In the following year he built an improved carriage for G. B. Upham, a lawyer of Boston, who is one of the parties interested in the suit.

The Stanley Brothers, as is well known to our readers, are the inventors of the steam carriages now sold as the "locomobile" and the "mobile." The inventors sold their rights in their first wagon to Amzi L. Barber and J. Brisben Walker, of the Locomobile and Mobile companies, respectively.

Since then the Stanley Brothers have produced a new wagon, which differs somewhat from the original, but possesses, it is alleged, all the fundamental principles of the first one.

The machine built in 1897 for G. B. Upham is the one that is being infringed, it is claimed, and it will play a prominent part in the litigation test begun by the Whitney Company. The contention is that the Stanley machine is an infringement of the Whitney vehicle, that the Stanley Brothers had had ample opportunity to inspect the wagon, which was in Mechanics' Building, Boston; that the Stanley motor vehicle was not produced until after the Whitney wagon had been exhibited, and that the Stanley wagon is a close copy of the Whitney both in a mechanical and in a general way; that it possesses the same number of tubes to the boiler, has virtually the same boiler, and is, in fact, practically a duplicate of the Whitney wagon. Although the new Stanley Brothers vehicle differs somewhat from the original one, it still retains the same features, and it is contended, therefore, that it is an infringement of the Whitney vehicle.

The application for an injunction is returnable to the United States Circuit Court in this city, on the first Monday in March. The Whitney Company has retained F. H. Betts, of New York, and F. L. Emery, of Boston, as counsel.

It has been a wonder to some persons why it was that certain large concerns allowed their vehicles to be copied even to the minutest details. It may be that this suit will throw some light on this question.

THE LOCOMOBILE COMPANY'S STATEMENT.

A. J. Kingman, representing the Locomobile Company of America, stated that the suit had really been brought in their interest, inasmuch as they control the Whitney patents. He said:

"The Locomobile Company controls the Whitney Motor Wagon Company and is back of these proceedings, and will push the suit as vigorously as possible. We consider that the Stanley Brothers have treated us very shabbily, as after selling us all their patents they followed by themselves manufacturing steam vehicles and offering them for sale at a lower price.

"Subsequent to our purchase of the Stanley patents we discovered that Whitney owned the dominating patents for steam carriages, and after thoroughly investigating their status we acquired their control.

"It seems that some manufacturers of steam vehicles have been far-sighted enough to obtain licenses under the Whitney patents. This appears to be a wise move if it be true, as stated, that these patents are basic, and that the steam carriages made by all other manufacturers are infringements thereof.

"We believe the Stanley patents which we acquired are of minor value to the Whitney patents, although important in that they cover certain useful structural details."

Stanley Brothers, of Newton, Mass., decline to give out any statement in reference to the suit.

The plaintiffs claim that Mr. Whitney successfully operated his wagon during the Mechanics' Fair in Boston in the year 1897,

and that up to this time the Stanleys had accomplished nothing in steam carriages. The Stanley carriage is claimed to be a copy of the Whitney vehicle, with a few minor improvements.

The suit appears to have been brought to test the validity of the Whitney patent with the purpose of enforcing it not only against Stanley Brothers, but against other manufacturers of steam carriages, in case it is sustained.

Frederick L. Emery, of Boston, appears for the complainant, and appearance will be made in the District Court in Boston on March 3.

THE WHITNEY PATENT NO. 652,941.

The patent on which the suit brought by the Whitney Motor Wagon Company against Messrs. Stanley Brothers, of Newton, Mass., hinges is No. 652,941, issued July 3, 1900, to George E. Whitney, of Boston, Mass., and applied for on April 30, 1897. It is entitled "Motor Vehicle," and is one of a series of five (652,940 to 652,944) granted to the same inventor at the same date, but the application for this patent antedates that for the rest. The patent contains forty-six claims, some of the broader of which are here appended:

Claim.—1. In a road vehicle propelling mechanism, speed controlling means therefor, a steering head having a rotative movement to steer the vehicle, and a compressible handhold mounted on the steering head connected with the speed controlling means, to regulate the latter by variation of hand pressure on handhold.

2. In a road vehicle propelling mechanism, speed controlling means therefor, a steering head having an overhanging arm adapted to travel in a lateral path to steer the vehicle, and a compressible handhold on said arm, having a connection with the speed controlling means, whereby variation in hand pressure on the handhold will regulate the speed.

5. In a road vehicle, propelling mechanism, reversing means therefor, a steering head having an overhanging extensible arm movable laterally to steer the vehicle, and a connection between the extension arm and said reversing means, to operate latter by longitudinal movement of former.

6. In a road vehicle, steering mechanism, propelling mechanism and speed governing means therefor, and a compressible speed controlling member connected with and to control both the said steering mechanism and speed controlling means.

7. In a road vehicle, steering mechanism, propelling mechanism and speed governing means therefor, and a compressible speed controlling member connected and moving with the steering member, to control the speed of the vehicle.

8. In a road vehicle, propelling mechanism, reversing mechanism, steering mechanism and a single compressible hand controller connected with and to control said propelling, reversing and steering mechanism, one of said mechanisms being controlled by compression of said controller.

12. In a road vehicle a steering axle, wheel spindles pivoted to the ends thereof, and an arm set at an angle on each wheel spindle, and a connection between the extremities of said arms, combined with a rotatable steering head having a rigidly attached arm at its lower end, a link connecting said arm and the connection between the spindle arms, a fulcrum supported on the steering axle for said rigidly attached arm, and a supporting bearing on the vehicle body, in which said head is suspended and permitted to rock.

14. In a motor vehicle variable speed propelling mechanism, steering mechanism including a steering head having a rotating movement to steer the vehicle, and a multipart hand controller the parts of which are movable relatively to each other, the controller being mounted on the steering head and by bodily movement rotating the latter, a member of the controller being operatively connected with the propelling mechanism to control the same by relative movement of said member by the hand of the operator while the controller as a whole is also manipulated by the hand.

15. In a road vehicle a main frame, a truss frame axle horizontally pivoted to said main frame, a vertical strut at or near the centre of the truss frame axle, and a steering arm loosely embracing at one end said strut, combined with steering wheels connected to the said arm, a rotative steering head rigidly secured at its lower end to the arm near the strut, the vehicle body yieldingly connected with the main frame, and a bearing on said body for the upper end of the steering head, from which bearing said head is suspended.

16. In a road vehicle, a main frame, a body connected therewith with springs, an axle, a steering head connected with said body to move therewith as the body moves on its springs, an arm rigidly secured to said steering head at its lower end, said arm being fulcrumed on said axle and connected therewith by a universal joint.

21. A motor vehicle containing a pair of propelling wheels, a pair of steering wheels, a body yieldingly sustained on said wheels through the medium of a plurality of longitudinal substantially horizontal fulcra arranged one in front of and separated from the other and about which said steering wheels may rock, a motor mounted on said body and operatively connected with said propelling wheels, and combined steering and speed controlling devices operatively connected respectively with said steering wheels and with said motor and working directly between said fulcra.

22. In a motor vehicle the combination of a body, a shaft carrying a propelling wheel or wheels and also carrying a gear wheel, a crank or other drive shaft provided with a gear wheel, a belt connecting the gear wheels on the said shafts, a motor connected with and adapted to rotate the drive shaft and movably connected with the body, whereby it is adapted to be adjusted on the body and with respect to the shaft carrying the propelling wheel, or wheels, and a longitudinally adjustable rod connecting the two shafts.

24. In a road vehicle, a frame, a driven axle mounted in bearings thereon, a body yieldingly connected with the frame, a motor mounted to partake of the body's yielding movements, and also movable fore and aft relatively to the body, direct driving connections between the motor and axle, to drive the latter, and means to maintain a substantially predetermined distance between the motor and driven axle in the path of power transmission.

26. In a road vehicle, a frame, a driven axle mounted in bearings thereon, combined with a body yieldingly connected with said frame, a motor carried by said body and adjustable fore and aft thereon to vary the distance between it and said driven axle, and driving connections between said motor and axle for driving latter by former.

31. In a motor vehicle propelling wheels, a driven shaft connected with and to rotate said wheels, a yieldingly sustained prime drive shaft connected with and to rotate said driven shaft, and a distance rod acting about a fixed fulcrum at or adjacent said driven shaft, to maintain a substantially predetermined distance between said shafts.

34. In a motor vehicle, propelling wheels, a driven shaft connected with and to rotate said wheels, a yieldingly sustained prime drive shaft connected with and to rotate said driven shaft, and universally jointed means acting about a fixed fulcrum at or adjacent said driven shaft to maintain a substantially predetermined distance between said shafts in the path of power transmission.

37. A motor vehicle provided with propelling wheels, yieldingly sustained propulsion means, power transmitting connections between said propulsion means and said wheels, and a distance member between said means and said wheels and bifurcated at its ends to span said power transmitting connections thereat.

43. In a motor vehicle running gear, including propelling wheels, a driven shaft connected with and to rotate said propelling wheels, a spring supported body having a seat, a steam generator supported on said body under the seat, a vertically acting reciprocating engine in front of said generator, and a substantially horizontal, direct power transmitting connection operating below said generator and between the engine and the driven shaft.

46. In a road vehicle propelling wheels, a yieldingly sustained body, a steam generator and connected motor having a drive shaft, all mounted to partake of the body's yielding movements and also movable fore and aft relatively to the body, driving connections between the said shaft and the propelling wheels, to actuate the latter, and means to maintain said generator, motor and its drive shaft at a substantially predetermined distance from the axis of rotation of said wheels.

MINOR MENTION

Electric mail delivery was inaugurated in Minneapolis last week.

The Toledo *Bee* has bought a Winton wagon for newspaper delivery.

An electric stage line has been started on North Third street, Newark, Ohio.

Quincy A. Shaw, Jr., Boston, Mass., is building an automobile after his own designs.

A case of damage to an automobile by freezing is reported from as far South as Atlanta, Ga.

Dr. Myron H. Carman, 317 Franklin place, Plainfield, N. J., is building an automobile stable 14x24 feet.

A new New York city corporation is the German-American Automobile Company; capital stock, $100,000.

The Locomobile Company of America has just paid a semi-annual dividend of 3½ per cent. on its preferred stock.

The Springfield Automobile Company has secured the agency for the Oldsmobile and the Waverley electric vehicles.

Smith & Mabley, the Panhard agents, have just sold a 24 horse power Panhard to W. S. Kilmer, Binghamton, N. Y.

Among the several devices of American manufacture shown at the recent Paris Salon was the Apple ignition generator.

The Oldsmobile Company, 138 West Thirty-eighth street, New York city, claim to be selling twenty machines a week.

The Adams-McMurtry Company, New York agents for the Packard machine, will soon have a new 20 horse power touring car to show.

Denver judges are beginning to enforce the speed laws against automobilists. W. B. Felker, of the Felker Cycle Company, was the latest victim.

Theodore Jonas, of the Merkel Manufacturing Company, Milwaukee, Wis., has secured the local agency for the Haynes-Apperson Company.

The Morgan Motor Company, Worcester, Mass., has been organized with $50,000 capital by Charles H. Morgan, president, and Paul B. Morgan, treasurer.

The New Haven Automobile and Storage Company has been opened at 109 Meadow street, New Haven, Conn., under the management of A. E. Bradley.

The Taunton Automobile Company, Taunton, Mass., are testing their first machine on the road. A feature of it is a new kerosene burner, for which strong claims are made.

The Holson Hub Motor Company, of Chicago, has been incorporated under Illinois laws with a capital stock of $2,500. The incorporators are Gustave A. Mueller, Herbert E. L. Doggett and John C. Hendricks.

The Union Steam Pump Company, Battle Creek, Mich., has brought out a combined air and water pump, also a single air pump and a single water pump for steam vehicles.

The J. P. Thomas Double Ball and Roller Bearing Company has been incorporated under South Dakota laws to manufacture improved bearings. The main office will be in Chicago.

L. B. Smyser & Co., manufacturers of gasoline automobiles, 11 Broadway, New York, are negotiating for the purchase of the Dunlop tire factory, on the Passaic River, near Newark, N. J.

Frank W. Stockbridge, proprietor of the Paterson (N. J.) automobile headquarters, has secured the agency for the Locomobile, Oldsmobile and the Darracq for Passaic and Bergen counties.

Charles W. Whitney, a New York broker who was arrested for reckless driving of his automobile last Saturday, was placed under $300 bonds by the magistrate to keep the peace for three months.

The Farmers and Suburban Jobbing Company, capital $25,000, has renewed its petition to the Massachusetts Legislature to operate exclusively a line of motor vehicles between Boston and Lawrence.

C. J. Field, formerly manager of the United States Motor Vehicle Company and the De Dion-Bouton Motorette Company, is reported to have made a connection with the H. Ward Leonard Electric Company, Bronxville, N. Y.

The Century Motor Vehicle Company, Syracuse, N. Y., under its annual statement, submitted in accordance with the corporation laws of New York State, shows: Capital stock, $100,000, $45,575 paid in; debts not to exceed $21,500 and assets at least $21,500.

Frank F. Howard, St. Louis, Mo., was severely injured recently while driving his automobile at a rapid pace in Forest Park. He lost control of the machine, which collided with an electric light pole, throwing him out against the pole and upsetting the machine, which then caught fire.

The Geneva Automobile and Manufacturing Company, Geneva, Ohio, have just shipped a carload of their 1902 steam runabouts to the Dunham, Carrigan & Hayden Company, San Francisco, Cal., and have taken several orders from parties in Maine for their new touring car. Dr. A. H. Heaton, Sedalia, Mo., is a recent customer.

The New England Electric Vehicle Transportation Company, Boston, Mass., is said to have disposed of all its vehicles, and to now have $145,000 cash on hand, besides its real estate. It is anticipated that when the company disposes of its real estate assets (assessed for $204,000) it will be able to divide between $1 and $1.50 per share in liquidation among its stockholders. The first dividend in liquidation amounted to $2.50 per share on 225,000 shares. The company has succeeded in settling practically all the lawsuits against it, the remaining unsettled suits being fully covered by insurance.

Harry Unwin has been appointed assistant secretary of the National Association of Automobile Manufacturers and is now in Chicago looking after the interests of the association in connection with the coming show.

A lamp was kept burning under an automobile in Revere, Mass., to prevent the freezing of the water therein. The vehicle caught fire, but the blaze was soon discovered and the damage, estimated at $100, confined to the body.

Charles D. Cooke, Paterson, N. J., has sailed for Europe to complete arrangements for the importation of the Darracq gasoline carriages, of which he has secured the agency. He was accompanied by Charles Auger, a silk manufacturer, who is interested with him.

At the annual meeting of the directors of the Eastman Metallic Body Company, Cleveland, Ohio, the following officers were elected: President, D. H. Patterson; vice-president, L. C. McLouth; secretary, treasurer and general manager, H. J. Hayes; superintendent, A. D. Ray.

John C. Speirs, formerly superintendent of the Locomobile Company of America, has brought suit against the company for $20,000 damages for alleged breach of contract, and an attachment has been levied against the company's property at Westboro, Mass. The claim will be contested.

The Knox Automobile Company, Springfield, Mass., report sales of their new four-wheelers to the following local physicians: W. R. Weiser, G. H. Finch, C. J. Downey and Dr. E. C. Switzer. The last named is a veterinary surgeon, said to be the first of his profession to adopt the automobile in his business.

The Petro Car Company, 71 Broadway, New York, purposes to build only 15 and 30 horse power cars using kerosene as fuel in internal combustion engines. Dr. Lepontois, the chief engineer, has completed the designs of a large eight wheeled truck, which will be described shortly in THE HORSELESS AGE.

The P. T. Motor Company, New York, have moved into their new factory at 328 Seventh avenue. They will manufacture their 1902 model, No. 6, 2 horse power bicycle motor, weighing 23 pounds; their No. 10 motor, especially designed for pacing bicycles and tandems, and a line of 4, 6 and 8 horse power single cylinder air-cooled motors for automobiles.

In relation to the affairs of the De Dion-Bouton Motorette Company, Brooklyn, N. Y., Frederick Cocheu, one of the capitalists interested, stated recently to a representative of THE HORSELESS AGE that the company's affairs would be satisfactorily adjusted in a very short time, when they will at once open up again and do their best to recover whatever prestige they have lost. C. J. Field will not be connected with the company and they have in view a very strong man for manager.

Samuel Frumidge, a St. Louis inventor, has devised a spring spoke wheel which he believes will solve the problem of motor truckage.

The Walterscheid Automobile Company, Wichita, Kan., has been organized by C. H. and W. Walterscheid and Alexander Glass to build steam wagons.

The Special Motor Vehicle Company, of Cincinnati, Ohio, has been incorporated with a capital of $10,000 by G. H. Eveland, Frank Scott, M. T. Eveland, Tom A. Scott and E. C. Shunard.

The Okonite Company, 253 Broadway, New York, manufacture a high grade, flexible rubber insulation wire which is waterproof and ought to fulfil the requirements of secondary current wires for gasoline automobiles that are equipped with jump spark ignition.

James W. Tygard, of No. 920 South avenue, Plainfield, N. J., has completed a rotary steam engine on which he has been working for some years, and which, he assures us, is free from the defects which have caused the failure of all other rotary engines. Mr. Tygard styles it a positive expansion reversible rotary. Some photographs sent us are unfortunately not suitable for reproduction.

It is announced that the Electric Vehicle Company has paid the final assessment, amounting to $580,000, on its holdings of New York Transportation Company stock. It is also said that other large payments have been made on account of the last assessment due on the stock, and that there are now only about 28,000 shares that the company will have to proceed against when the time expires.

The Boston Automobile Exchange, 122 Massachusetts avenue, reports the following recent sales: E. C. Lee, 40 State street, Boston, steam carriage, water tube boiler and Phelps pump, etc.; Otto B. Cole, 551 Boylston street, Boston, Duryea phaeton; George R. Harris, Brookline, Mass., Duryea phaeton; W. S. Southworth, Lowell, Mass., Duryea phaeton; B. N. Bridgman, M.D., Jamaica Plain, Mass., Duryea.

The new 1902 Winton touring car will be ready for delivery about the middle of February. The factory is said to be equipped to turn out twenty a week. The 1902 phaeton is already out, showing, among other features, improved cooling and lubricating devices. Any desired set speed can be maintained by adjusting a conveniently situated throttle, avoiding the necessity of operating the variable foot regulator.

The Spaulding Automobile and Motor Company, Buffalo, N. Y., state, in reply to an inquiry regarding a rumor that they had been enjoined by the Olds Motor Works from further manufacturing the motor they were about to place on the market, that a few parts of theirs did infringe on patents recently granted to the Olds Company, but that these parts were made prior to the application of the Olds Company. They have reconstructed their motor on new and patented lines, and will be ready to make deliveries by February 15.

The stockholders of the Automobile Company of America have elected the following board of directors: G. D. Gregory, Henry B. Hammond, John S. Heep, Frederick D. Long, George V. Mullan, W. Bruce Cobb, Louis Halk, J. E. White, Robert Major, Stephen P. Anderton and Edward A. O'Brien. The new board has elected the following officers: President, G. D. Gregory; vice-president, Henry B. Hammond; secretary, Stephen P. Anderton; treasurer, Henry C. Cryder; general manager, Henry C. Cryder.

The Oldsmobile Company, 71 Euclid avenue, Cleveland, Ohio, report the following recent sales to Ohioans:

A. S. Chisholm, 790 Euclid avenue; Miss Rust, 720 Prospect street; H. A. Kelley, 1490 Euclid avenue; H. T. Osborne, seventh floor Caxton Building; W. W. Adams, 47 Elberon street; J. G. Moore, 392 Bond street; L. Hitchcock, 861 Prospect street; C. A. Tower, 172 Harkness avenue; H. Corning, 1147 Prospect street; F. B. Mead, corner Euclid avenue and North Perry; F. F. Hickox, 595 Prospect street; R. A. Rainey, 1666 Euclid avenue; W. T. Rainey, 1666 Euclid avenue; P. J. Rainey, 1666 Euclid avenue; C. W. Bingham, 595 Euclid avenue; Miss O. P. Corning, 869 Euclid avenue; Mr. Wilson Hungate, 270 Prospect street; Ralph Brown, 247 Bond street; C. W. Noakes, 166 Huron street; Joe Schowaker, Williamson Building; T. H. Wilson, 120 Bolton avenue; Dr. W. A. Tims, 425 Wade Park avenue; Dr. Roper, 16 Cullison street; Col. Myron T. Herrick, Euclid Heights; F. Kuzel, 1464 Lamount street; J. C. Wood, 326 Amesbery avenue; B. T. Day, 460 Canal street; L. Dautel, Rose Building; Geo. Bowler, Williamson Building; William F. Bonnell, Cuyahoga Building, all of Cleveland; and Avery & Davis, Columbus; Kiser & Co., Dayton; Geo. W. Blackmore, Painesville; Canton Oldsmobile Co., Canton; Toledo Motor Car Company, Toledo; A. Auble, Wadsworth; Flank Brothers, Quincy; W. H. Buechner, Youngstown, and A. D. Clark, Dayton.

Automobile Club Notes.

H. B. Fullerton, chairman of the committee on good roads of the Long Island Automobile Club, together with Messrs. Pardington and Chapin, will attend the supervisors' convention to be held at Albany to-day, January 29, in the interest of the good roads movement.

Chairman George F. Chamberlin, of the law committee of the A. C. A., states that owing to an error the hearings on the Cocks and Robinson bills before the committee last Wednesday were set only one hour apart, and in consequence only those favoring the Cocks bill and opposing the Robinson bill were heard. At the second hearing to-day the other side will be presented, and it is confidently expected that a compromise will be reached, as the A. C. A. is in favor of a proper restriction to speed and realizes that the public will not be satisfied unless stringent measures are adopted to prohibit reckless speeding.

W. J. Stewart, secretary of the New Jersey Automobile Club, reports that the club has held no meeting this year, but that a call for one will shortly be issued. The club has a membership of 103 and many applications are waiting action. No invitation as to affiliation has been received from the A. C. A., although it is supposed one was sent and has miscarried. The club will have a series of invitation runs, which it desires other club members to join.

Regarding affiliation with the A. C. A., Secretary Hopkins, of the Long Island Club, reports that the club is desirous of effecting an agreement, but is strongly opposed to the terms offered, regarding them as too autocratic. They are holding out for representation based upon club membership.

E. C. Bell, Jr., secretary of the North Jersey Automobile Club, Paterson, N. J., reports his club in a flourishing condition and without liabilities. The membership is now nearly sixty, but the entrance fee has been suspended, with the result that a large number of local automobilists have sent in applications. The club contemplates a series of ten runs for the coming season. The secretary believes it highly probable his club will affiliate with the A. C. A., as they are perfectly willing to come under a central sway as regards racing and allied matters. A conference will soon be held with other New Jersey clubs to determine the rights of automobiles upon the roads and to combat adverse legislation. Road improvement in the State will also form part of the club's propaganda.

A. R. Shattuck, president and chairman of the good roads committee of the Automobile Club of America, is attending the Good Roads Convention at Albany this week, called by State Engineer E. A. Bond. S. M. Butler, secretary of the club, and George F. Chamberlin, chairman of the law committee, will also be present.

As a proof of President Shattuck's wit and versatility here is a little incident which occurred during his recent visit to Albany in the cause of auto legislation. He sent to Assemblyman Armstrong and Senator Feeter at Albany toy automobiles that, in compliance with the present law, had their initials marked on the back. Mr. Shattuck facetiously informed the lawmakers that, in further compliance with the law, both of the miniature automobiles had been properly registered with the Secretary of State.

...OUR... FOREIGN EXCHANGES

The Welbeck Brake Trials.

The brake trials which the A. C. G. B. I. arranged to obtain incontestable evidence of the stopping facilities of modern automobiles, for use in its campaign for more liberal legislation, were held at Welbeck on January 11. Welbeck is located 150 miles from London, but this did not prevent the club from making a tour of the event.

The speed trials were first entered upon at 11 o'clock, and C. Friswell led the way with his Peugeot, Lyons Sampson taking the times at the initial tape, and Messrs. Bidlake and Swindley being at the far end of the course. The first speed tests were taken over the downward run, with a flying start in each case. Mr. Manville came second, followed by Mr. Crombie, Mr. Owers, Mr. Jarrott and Mr. Stanton. One noticed with interest that Mr. Owers had solid tires to his driving wheels and pneumatics on the front, after the fashion recently described by Mr. Wood. These half dozen vehicles were then driven again over the return course, also with flying starts from Cavendish Lodge.

Some of the vehicles entered had taken a wrong course, and it was decided, therefore, to proceed with the brake trials, and the method of operation pursued was as follows: Eighty-eight yards from the finishing tape, at each end of the mile course, another tape was fixed, for the purpose of timing the vehicles over the final one-twentieth of a mile, and thus determining the speed at which they were traveling when the brakes came to be applied. The instructions were that this was to be done as the front wheels crossed the finishing line, and on coming to a stop the drivers, of course, waited while the measurements were taken, Colonel Crompton officiating as judge in this respect.

By the time the first half dozen vehicles had completed their records the missing ones had turned up, nearly an hour and a half late, entering on the course, as had been anticipated, from the Cavendish Lodge end after a formidable detour. They were at once sent over the mile for the brake trials, so that the latter might be completed en bloc, the speed trials being deferred until all measurements were recorded. Of the stoppages generally, it may be said that those at the upper end of the mile were exceedingly good, while at the Cavendish Lodge end the results were less dramatic, for vital reasons: The course was slightly downhill in the latter direction, and the drivers went "all out," while on the return journey they endeavored to comport themselves as if actually driving on the highway, with a certain amount of traffic to be reckoned with; thirdly, the finishing point on the downhill course was perfectly wicked for the purpose, the surface being coated with thick grease. At the upper end the road was somewhat slimy, but less disconcertingly so than at Cavendish Lodge.

The spectators were chiefly clustered at the upper end, and were rewarded by some most excellent finishes. The first carriage up was Mr. Friswell's Peugeot. His front wheels had no sooner crossed the tape than the back wheels skidded forward and were only 2 feet over the line when the vehicle stopped dead in 4 yards. Then came Mr. Crombie's Daimler, which traveled much faster and pulled up less dramatically in consequence. The locomobile followed, with a partially detached band on the off front tire flopping weirdly, and gave a slight slew round as it came to a standstill. Mr. Instone pulled up in a few feet less space on the Motor Manufacturing "twelve horse."

The De Dion voiturette when its operator applied the brake while going at top speed at the other end of the course had swung around through the greater part of a circle, but this time a stop was effected without side slip. Then Mr. Lewis came along on his Daimler, followed by Mr. Bush, who made a splendid stop in 7 yards 4 inches, although the vehicle was going at a good pace. Still better was Mr. Stanton's pull up, for his huge 24 horse power was stopped in 6 yards 3 inches amid involuntary applause. Bearing in mind that a considerable portion of this distance was occupied by the length of the vehicle itself it may be imagined what the optical effect of the stop amounted to.

All made good stops in proportion to the rate at which they traveled, but, of course, it is impossible to award the palm to any one without knowing all the figures as to speed and weight, as well as the mere measurement of the stoppage.

It now remained to complete the speed trials, and the late comers made their double courses. Mr. Midgley's Napier went first, at a fine pace, and then J. R. Hargreaves turned out on his new 22 horse power Daimler. At the starting tape he had only got on to his second speed, the vehicle being very highly geared, and as a matter of fact the fourth was never used, either on the upward or downward run.

Then a warning toot of a horn caused everyone to look up the approach, and Mr. Rolls' Panhard came sweeping on, and passed at a rousing pace, which was obviously in excess of anything that had preceded it. He had taken a long start, and incidentally passed between a standing vehicle and a too venturesome photographer. It was now verging on 3 o'clock, and a hasty exit from the park was made, and Nottingham aimed for. Later in the day the vehicles which had come from the south made for Grantham, over a winding, greasy road that made fast traveling no sinecure. Next day the homeward run was made to London, and some excellent journeys were made for the most part. Police aggressiveness made itself felt, however, at Stilton, Alconbury and Hitchin.

The vehicles, all but the 8 horse power Peugeot, the 4½ horse power De Dion and the locomobile, were distinctly powerful machines, and not in the remotest sense representative.

It is not proposed by the Automobile Club to publish every record made by the various vehicles, but the following average statements will be made: The results showed that at the undermentioned speeds the vehicles could be stopped on an average in the following number of lengths—a length for this purpose being calculated to be 11 feet 8 inches, as that is the average length of the vehicles engaged in the trials:

From 11 to 14 miles per hour in 1 4-5 times the vehicle's length.

From 15 to 17 miles per hour in twice the vehicle's length.

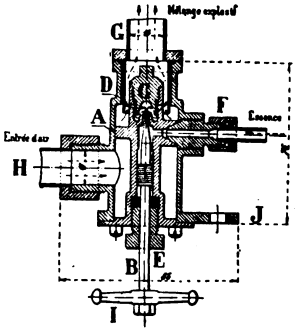
From 18 to 20 miles per hour in 2¾ times the vehicle's length.

From 20 to 24 miles per hour in 3½ times the vehicle's length.

It must be observed that these figures are averages.

New Longuemare Carburetor.

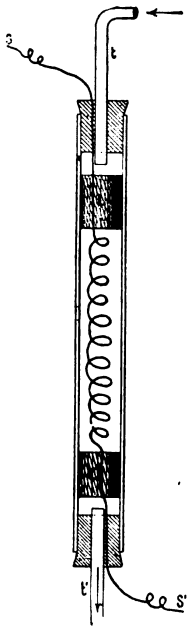
A small size of carburetor suitable for bicycle motors of 1 to 2 horse power has recently been placed upon the market by the Longuemare firm, of Paris. In this the float and constant level mechanism have been done away with and the size and weight have thereby been greatly reduced. The body of the carburetor is approximately cylindrical in form. The air arrives through a tube joined to the carburetor on one side and the gasoline through a small tube on the opposite side. The gasoline flows through a hand-operated needle valve, through a winding passage and a series of small apertures into the air passage. Here the mixture is formed which leaves the carburetor through a tube connected to it on top. The air and mixture tube have an internal diameter of about 5/8 inch.



THE LONGUEMARE CARBURETOR.

A Combustion Phenomenon.

A French savant, M. Trillat, has observed a curious phenomenon in the catalytic action between alcohol vapors and certain metals at various temperatures, with which he deals in a work on "Alcohol Oxydation by Contact Action," the first part of which has just been published.



The apparatus with which the experiment is carried out is very simple. It consists essentially of a strong, vertically arranged glass tube, to one end of which are admitted the vapors or gaseous mixtures to be experimented with, while the gases formed by the combustion process leave by a tube *t'* at the lower end, to be analyzed. The apparatus contains a metallic spiral S S', most generally of platinum, which is carried to a more or less elevated temperature by passing an electric current through it, which can be regulated by means of an amperemeter and a voltmeter. To prevent any explosions that might be produced from lighting back into the distilling apparatus, plugs formed of metal gauze (generally brass) are inserted into the glass tube just inside each stopper, thus limiting the explosion to the heavy walled glass tube.

The alcohol vapor or vapor mixed with air is admitted into the apparatus to expel the air therefrom. Then a current is passed through the spiral to bring the wire to a dark red heat, for example. In that case the products which pass out through tube *t'* are of a low degree of oxidation, such as acetal and aldehyde in the case of alcohol. If instead of a dark red the spiral was brought to a cherry red, more highly oxidized products are obtained, such as acetic acid. Once the process has been started, the current may be turned off, and the reaction continues indefinitely.

Now the peculiar phenomenon above spoken of is as follows: After a wire has been heated by the current to a dark red heat and started the above described reaction several times in succession, there is no longer any need to send a current through the spiral when starting the operation. When the mixture is admitted the wire is soon raised to its usual temperature of a dark red and the reaction ensues as usual. On the other hand, if the spiral has been working at a cherry red with current, it will come to this temperature and the reaction will take place as usual. But if the mixture is changed it is necessary to again employ the current to start the reaction.

This same effect can also be produced with wires of other metals, such as silver, iron and copper. M. Trillat states that he has been unable so far to account for this phenomenon; but thinks it may be due to a molecular change in the metal or its absorption of hydrogen or carbon.

Experiments on Bronze.

The Verein Deutscher Ingenieure recently instituted a series of experiments with a view to determine at what temperature bronze is reliable in engine construction. For the purpose of the tests twenty-five bronze rods were supplied from the Imperial Dockyard at Kiel 8.66 inches in length and 0.48672 square inch in section, and composed of 91 parts copper, 4 parts zinc and 5 parts tin. A set of five rods of similar dimensions and composition gave the following average: Breaking weight per square inch, 8.47 tons; elongation at moment of rupture, 36.7 per cent. on 7.874 inch; decrease in sectional area, 47.4 per cent. at a temperature of 20° C. (68° Fahr.). The results are summarized as follows, taking the results obtained at a temperature of 68° Fahr. as unity:

Temperature.	Breaking Strain.	Elongation.	Decrease in Section.
212° Fahr.....	1.01	.98	.91
392° Fahr.....	.94	.96	.93
572° Fahr.....	.57	.32	.31
752° Fahr.....	.26	....	....
932° Fahr.....	.18	....	....

From this it is evident that bronze of the composition here experimented on may safely be employed for valve seats, pipes, &c., at a temperature of from 392° Fahr. to 572° Fahr., but not above.

The English postal authorities have decided to supplement railway and horse traction for the conveyance of parcels between Manchester and Liverpool by the institution of automobile service, which will commence on March 1. It is stated that the undertaking is in the nature of an experiment.

La France Automobile is organizing a heavy traction competition, the course to be from Paris to Monte Carlo, 697 miles, finishing by the climb of the famous "La Turbie" hill. There will be classes for delivery wagons carrying half a ton, lorries carrying a ton, and omnibuses carrying from eight to twelve passengers.

The "X. Exposition of the New Locomotions" will be held at the "Pôle Nord" in Brussels, Belgium, March 15 to 23. Among the attractions will be automobile trucks built for use in the Congo Free State, alcohol motors in operation, and new steam and electric vehicles.

The recent brake trials of the Automobile Club of Great Britain are reported to have been so convincing to the local government board that there is no longer doubt of the speedy abolition of the 12 mile an hour restriction and the substitution for it of a clause allowing a maximum of 18 or 20 miles an hour in the open country.

The question of solid versus pneumatic tires was recently discussed at the Automobile Club of Great Britain, and one member, who drives an 18 horse power Daimler, for which he has duplicate sets of wheels, stated that a journey which occupied 3 hours 5 minutes when the car was running on pneumatics was found to take 4 hours 5 minutes when running on solid tires.

According to the *Aluminum World* aluminum is an exceptionally useful ingredient in yellow brass, provided but little tin is present. It makes the metal run more freely, and enables much cleaner and sounder castings to be made. The best brass founders are accustomed to use aluminum for all cheap yellow brass work that is to be used for sand castings; it is not a desirable ingredient in brass intended for rolling.

The question of using petroleum for propelling purposes is being considered by the London Fire Brigade, and it is understood that the fire brigades committee of the London County Council has practically decided to abandon horse traction. The change will not take place immediately, but for motives of economy will be gradual; and it has still to be determined whether gasoline or electricity shall be the power employed.

During some recent manœuvres of a division of the Italian Army in the neighborhood of Piacenza, a motor omnibus was employed during twelve consecutive days for the conveyance of the general commanding and his staff. Despite bad weather and bad roads, the motor is reported to have worked admirably, without a single breakdown or hitch. We are informed that it is further intended to shortly supply motor vehicles to each of the Italian Army Corps.

The number of exhibitors for the Agricultural Hall Show, to be held in April next, is said to have passed the 200 mark.

In the brake trials of the A. C. G. B. I. at Welbeck Park, on January 11, twenty-nine vehicles were present, with motors aggregating 206 horse power and an estimated total value of $102,000.

The Standard Oil Company is said to have informed an inquirer in Assam that the Government regulations regarding the importation of motor spirit into that country are so stringent that its importation in commercial quantities is practically impossible.

The "Badminton" series of books on sports and pastimes is soon to be increased by a volume on automobiling. It will contain five lectures, with discussions on the various phases of the subject, to be given at the A. C. G. B. I., and will avoid the use of technical language.

A writer in the *Pall Mall Gazette* dwells upon the numbers of animals and birds—cats, dogs, hares, thrushes, nightingales, sparrows and robins—being killed by high speed automobiles, and thinks that birds, mammals and insects in time will learn to estimate the pace of fast moving automobiles and to avoid them.

The Nesselsdorfer Motor Wagon Company, of Nesselsdorf, Moravia, have in course of construction a high powered automobile, to be used by the Austrian army. It has three separate motors, which work independent of each other. The maximum speed is stated to be 120 kilometres, or 74 miles, per hour, and an entirely new system of transmission is to be used.

The police department of Brussels, Belgium, has issued a *carnet* or instruction book, telling automobilists what time they must occupy in going from one point in the city to another. For instance, if you wish to take a ride on the main boulevard of the city from the "Bourse" to the "Boulevard Botanique" you find by referring to the instruction book that the distance is 853 metres, and that three minutes and twenty-eight seconds is the minimum time allowed.

An electric trolley omnibus service has been started by Siemens & Halske, of Berlin. The line is nearly 12 kilometres long, and extends through the valley of Bielabach, from Königstein to Hütten and Königsbrunn. In passing another electric 'bus it is of course necessary to remove the trolley poles, while in passing other vehicles it is only necessary to steer to one side, as the poles are of sufficient length to allow a side movement of 3 metres from the trolley line. A speed of 7½ miles per hour is usually maintained, and the vehicles will hold twenty-one passengers.

The Foden Company, who, as reported in our last issue, were awarded second prize in the recent War Office Trials, have refused to accept it, and have entered a protest, claiming to be entitled to first prize.

It now transpires that the accumulator competition and fuel competition of the A. C. F., which were to begin on May 1 last, have not begun even now. The club's laboratory is not completed, and negotiations are now said to be in progress with the Ecole Supérieure d'Electricité to use its laboratory for the accumulator contest.

Another defect has been discovered in the new French regulations. A motor cyclist had his machine stolen, and with it, of course, the number plate. He has so far been unable to convince the authorities that he is no longer in possession of the machine (by returning the plate), and to present appearances he will have to pay taxes on it indefinitely.

A writer in *La Locomotion Automobile* states that taking all the gasoline vehicles at the recent Salon, 86 per cent. of the motors were vertical and 14 per cent. horizontal; 89 per cent. of the transmissions contained gears (three-quarters of which sliding gears) and 11 per cent. belts only; the "elastic" transmission from the frame to the rear axle was effected by chains in 50 per cent. of the vehicles; by shafts with universal joints in 44 per cent., and by belt in 6 per cent.

It is announced from Berlin that three prizes of 5,000, 3,000 and 2,000 marks respectively are offered for the invention of a satisfactory instrument for measuring the pressure of wind, while a further sum of 3,000 marks will be given to the inventor whose instrument, after due trial, seems best adapted for Government purposes. The competition is open to foreigners as well as Germans, and competitors must send in their designs to the Deutsche Seewarte, in Hamburg, not later than April 1, 1903.

Electric Newspaper Delivery Wagon.

The Providence (R. I.) *Journal* has had in use for some time a Waverley electric delivery wagon, regarding the operation of which it gives the following information in a recent issue:

The vehicle has been run over 1,000 miles since it was delivered, late in the fall. It has been subjected to very severe tests, but the batteries are by no means exhausted, and probably will remain in service for 500 miles more. The vehicle was sent frequently over the East Side hills and was kept on the roads regardless of mud, rain and snow, which, with hill work, drew heavily on the batteries. It may be assumed that the 1,000 miles made by the vehicle represents 1,500 or 1,800 miles covered under ordinary conditions.

The normal discharge rate is 22 amperes, and on College Hill and Waterman street the discharge was 80 amperes or more. An abnormal discharge rate is very destructive to batteries, and the electric automobile, therefore, is especially adapted to smooth roads with moderate grades. But the record of the machine shows that if one is satisfied to renew batteries more frequently the electric carriage can be operated on 10 per cent. grades.

Replacing the positive plates and cleaning the negative plates will restore a battery to its full efficiency, and the expense is not excessive when mileage is taken into consideration. Estimates based on this performance indicate that it costs as much to keep one horse and a carriage as to own and operate an electric carriage, this estimate including the renewal of the plates, etc.

The motor received less attention than a motor in a machine shop. One tire was punctured, but the inner tube was made as good as ever by vulcanizing, and the tires have not been damaged by use to any appreciable extent.

Schedules of the Baldwin Automobile Company.

The schedules of the defunct Baldwin Automobile Manufacturing Company, Connellsville, Pa., show liabilities $100,298 and nominal assets $98,608. Of the liabilities there is due $2,251 for wages, $6,500 on secured claims and $91,547 on unsecured claims. The wage claims have been bought, the wages paid and the claims assigned. The secured claims are mortgages on property in Connellsville. There is a total of $25,514 due to 220 general creditors, the amounts of the claims ranging from 30 cents to $6,892. Besides all these claims there is $64,029 due on nineteen notes, the amounts of which range from $700 to $10,000.

The assets consist of $71,856 worth of real estate, $90.30 in cash, $6,000 on a note, $15,000 worth of stock, tools and equipments, $1,658 due on accounts and $4,000 due on subscription stock. Besides these, there is fire insurance to the amount of $58,000, which was not included in the schedule of assets.

Autos Barred from This Park.

General Palmer, of Colorado Springs, Col., has just given the city Austin Bluff Park for public use, with the provision that no automobiles shall be allowed within the park until such times as they are as odorless and quiet as a horse conveyance.

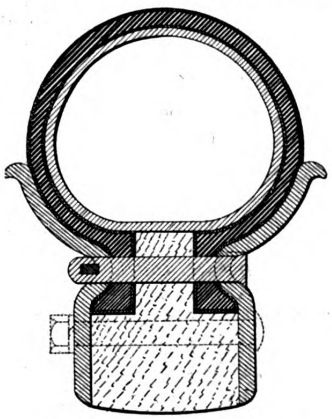
Schollenberger Brothers, Wichita, Kan., have secured the agency for the Oldsmobile.

MOTOR VEHICLE PATENTS ∴ ∴ OF THE WORLD ∴ ∴

United States Patents.

691,467. Vehicle Wheel and Tire.—Charles Howells, of New York, N. Y. January 21, 1902. Filed May 19, 1899.

The invention relates to improvements in wheel tires of the pneumatic type, and it also includes a rim and a wheel especially adapted thereto, the construction as a whole being particularly suited to the heavy service required by motor vehicles, which are necessarily of considerable weight and from which at times heavy strains are transmitted to the tires of their

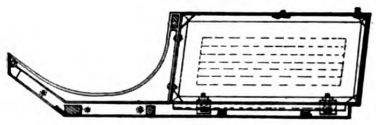


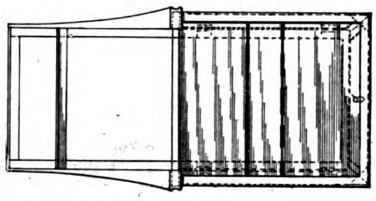
supporting wheels, which it is the object of the present invention to meet.

The tire comprises an inner tube of usual form and an outer casing strengthened with fabric. The outing casing has, however, extra strong, thickened and reinforced edges, seated in recesses against the tongue of the felloe, where they are secured from the outside by central, inwardly curved portions of the flanges, which engage and securely hold them. These parts are connected by key bolts, which pass through the inwardly contracted portions of the flanges, the thickened lower edges of the casing and the tongue of the felloe being detachably secured in position by these bolts and keys. An advantage resulting from the use of the keys instead of the usual screw threaded nuts is that the expansion of the elastic material of the tire will keep them seated in the depression, so that they are not liable to jar loose.

691,455. Metallic Body for Vehicles.—Henry F. Eastman, of Cleveland, Ohio. January 23, 1902. Filed January 11, 1901.

A three-sided integral base frame is constructed of angle iron and extends from front to rear of the body, the front ends being bent upwardly, as shown, to provide the necessary conformation for the front portion of the body and to form a base for the foot rest. This frame is provided with one or more transverse braces for imparting rigidity thereto. It forms part of the lower side and rear portion of the body and supports upon its rear the main body portion, which is comprised of a frame or skeleton, and panels secured thereto. The frame of the main body portion is constructed of angle iron brazed to form an integral structure and is three sided, rests upon the upper edges of the base frame, and is secured to the latter by means of angle plates, bolts and nuts, whereby the two frame portions may be readily attached or detached. Secured to the base frame by means of bolts is a grid, which consists of crossed angle bars brazed at their crossing points and forming a support upon which the motive apparatus of the character employed in the vehicle is placed and supported.

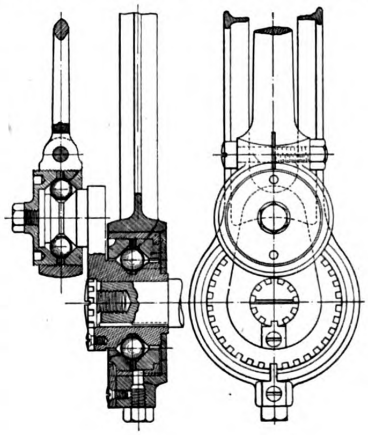




691,487. Roller Bearing for Crank Shafts or the Like.—George H. Reynolds, of Mansfield Depot, Conn. January 21, 1902. Filed August 8, 1901.

In the construction of light high speed engines, used with automobiles, ball bearings for the crank shaft and cranks are extensively used; but as at present constructed inadequate provision is made for taking up wear in or for adjusting these bearings.

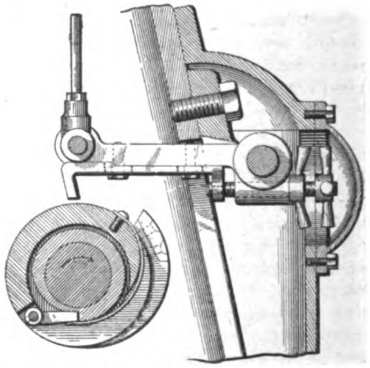
The engine frame is provided at its lower end with a cylindrical recess, provided at one side with an annular wall, partially closing the recess at that side of the frame. Within the recess is a ring-like receiver, having at one edge an inturned flange, and within this receiver are arranged the outer ring-like cone bearings. One bearing ring is shown as fitting tightly the inner bore of the receiver, together with the inturned flange thereof, while the other bearing ring is threaded exteriorly and is screwed into the outer portion of the receiver, that is interiorly threaded for the purpose.



The crank hub is provided with a circumferential groove conical in cross section—that is, formed to present tapering side walls, between which and the adjacent conical walls is arranged a series of balls. The outer and the inner bearing members, together with the intervening balls, constitute a ball bearing in which the crank shaft may turn freely. The crank is prevented from working off from the end of the crank shaft by a screw tapped into the end of the shaft and provided with peripheral notches, that receive a locking finger on a locking plate secured to the crank. The bearing ring is secured against rotation by providing the same with a series of circumferential notches or pockets, with which co-operates a locking plate secured to the bottom of the frame and having a projecting finger that enters one or another of the notches, thus locking the ring against rotation. By slackening the screw and lifting the locking plate the ring may be rotated in either direction necessary for proper adjustment of the bearing.

691,509. Igniter Controlling Mechanism for Explosive Engines.—Jesse Walrath, of Racine, Wis. January 21, 1902. Filed October 12, 1900.

A mechanism for a contact spark igniter



by which the time of ignition can be varied while the engine is running.

A pivoted arm is provided which has its movable end operatively connected with the igniter mechanism. This arm has a threaded sleeve, and an adjustable controlling bar is attached to the under side of the arm, having longitudinal sliding engagement with, and provided with a projection to engage the arm, and with a yoke. An adjusting screw engages the threaded sleeve and has an annularly grooved portion engaging the yoke.

A cam operates upon the bent outer end of this adjustable sliding bar, and it is eas-

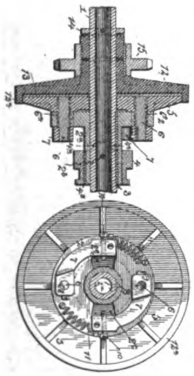
ily seen that by adjusting the bar in the direction of the arm, by turning the screw, the angular position of the cam at which it acts on the arm is varied.

The cam is driven by spring ratchet, so that if the engine should accidentally be turned over in the wrong direction the cam will remain stationary and not break the igniter mechanism.

691,508. Variable Speed Gearing.—Colcord Upton, of Beverly, Mass. January 21, 1902. Filed October 29, 1901.

A variable speed gearing of the sun and planet type, giving several speeds, both in the forward and reverse direction.

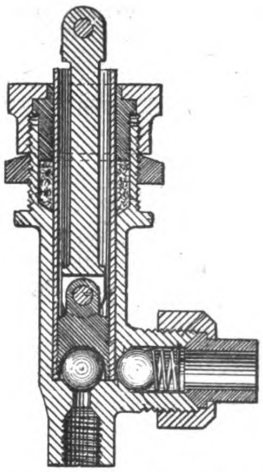
691,507. Friction Clutch.—Colcord Upton, of Beverly, Mass. January 21, 1902. Filed March 9, 1901.



A disk clutch. Referring to the drawings: When the sleeve 4 is not pressing the arms 7 outwardly, the disks 5 and 12 are free to rotate independently, so that if shaft 1 is rotated, disk 12 will not be rotated thereby, and, vice versa, if disk 12 be driven, shaft 1 will not be rotated thereby. When sleeve 4 is pushed under the arms 7 the latter will rotate the right and left screws or threaded rods 6, whereby disk 5 will be caused to frictionally join the parts 1 and 2 with the disk 12, and thus the driving and driven parts (1 and 12) will be rotatively united. As the surface of the projections or extensions 4^a is beveled or cam-like the more they are pushed under the arms 7 the more will be the frictional contact between the parts 5 and 12, and thus by pushing the projections 4^a and sleeve 4 more or less under the arms 7 the frictional connection between the driving and driven parts can be regulated, whereby they may be driven at equal speed and the friction may be allowed to slip as much as desired.

691,512. Pump.—George E. Whitney, of Boston, Mass. January 21, 1902. Filed April 29, 1901.

In pumps as ordinarily constructed and adapted for motor vehicle use there is a relatively large amount of clearance between the plunger and the inlet and discharge valves, and this clearance is a serious objection. For instance, if the water in the supply tank becomes exhausted, or if there be any leak in any of the supply



connections, air will be drawn into the pump cylinder, and so much of this air as is contained in or can be compressed into this clearance cannot be expelled from the cylinder by the reciprocations of the plunger, and the air thus compressed into this clearance by successive strokes of the plunger soon reaches such a pressure that, even when expanded to fill the entire cylinder upon the up stroke of the plunger, it prevents the lifting of the inlet or suction valve, and consequently prevents the entrance of water to the pump cylinder after the tank has been refilled or the leak stopped. The pump is then "air locked," as it is commonly known. This is particularly dangerous when the pump is used in connection with any form of automatic regulator, for, reliance being placed upon the regulator, the latter will frequently call for more water while the pump is thus air locked and unable to meet the demand.

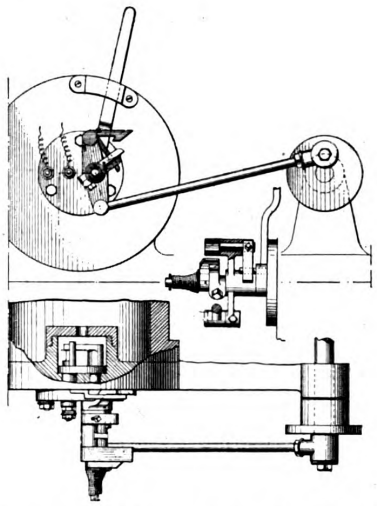
The object of the present invention is therefore to reduce the clearance.

The pump comprises a one-piece body, bored longitudinally to provide a pump cylinder having an inlet passage in one of its ends and a ball valve therefor contained wholly in the cylinder. A laterally extended portion on the body is bored to provide an outlet passage at the end of the cylinder. An outwardly directed valve seat is formed in the wall of the cylinder and a spring supported ball valve controls the outlet passage. The valve, when seated, is substantially tangent to the inner circumference of the cylinder. A plunger, cup-shaped at its end, receives the inlet ball valve when the latter is seated, whereby substantially all clearance is eliminated at the end of a plunger stroke.

691,561. Igniter for Explosive Engines.—John T. Metcalfe, of Quincy, Pa. January 21, 1902. Filed July 25, 1901.

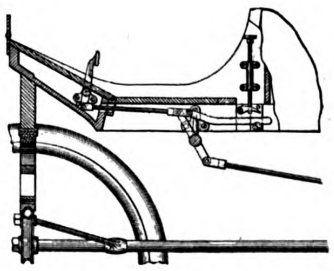
A variable ignition gear of the contact spark pattern. The spark plug is placed in a small chamber communicating with the explosion chamber by an aperture.

At the end of the movable electrode is rotatably mounted a catch, which is con-



nected to the electrode by a coiled spring. Just inside this catch another similar one, acting as a stop to the former, is clamped to the electrode. Still further inward along the electrode shaft is mounted a rock lever, which receives its rocking motion through a connecting rod from the secondary or crank shaft of the engine. At the opposite end of this rock lever is rotatably mounted a shaft, to which are fastened a catch to engage with the first of the above named catches, and a lever arm. This arm is engaged by a boss upon a head, which is integral with the lower end of the base of the ignition controlling hand lever, so that, when the hand lever is moved in an arc, the boss is likewise moved radially and is made to govern the movements of the catch—that is to say, when the arm engages the boss in its extreme right hand position, as shown in Fig. 1, the catch releases the hammer at a slightly different period than would be the case if the boss were in its extreme left hand position, being moved to the same by the hand lever.

691,724. Brake Mechanism for Motor Vehicles.—William B. Mason, of Boston, Mass. January 21, 1902. Filed August 14, 1901.



A hand operated pawl is provided to lock a pedal operated brake to hold a vehicle in position on an incline. The construction is plain from the drawing.

691,638. Electro-magnetic Regulator for

Admission Valves of Hydrocarbon Motors.—Arthur C. Krebs, of Paris, France. January 21, 1901. Filed October 29, 1900.

Assigned to Panhard et Levassor, and already described in THE HORSELESS AGE.

691,591. Gearing.—Alexander T. Brown, of Syracuse, N. Y., January 21, 1902. Filed January 2, 1901.

Refers to a spur differential gear and to the combination of parts thereof.

691,634. Gearing.—Lewis Jones, Jr., of Philadelphia, Pa., January 21, 1902. Filed October 22, 1901.

691,078. Automobile Car.—Karl Schiller, of Zizkow, Austria-Hungary. January 14, 1902. Filed January 27, 1900.

The inventor says: "The motor arrangement of the present automotor vehicle is based on the fact that by the employment of small efforts considerable hydraulic pressures are obtained, and the practical application of this principle."

The "small efforts" he intends to produce by operating a pump pedal with his foot, and the "considerable hydraulic pressures" are to be expended on the pistons of a four-cylinder fluid pressure motor which drives the wheels of the vehicle.

691,083. Compound Explosive Engine.—Frederick W. Toedt, of Hamburg, Ia. January 14, 1902. Filed March 19, 1901.

691,084. Compound Explosive Engine.—Frederick W. Toedt, of Hamburg, Ia. January 14, 1902. Filed June 27, 1901.

691,206. Motor Vehicle.—Gerome F. Tadini, of New York, N. Y. January 14, 1902. Filed October 4, 1901.

An invention to take the place of the differential gear on motor vehicles, and consisting in a device by which the outer wheel is freed from the axle when turning curves.

Near the two ends of a one-piece axle are slid over it, on feather keys, truncated threaded cones, these cones engaging with similarly truncated and threaded female cones on the wheel hubs. Coil springs on the axle press the truncated cones outward.

It will be apparent that when the vehicle is rounding a curve the increased speed of the outer wheel over the speed of the axle, due to its greater travel, will cause the wheel to become disengaged automatically from its clutch, and the wheel will then be free to turn on its bearing independently of the speed of the axle, and the driving will all be done through the inside wheel.

691,259. Feed Regulator for Motors.—William E. Gibbs, of Fanwood, N. J. January 14, 1902. Filed May 8, 1901.

690,935. Pneumatic Tire.—Alfred Ducasble, of Paris, France. January 14, 1902. Filed February 28, 1901.

690,981. Boiler.—Ralph L. Morgan, of Toledo, Ohio. January 14, 1902. Filed July 6, 1901.

The Morgan water tube boiler already fully described in our columns.

691,054. Steering Mechanism for Motor Vehicles.—Franklin R. Heister, of Centerport, Pa. January 14, 1902. Filed September 28, 1901.

691,027. Corner Joint for Vehicle Bodies.—James F. Watts, Wadsworth, Ohio. January 14, 1902. Filed January 24, 1900.

691,028. Rubber Tire Equipment for Vehicle Wheels.—John G. Webb, Springfield, Ohio. January 14, 1902. Filed July 5, 1900.

691,044. Steam Boiler.—Franz Burger and Henry M. Williams, Fort Wayne, Ind. January 14, 1902. Filed October 11, 1900.

691,099. Wheel Fastener.—Auren M. Beebe, Banner, Ill. January 14, 1902. Filed August 15, 1901.

691,151. Driving Gear.—Charles M. Leech and Seymour D. Evans, Lima, Ohio. January 14, 1902. Filed March 25, 1901.

691,173. Roller Bearing.—Julius A. Perkins, Omaha, Neb. January 14, 1902. Filed January 6, 1900.

691,424. Motor.—Frederick E. Wells, of Greenfield, Mass. January 21, 1902. Filed January 25, 1901.

691,498. Electric Igniting Device for Explosive Engines.—James A. Smith, of Newark, N. J. January 21, 1901. Filed December 21, 1899.