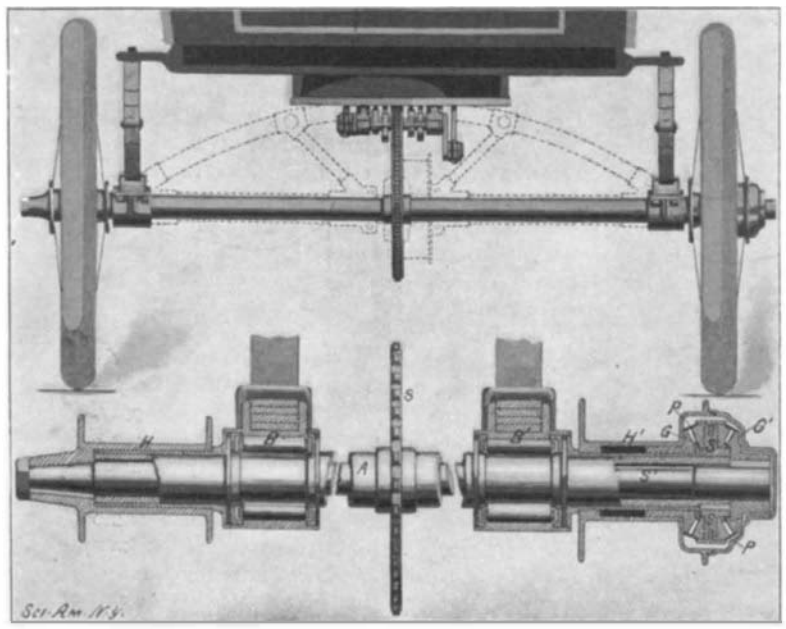
A NEW DRIVING AXLE FOR AUTOMOBILES.

It is well known that the driving wheels of motor vehicles must be connected to the motor in such a way that they can revolve independently of each other, for the reason that when the vehicle turns a curve, or deviates from a straight line, the wheels mounted on the same axle turn at different speeds. Ordinarily, the driving wheels are mounted on the end of a rotating axle or shaft which is divided in its center so as to form two independent parts, these two parts being connected together and with the motor through what is called a differential or compensating gear—a mechanism consisting of two gears, one fast to each axle-end, and a number of loose pinions mounted on the part connected to the motor (usually a central gear or sprocket) and meshing with the gears. When a turning movement is applied to the central gear or sprocket, the pinions act with the same pressure on each gear. If the driving-wheels turn at an equal speed, these pinions remain stationary on their studs and act simply as driving-keys, turning the gears, axles and wheels together as if they were one piece. But should the speed of the driving wheels become unequal—as when the vehicle turns a curve—the pinions would rotate on their studs, with a balancing action on each gear wheel, as much as is necessary to take up the difference in the gears' speeds and drive the driving-wheels, to which they are connected by the axles, with equal force, irrespective of the difference in the speed at which they are turning. While this method of connecting the wheels together and to the motor permits their absolutely independent movement, the division of the axle into two parts weakens it greatly, and obviously necessitates the placing of two extra bearings near the compensating gear, besides introducing a very great difficulty—that of keeping these parts—each carrying a wheel and subject to the severe strains of the road as well as those from the motor—absolutely in line. The slightest diversion not only produces a great amount of friction, but causes the elements of the compensating gearing to slide in and out of pitch (perhaps to the extent of binding) during every revolution of the axle, wearing them out very much faster than they would otherwise wear under simply the compensating action of the parts. It is consequently necessary, with this compensating arrangement, to employ a very strong frame to hold the parts of the axle in line; this frame being, if well made, very expensive, owing to the great number of parts and accurate work required in its construction.

In the accompanying illustration is shown a new driving axle, which has been brought to our notice by Mr. A. E. Osborn, of 2048 Valentine Avenue, New York city, and which, it is claimed, will overcome these disadvantages by making the axle—while permitting the use of any type of compensating gear—solid from the outside of one hub to the outside of the other (the same as in horse-drawn vehicles). The axle, if so made, is not only simpler and stronger in itself, but does away with the weight and expense of the above-mentioned framing and the necessity for the central bearings, thereby eliminating their friction and leaving only the two outer bearings to need attention. The lower view of the annexed illustration shows a section, with the parts broken away, of one form of the driving axle, illustrating only one of the several modifications covered by the patent, while in the upper view is shown a rear elevation of the same applied to a vehicle. The neat appearance of the contrivance—there being nothing between the bearings, except a sprocket or other transmitting mechanism—is apparent, especially when compared with the frame and central compensating gear now used, as shown by the dotted lines.

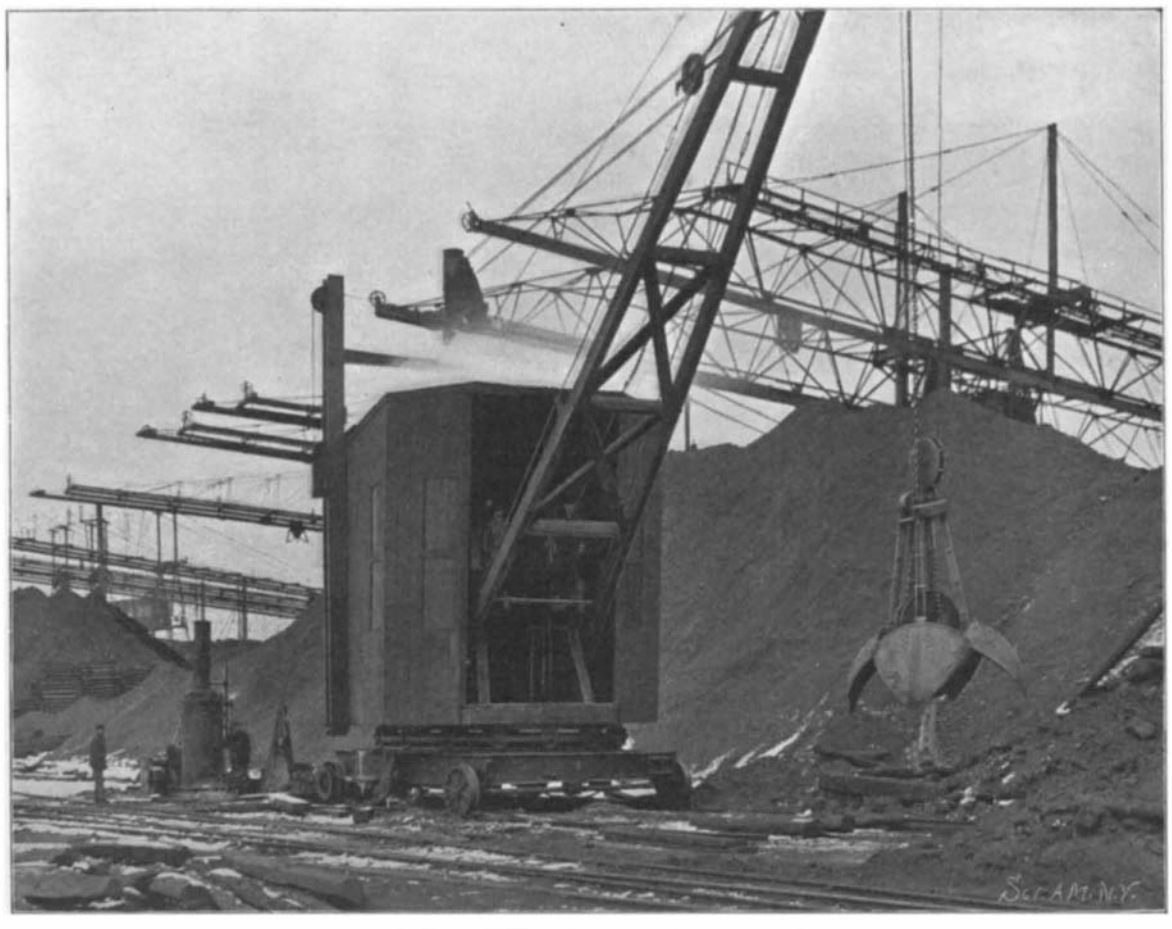
As shown in the sectional view, the hollow driving axle, indicated by *A*, is mounted to rotate in the bearings, *B B*¹, fastened to the springs or framing of the vehicle, and is connected to the vehicle motor by a sprocket, *S*, and chain, as shown, or by any other suitable method. Through the axle a shaft, *S*¹, passes, fastened to the gear, *G*¹, of the compensating gearing at one end and to one of the wheel hubs, *H*¹, at the other, it serving simply to connect the gear and the hub together. The other element, *G*, of the gearing is attached to the other wheel hub, *H*, mounted on the adjacent end of the axle and driving it directly.



A NEW AUTOMOBILE DRIVING-AXLE.

Thus, as both wheels are, of course, free to turn on the ends of the axle, by driving the axle, the pinions, *P*, mounted on the studs, *S*¹, fastened to it, would drive both gears, *G G*¹, which, as they are connected independently to the wheels—one directly and the other through the shaft, *S*¹—would in turn drive them in the same manner as with the usual construction described. As the gearing is inside of one of the traction wheel hubs, it is more easily accessible than when it is placed in the usual position between the axle bearings; for, simply by removing the hub-core, it can be readily examined and oiled. Moreover, the adjustment of the axle-bearings does not affect the mesh of the compensating gears in any way.

Another important feature of this patent is that it covers the use of the spur types of compensating gears with any form of solid axle of the class described, although this type is not shown in the illustration, as the bevel type is more easily understood.



SELF-PROPELLING, AUTOMATIC GRAB BUCKET.

Paris is now erecting along its principal streets "*Phares de Secours.*" They are large lamp-posts provided with a box containing a stretcher, dressings for wounds and a telephone connecting with the nearest ambulance station. On the outside is a barometer and a letter-box.

SELF-PROPELLING AUTOMATIC GRAB BUCKET.

The handling of iron ore has produced some of the most ingenious and labor-saving machinery in the world. The demand for machinery of this type has been made and answered so successfully that the machinery itself has reacted favorably upon the ore-handling industry by multiplying tenfold the amount that can be handled in a given time, and also by greatly reducing the cost of handling. In the Scientific American we have, from time to time, illustrated the latest improvements in ore-handling machinery, and we now present an illustration of what is known as the Hayward Grab Bucket. This is one of the newer machines to be introduced in this class of work. It has made its appearance, and won its way into favor, at the great ore docks of the Carnegie Company, now owned by the United States Steel Company, at Conneaut Harbor. It is used for loading ore from the stock piles into the railroad cars. To enable it to be moved from place to place, it is mounted on a low truck, the wheels of which are driven by sprocket-and-chain gears, operated from a transverse shaft extending beneath the platform of the truck. The grab bucket is mounted centrally upon the truck and rotates upon a turntable, as shown in the engraving. The hoisting and turning engine is closed in by a wooden housing, so that the operators can work at all times protected from the weather. The bucket is what is known as the orange-peel pattern. It consists of four curved triangular steel plates, which are hinged together at their upper abutting corners, and are capable of being swung together until the lower edges meet and form a closed bucket, within which the material is retained. The bucket is raised and lowered by means of a wire cable running in a sheave carried on the top of the bucket. The opening and shutting of the sections of the bucket are accomplished by means of a chain which is worked from the platform of the machine. In operation, the bucket is allowed to fall by its own weight with the leaves open, as shown in our illustration. Its weight buries it in the stock pile; and, as it is lifted, the chain is wound in, bringing the sections of the bucket together and grasping a full load of the ore. The bucket is then raised by the wire cable, swung over the railroad car, and the chain is wound up, opening the leaves and releasing the load.

Persian Carpet Weaving.

A replica of the famous carpet from the mosque of Ardabil, which is now preserved in the South Kensington Museum, London, is being made at Tabreez, Persia, the center of the carpet-making industry of that country. The flowering and designing of this carpet are absolutely unique. A hand-painted design of the original has been furnished to the Persian weavers, and so skillfully is the work being carried out that it is stated by the English consul-general that when completed it will be equal in every respect to the original carpet, so faithfully is the work being reproduced, both with regard to coloring and detail. The carpet is being woven by boys ranging from eight to twelve years of age. They sit in serried rows before their looms. Their method of procedure is to pull the wool from a reel suspended above their heads in their left hands, and, with a flat knife provided with a crooked point in their right, dash the thread, with three movements, through the web strings, hook it into the desired knot, cut off the surplus ends, and start another knot. The work is carried out with such remarkable rapidity that it is almost impossible to follow the movements of the weaver. Before setting to work, the weavers closely study the painted design which they have to reproduce, and then depend entirely upon their memories to enable the work to be completed. Their memories are so reliable that it is very seldom they will refer back to the painted design. When