the square hole provided in the lower end, the drill is inserted. The feed is controlled by slowly turning the screw by hand, or by tightening the setscrew, *a*, and operating the ratchet. The ball bearing on the end of this feed-screw takes all the thrust of the drill against the feed-screw, and the shoulder on the sleeve, *E*, which is also reversed for this operation, takes up the thrust against the casting, *A*. The drill can be adapted for hand, or it can be attached to an object, such as the bar of a gate. In the former case, the object to be drilled can be tightly held in position between the jaws of the vise. For the alternative method, the drill is attached to the object in the manner shown in the illustration.

To convert the tool into a vise, the arms of the casting, *A*, are bent inward. The feed-screw is inserted horizontally through the hole in either end of the arms, and the sleeve, *E*, is brought to bear upon *D*, thus obtaining the necessary action for tightening or releasing the vise. In this operation, also, it is necessary to attach the vise for rigidity upon another object.

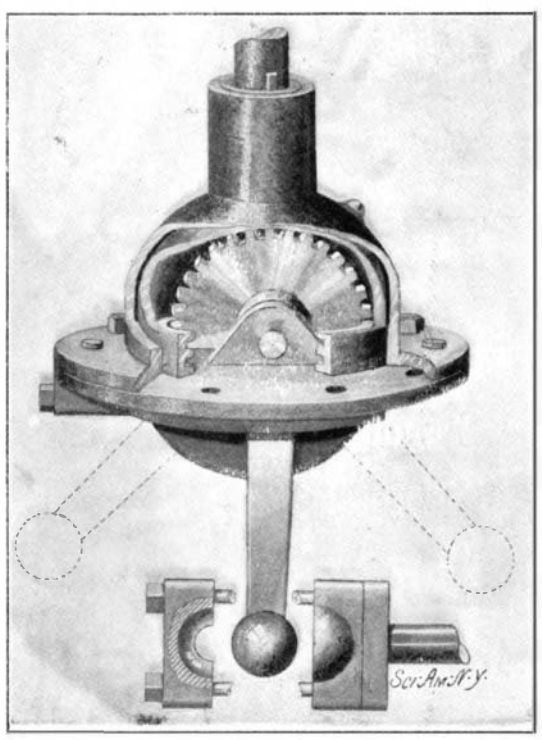
This combination tool is strongly constructed, so that it may withstand considerable hard wear and tear. Yet weight has been reduced as much as practicable, so as not to render it unwieldy. Furthermore, when the parts are detached, they can be packed up into such small compass as to occupy but very little space, and, owing to the number of component parts, the tool can be adapted to either of its purposes with celerity and facility. Its total weight is but 11 pounds and its height 11 inches.

THE BROWN-LIPE STEERING DEVICE.

A wheel steering device which was brought out a year ago by the Brown-Lipe Gear Company, Syracuse, N. Y., is of quite novel construction, and is found on many of the 1904 machines. This steering device was invented by Alexander T. Brown, and it has for its object the providing of an irreversible steering arrangement that can be readily attached to any style of vehicle. The novel feature of the device consists of an internal worm cut on the inner surface of a cup which is attached to the steering post. The internal worm meshes with a gear wheel, on the shaft of which is the steering arm that is connected to the steering lever of the front wheels.

The operation of the device can be seen almost at a glance. The cup containing the worm gear is filled with oil, and consequently has but very little wear. One and a half turns of the steering wheel operate the lever its full throw of 90 deg. The device is self-locking and irreversible, so that it is impossible for the front wheels to change their course if they run against an obstruction in the road.

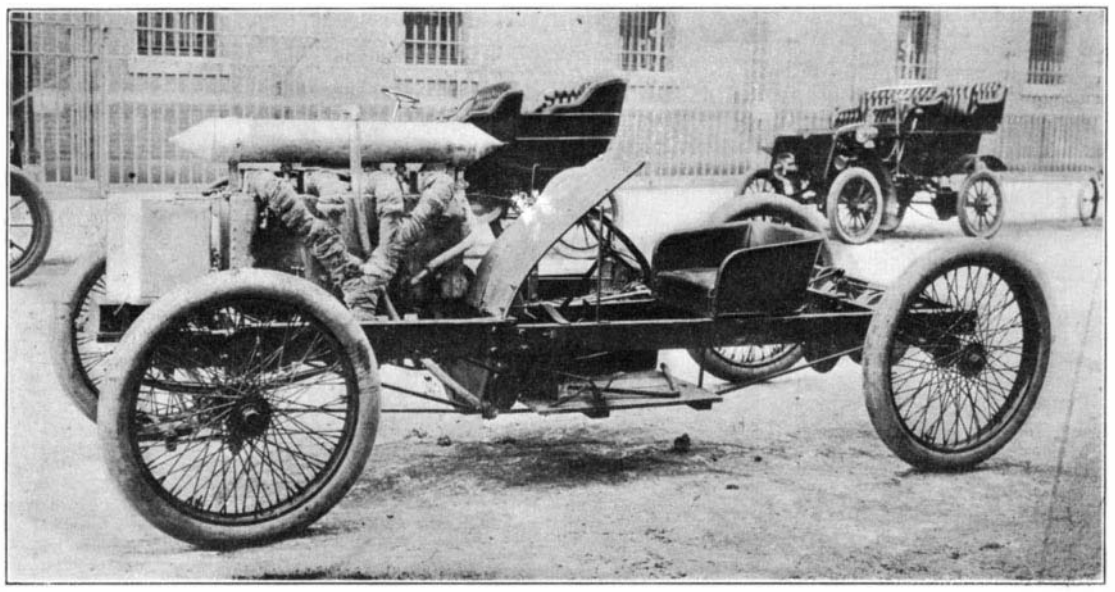
A model of the Assouan Dam, which is on the first cataract of the Nile, will be exhibited in Great Britain's display at the World's Fair. The model is 16 by 4 feet and is the property of Sir Benjamin Baker, the engineer of the dam.



AN INTERNAL-WORM STEERING DEVICE.

THE FORD RECORD-BREAKING RACER.

The racer on which Henry Ford made a world's record on the ice of a mile in 39 2-5 seconds is shown in one of our illustrations. Its appearance is much the same as when it made its first records about one year ago. The change from lever to wheel steering, with a curved wind shield in front of the driver's seat; the substitution of a cylindrical water tank placed on top of the motor, and directly connected to its water jacket, for the old water tank and radiating coils; and the placing of a gasoline tank in front of the motor, are the principal changes. The inlet pipes are shown covered with burlap to prevent too great condensation. A full description of the entire machine was given in our issue of January 17, 1903. It will suffice to state that the motor has four cylinders of 7-inch bore and stroke, and that at the speed of 90 miles an hour, which the car made on the ice, it turns at the rate of 860 revolutions per minute.



FORD RACER WITH RECORD OF A MILE IN 39⅖ SECONDS.

The record was made on the ice of Lake St. Clair, Michigan, on January 12. A mile and a half start was used, in which to get up speed. Edward Huff, Ford's assistant, crouched on the frame in front of the wind shield and held open the carbureter throttle, simply because the jarring due to rough places rendered it impossible to hold the throttle open with the regular pedal. The machine slewed more or less to each side of the 15-foot track, and it ran five-eighths of a mile through the snow after the spark had been cut off. Mr. Ford wore no goggles, and he states that the rush of air was so terrific he could barely see the course, as he was obliged to keep his eyes almost closed.

GLASS-FRONT PROTECTOR FOR PHAETONS.

Although many of the large touring cars this year are fitted with canopy tops and glass fronts, but few runabouts were shown so equipped at the Automobile Show. One of the simplest of these equipments was that on the Elmore runabout, which, it is claimed, can easily be adapted to any phaeton or buggy with a top. The front is contained in a frame which is clamped to the carriage top and to the dash by means of several thumb screws. Side curtains can be buckled to the top, thus completely inclosing the occupants of the carriage. The glass front has a window, which can be raised if the weather permits. This simple attachment should be of great service to physicians and all others who are obliged to drive an automobile in stormy weather.

Dr. Morton's Theory of the Therapeutic Value of Radium Solutions.

Radium and actinium were discussed recently before the Technology Club of New York in the operating rooms of Dr. William J. Morton, by Dr. George F. Kunz and Dr. Morton, who is professor of electrotherapeutics in the New York Post Graduate Medical School and Hospital.

Dr. Morton explained in detail the uses to which radium might be put in curing diseases, particularly those of an internal nature.

"Medicine," he said, "is gradually abandoning its old-fashioned concoctions, and we are taking up radium with exceedingly bright prospects. Its use will consist of physical treatment almost exclusively. The Roentgen ray has been of immense value in curing cancer, but radium promises to go far ahead of it. If we had radium of 150,000 activity we could no doubt do a great deal more than we are doing now. Most of us have been confined to a much lower radioactivity. We have been working with from 7,000 to 10,000 luminosity.

"The actual glow of radium does not represent its actual radioactivity. There is a great difference in the ore. One sort of radium may possess a high luminosity, while another sort may have a high radioactivity and very little luminosity. We cannot boast of the luminosity of the kind which we now have."

Dr. Morton startled his hearers by telling of a mixture which he had prepared and called "liquid sunshine," the name having been applied because the doctor regarded it as a good "catch" phrase to give to the preparation. By means of this fluid, he said, the whole interior of a patient could be lighted up.

The doctor exhibited six tubes containing "liquid sunshine," one of which, he explained, contained quinine sulphate which had been exposed to radioactivity. He then proceeded to show the luminous quality of the fluid by placing each tube before a strong X-ray, whereupon a spot of faint light was seen about the size of the palm of the human hand.

"That," said the doctor, "would be the result if the liquid were taken inside. I believe," he added, "that radium may after all be the real curative property which has been found in so many spring waters throughout the world.

"The advantage of radium over the X-ray is that it can be applied directly to the part affected. For example, if placed in a small tube it may be inserted in the throat, and in similar manner it may be applied to any vital region. In other words, with radium we shall be able to get at the seat of diseases. There is no end, in my opinion, to the cures which may be effected by radioactivity, excited in one way or another.

"In imparting radioactivity to liquids, however, we will have to be extremely careful, and physicians will need to use the utmost discretion in advising patients to drink the fluid. It will be possible, however, to bathe a patient's entire interior in violet or ultra-violet light as the result of this discovery, and this light we have decided to call 'sunshine.' We know of the value of sunshine on the outside, particularly where bald heads are concerned, and we believe it will have a similar effect on the inside."

Mr. Morton told of several cures of cancer by radium, and exhibited a bell-shaped glass, where the smaller tubes of radium, of about 7,000 activity, could be placed in the flesh affected. As the activities of radium became greater, he expected that more important results would follow.

A brake shoe is being constructed by an American firm having a hard iron insert around which is cast the body of the shoe in gray iron. The gray iron is not permitted to chill, which is claimed to be a peculiarity of this shoe as compared to others of the kind. The hard iron is made of very high-grade malleable iron. The secret processes of casting gray iron about the insert without chilling are said to give toughness to the body of the shoe, and a better friction coefficient than a chilled shoe.

GLASS FRONT AND SIDE CURTAINS AS APPLIED TO A RUNABOUT.