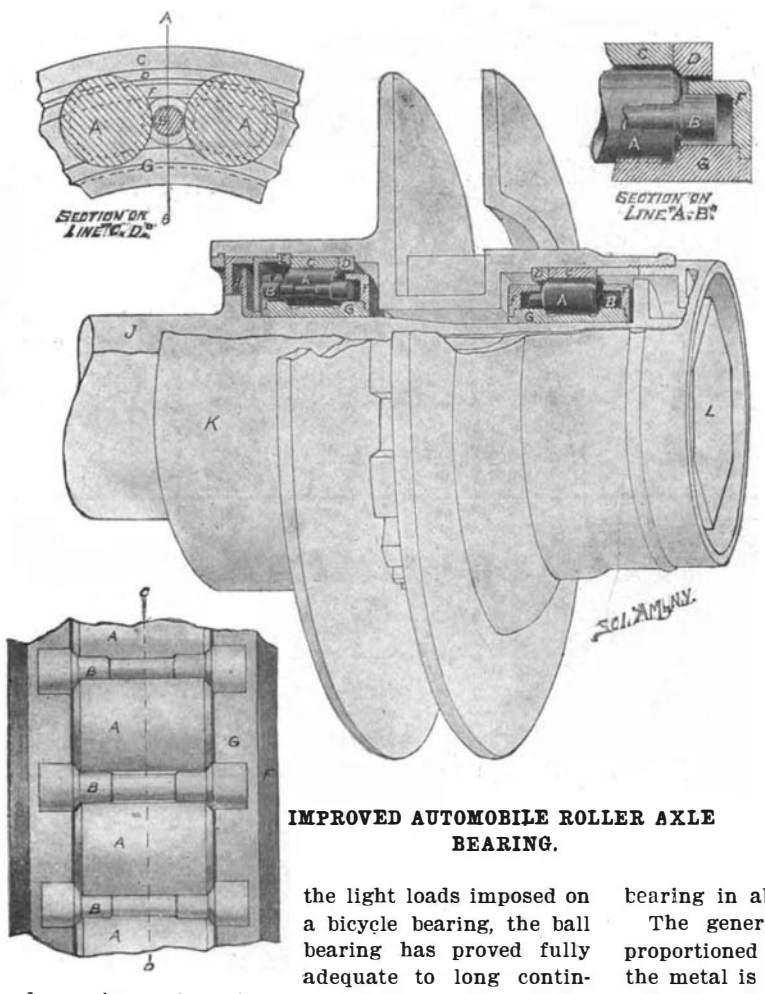
AUTOMOBILE ROLLER AXLE BEARINGS.

The simplest and oldest form of bearing is undoubtedly the plain or parallel axle bearing. It is as old as history itself, and we might be using it yet had it not been for the advent of the bicycle. The writer of the present article well remembers how, in the late seventies, he rode machines that were successively equipped with the plain parallel bearing, the cone bearing, the roller bearing, and finally the single and double ball bearing. Each of these sought to improve upon the original parallel bearing by reducing friction and providing a means of periodically taking up the wear. The plain and the cone bearings were subjected to rubbing friction, the roller and ball bearings to rolling friction. For reasons which will be subsequently explained, the early roller bearings were a failure and soon ceased to be a serious competitor to the ball bearing, which at once proved its absolute superiority to any other type for use in bicycles.

It is not necessary here to demonstrate the superiority of a rolling over a rubbing friction in bearings; and were the question of a perfect bearing a question of friction merely, the ball bearing would stand to-day as the perfect bearing for every conceivable class of work. There are, however, other elements which are of vital importance, especially in bearings intended to carry the heavy loads and be subjected to the violent shocks which are imposed in the modern automobile. We refer to the question of wear and adjustment. As regards the wear, while it is true that under



IMPROVED AUTOMOBILE ROLLER AXLE BEARING.

the light loads imposed on a bicycle bearing, the ball bearing has proved fully adequate to long continued service, when it comes to be subjected to the extremely heavy loads and severe shocks encountered in the automobile, to say nothing of heavy truck or railroad car service, it is found that much larger bearing surfaces are necessary than are provided by the limited contact surface between the ball and its race. Hence it was natural that in searching for a type of bearing which would give this increased bearing surface, inventors should take up, once more, the discarded roller bearing of bicycle days and endeavor to adjust it to modern conditions. Here, apparently, was a complete solution of the problem of adequate bearing surface, and the new types of roller bearing were put upon the market with every confidence that they would meet the conditions of low coefficient of friction combined with adjustability and endurance. It was found, however, that there was a new and unsuspected weakness in the roller bearing, which has proved to be really the most troublesome defect of all. We refer to the necessity of maintaining absolute parallelism between the rollers. It was discovered that if the bearings lost their parallelism they would lose their line contact, and would bear at their center on the inner race and at their ends against the outer race. Under these conditions a heavy cross-bending strain was brought upon the rollers and they were frequently broken. It was found that it would not do merely to place the rollers side by side and trust to their wearing evenly and maintaining parallelism unassisted. Some device for maintaining them in accurate parallel adjustment was essential. So true is this that it is recognized to-day among the makers and users of this type of bearing that the best bearing is the one which has the best method of control. Moreover, it is scarcely less important to provide some form of separator, otherwise the adjacent surfaces of rollers, since they rotate in opposite directions, will exert a rubbing friction against each other that would defeat the very object of the bearing. Many devices have been adopted for guiding the rollers, among which may be mentioned the use of end slots, cages and pivots mounted in cages. Some of these have considerable merit and have stood the hard service of several thousand miles of work; but they all show more or less weakness in the tendency of the cages to wear away, letting the rollers get out of adjustment, and in the liability of the cages to break under the twisting strains that are brought upon them. There is also a certain amount of friction due to the rotation of the rollers in the cages themselves.

The very interesting roller bearing herewith illustrated, which is manufactured by the American Roller Bearing Company, 32 to 40 Binford Street, Boston, Mass., has been designed with a view to satisfactorily solving this problem of control. It seeks to get rid of the rubbing friction which is ultimately fatal to the roller cage, and to provide a system of separation and control which will not only obviate friction, but which will keep the rollers at all times absolutely in parallelism. We present several views of the details of this device, and also a sectional view of a wide axle bearing, in which two of the standard bearings are used, one at each end of the journal. The bearing consists of a series of large rollers, *A*, separated by smaller separating rollers, *B*, which are mounted between the centers of the main rollers, and serve to prevent them from coming in contact. These separators which, like the main rollers and the races, *C* and *G*, are made of hardened steel of high tensional strength, have rolling supports at their ends, this support being afforded by the retainer caps, *F*. The enlarged ends of the separators bear on the races in these caps and are so proportioned that they travel around in perfect harmony with the main rollers without slipping or dragging. Even at the slower speeds, centrifugal force keeps the separating rollers in contact with the retainer caps, so that they have no bearing on the sleeve. At the same time this inner sleeve prevents them from dropping out of place when the speed is too slow. Now, it will be noticed that instead of utilizing the cages ordinarily used, the main rollers, *A*, are kept in place by their beveled edges bearing against the beveled enlarged ends of the separators. Before any given bearing could get out of lateral adjustment, or swing around out of parallel with the axis of the bearing, it would have to stretch and break the shank of the steel separators. In other words, the whole tensional strength of the separators is available to keep the bearing in absolute alignment.

The generous bearing surfaces and the carefully proportioned parts, which have been so adjusted that the metal is never strained as in other bearings up to and beyond its breaking strength, are features that have combined to give to this bearing the extremely low coefficient of friction of 0.00127, as shown in laboratory tests, and a practically negligible amount of wear.

The development of this bearing was carried out in the automobile field, and the success achieved has led to its application to general carriage, wagon and truck work, and to that most severe of tests, the trolley and railroad service. The bearing has stood up so well under heavy trucking that steps are now being taken to enter that most severe field of trolley and railroad service.

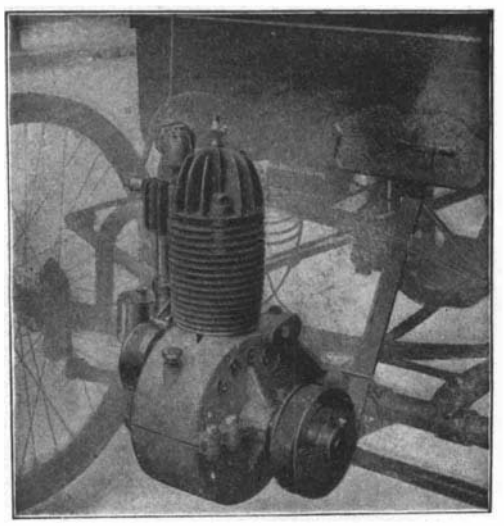
This is the third year of the bearing in active service and the results seem to be proving the claims of the bearing. It is found that the bearings need attention about once in three to six months according to the service. The saving in care is therefore an important element.

An interesting test was made recently with two heavy caravans of a Boston transportation company, one fitted with American roller bearings and one with plain bearings. The roller bearing van had been in service for ten months, and both vans were of the same type. They were loaded equally and a series of draw-bar pull tests made on various kinds of roadbeds. An average of all the readings on both vans showed a net saving of 26.5 per cent for the roller bearing van. These bearings had received attention but once during the ten months and showed no perceptible wear.

Dr. Theodore W. Richards, who was recently called to the Chair of Chemistry at Göttingen, has been elected Professor of Physics at Harvard University.

AUTOMOBILE NOVELTIES.

The Crest Motor Starter.—A very handy device for starting the motor from the seat of the carriage is shown in the annexed cut as applied to the light runabout of the Crest Manufacturing Company. The apparatus consists of a drum on which is wound a belt that passes up through the floor of the vehicle and ends in a suitable handle. Fastened to the inside of the drum is a ratchet that some pawls on a plate keyed to the shaft of the motor, engage. A pull on the strap, therefore, turns the motor, after which a spring in the drum revolves it backward and re-winds the strap.

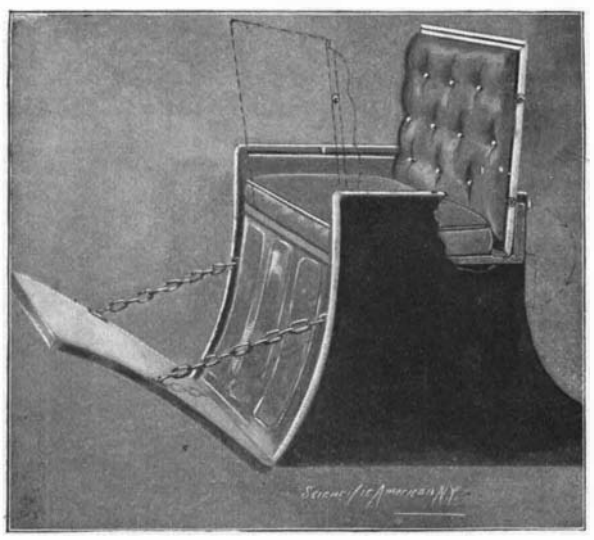


CREST MOTOR STARTER.

As soon as the motor starts, the pawls are thrown out of engagement with the ratchet by centrifugal force, and so produce no clicking noise.

The motor on the Crestmobile also carries a novelty in the shape of an exhaust valve lifter, by which the valve can be raised when the carriage is coasting, and the motor allowed to aspire cool air instead of an explosive mixture. This is one of the patented features of the Crest air-cooled motor.

Mr. Elihu Thomson, who is one of our best-known inventors, is the assignee of a patent recently granted to Otto F. Persson, of Lynn, Mass., for a novel reversible automobile seat. The back of the seat is provided with a double set of projections which work in closed-end slots formed in the back-supporting pieces. An opening is located between the ends of each slot in order that the seat may be inserted and removed. It is evident from this construction that the seat can be easily placed in the slots, shifted either forward or backward, and thus readily reversed. The ends of the



A NEW REVERSIBLE AUTOMOBILE SEAT.

slots are somewhat enlarged, so that the lower edge of the seat may fit into a notch in the seat in order to provide a rigid support.

The Hendricks Magneto.—Instead of a miniature dynamo, the Hendricks Novelty Company make a magneto with permanent magnets, for gas engine ignition. The claims of this company for a patent on a speed governing pulley that is applicable to any small dynamo or magneto have, we are informed, just been allowed, and the company intends putting the device on the market in the near future.

The Covert Running Gear and Transmission.—To anyone contemplating building his own automobile, the light runabout furnished by Byron V. Covert & Co. offers many advantages. The running gear is sold complete, with two clutches operated by a single lever all on, and the body attached also, if desired. All that is necessary to complete the rig is a suitable light motor. The company are now getting out a very neat complete vehicle of this type, which, ready to run, weighs only 400 pounds.