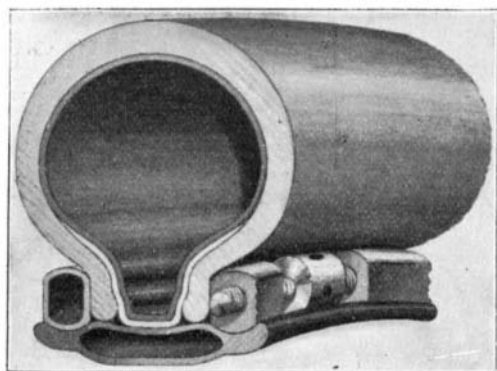


A NEW DETACHABLE TIRE.

Despite years of experience with bicycle tires and the large number of automobile tires invented, every year seems to bring still further improvements on this vital part of the automobile. The accompanying engraving shows one of the latest types of automobile tires, which has been brought out by the Hartford Rubber Works. This construction provides a simple means for removing the tire quickly and conveniently from the wheel. The wheel rim, it will be observed, is



IMPROVED DETACHABLE TIRE.

flat in cross section, with two grooves formed near the edges on the outer surface, to receive the retaining rings. The retaining rings are formed of metal tubing bent around the wheel rim, and closed at their ends by plugs firmly secured therein. These ends are tightly drawn together by a double-ended bolt with right and left-hand threads, which screws into the plugs, thus firmly holding the retaining ring in place. The tire, as shown, is held between the two retaining rings. When it is desired to remove the tire, it is only necessary to remove one of the rings, and this can be done by giving the bolt a few turns, which loosens the ring to such an extent that it can be removed from the rim, permitting the tire to be slipped off.

THE CADILLAC PLANETARY GEAR TRANSMISSION.

The transmission gear used on the Cadillac car may be taken as typical of all the planetary gear transmissions used at the present time. It consists, as will be seen from the annexed cut, of two drums, *H* and *K*, the former of which contains six studs, *L*, having mounted on them six spur pinions. Three of these pinions, *E*, are twice the width of the other three, *F*, and all mesh with a pinion the width of the *F* pinions and placed at *G* in the diagram, although it is not shown. This pinion is on a sleeve keyed to the hub of the drum, *K*. The main driving pinion, *D*, is keyed to the driving shaft, and meshes with the *E* pinions only, on the widened portion which projects beyond the pinions, *F*, as shown in the cut. The left end of the gear case, *C*, is fastened to *H* by screws. The drum, *B*, on which is the internal gear, is continued through the casing, and the sprocket, *A*, forms part of it. The operation of the transmission, the driving shaft of which is direct-connected to the crank shaft of the motor, is as follows: The brake drum, *H*, with the pinion studs upon it, is held stationary by a band brake; and when pinion, *D*, turns with the shaft in the direction of the arrow upon it, it drives pinion, *E*, in the direction shown by its arrow, and, since *E*'s stud is stationary, *E* in turn drives internal gear, *B*, in the opposite direction. This produces the reverse. To obtain the slow speed, the brake drum, *K*, is held by a brake band, and pinion, *D*, drives pinions, *E*, as heretofore. *E* in turn drives *F*, but as *G* is stationary, since it forms part of the drum, *K*, the pinions, *F*, travel round it with a planetary motion, thus turning the drum, *H*, slowly and causing the pinions, *E*, to turn the internal gear and drum, *B*, even more slowly, but in the same direction as that in which *D* is turning. For the high speed, a leather-faced disk keyed to the shaft is pushed against the smooth surface on the right-hand end of drum, *K*, thus locking *K* to the shaft, and causing the whole drum to turn as one unit without any of the gears revolving. When the car is standing still and the engine is running, all the gears are turning, and the drum is revolving idly about the shaft. Another form of planetary gear transmission that is now widely used has no internal gears whatever, but the form illustrated is a simple one, in that the internal

gears are reduced to but one, which is used only for the reverse.

A COMBINATION TOOL FOR AUTOMOBILES.

BY THE ENGLISH CORRESPONDENT OF THE SCIENTIFIC AMERICAN.

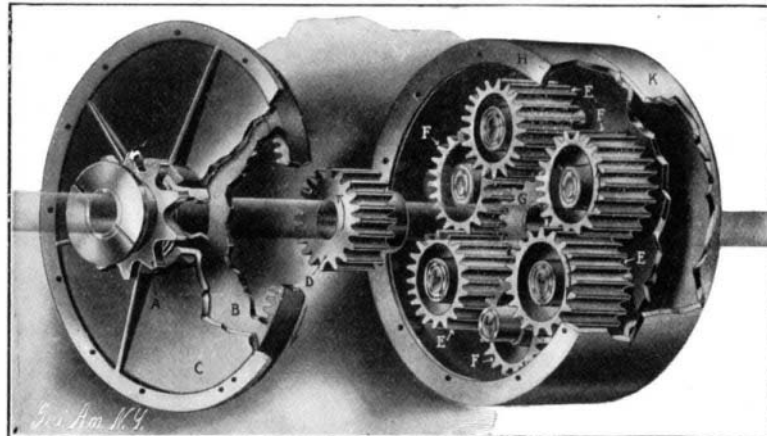
A novel combination tool for automobilists has been devised by Mr. F. V. Dalton, of England, the feature of which is that therein are incorporated many of the tools which are often required on the road when a breakdown occurs, but are not carried on board, owing to their bulky nature. In this device, however, these tools have been ingeniously compressed. The new tool can be operated as a lifting jack; a handy, albeit powerful, vise; and a drilling machine. When dismembered and packed away, it requires no more space than is generally occupied by the ordinary lifting jack.

The device consists essentially of but seven pieces, which are shown disconnected in the first illustration. The letter *A* represents the largest portion of the tool, a malleable casting with its extremities comprising jaws, as in the ordinary vise. This portion is made in three pieces, the jaw pieces being hinged on either side of the central casting by means of detachable pins. The faces of the jaws are roughened in the conventional manner to insure a firm grip when the tool is used as a vise. It is equally serviceable for small parts, such as bolts, nuts, screws, and pipes.

Between the two jaw arms is hinged a link comprising the central casting, which is machined out to carry the small sleeve, *E*, which is held firmly in position when inserted by means of the setscrew, *a*. Through each jaw arm is another hole. When these arms are hinged over so as to form a vise, these holes are brought into the same horizontal plane, and through these works the feed-screw, *B*, which constitutes one of the vital parts of the whole tool, and in this particular instance serves to open and close the vise.

The feed-screw, *B*, is of the same gage as the thread in the piece, *E*, in which it works. It is made of

steel and is hollow. Through this feed-screw extends a steel spindle, held in position to prevent any longitudinal movement, by a ball thrust bearing at the upper end and a collar at the lower extremity. The upper end of this spindle terminates in a broad block with a concave face, as in an ordinary lifting jack. In the center of this head is a square-cut hole to carry a drill. Just behind this head is the ball bearing, and then comes the casting, *b*, which is free, so as to turn



CADILLAC PLANETARY GEAR TRANSMISSION.

in either direction upon the feed-screw. This casting is fitted with a double pawl, which is so pivoted that it can be made to engage either to the right or left in the slots in the head, *e*, on the feed-screw, acting ratchet fashion, so that the feed-screw can be made to turn right or left as desired. The opposite end of the spindle in the feed-screw is squared.

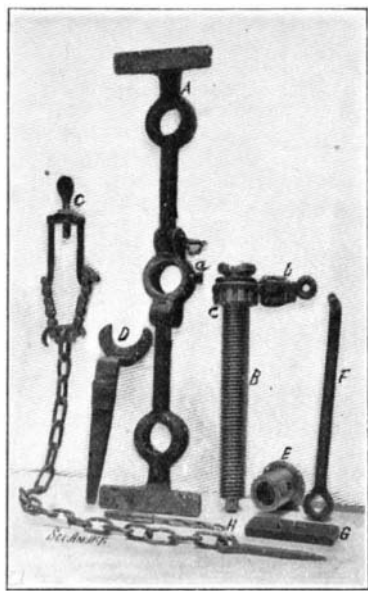
F is a forging bent at one end, flattened at the other end, and pierced with a square hole, to fit like a spanner upon the square end of the spindle in the feed-screw, *B*. The bend in the upper end forms a right angle, and has a reduced cut around it. This extremity is inserted in a hole in the small casting, *b*, forming a handle to operate the feed-screw, *B*. On the feed-screw is fixed a small spring projecting slightly over a hole parallel with the axis of the screw, and which engages on a narrow saw-cut around an inserted movable ratchet pawl, thus keeping the pawl in its proper working position. This spanner also fits the head of the setscrew, *a*, in the center casting of the piece, *A*.

C is a clamp fitted with a thumbscrew and two projecting pins, one on either side, with hooks attached. One of these hooks is made to engage in one end of a block chain, and the other hook is so fashioned that it will take any link in the chain, so that the latter may be shortened or lengthened as the exigency of the work in hand demands. Another chain of ordinary links is attached to the block chain by the fastening shown in the illustration, which enables an even or balanced purchase to be obtained. The other end of this second chain is provided with a pin which will pass through any link of the chain.

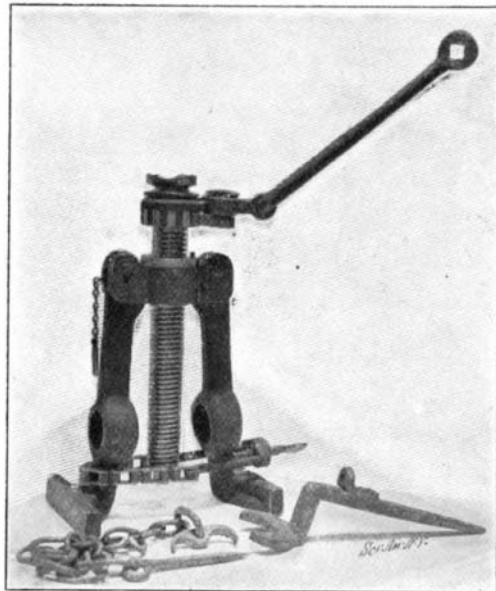
The remaining two pieces, *D* and *G*, are of minor character. The forging, *D*, is somewhat similar in shape to a spanner. The larger end encircles the feed-screw, *B*, while the other end has a blunt point. *G* is simply a bar of iron which can be used for any purpose that may arise, such as the bedplate in the drill, and is consequently not a necessary part of the outfit. *H* is the drill.

This tool can be accommodated to any of the functions which it is intended to fulfill with ease and celerity, and the accompanying photographs will show how it is accommodated to these respective operations. For use as a lifting jack the vise-jaw arms are bent over with the jaws outside, the sleeve, *E*, is inserted in the central hole of *A*, a shoulder on the sleeve preventing it passing right through. The vise jaws are converted into feet for the jack, giving it thereby a solid foundation, and are prevented from springing open by the clamp and block chain, *C*. The feed screw, *B*, is threaded into the sleeve, and the handle, *F*, attached as shown. This jack is both powerful and strong, and is sufficient to cope with any lifting operation that may arise with the general type of automobile, its maximum lifting capacity being two tons.

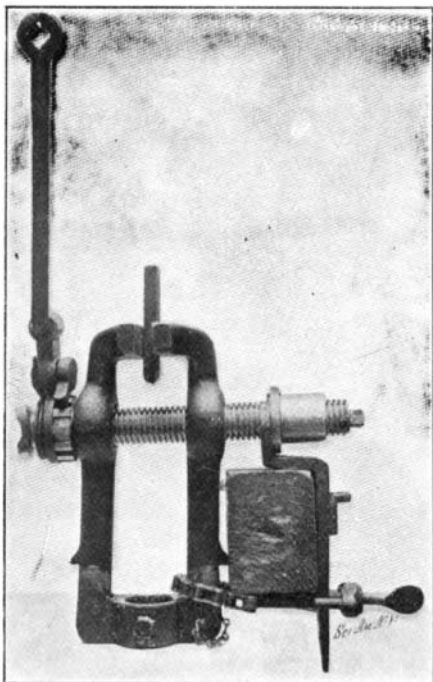
To employ the tool as a drill, the arrangement is slightly modified from that required for the jack, as may be seen by reference to the illustration. In this instance the feed-screw is reversed, and in



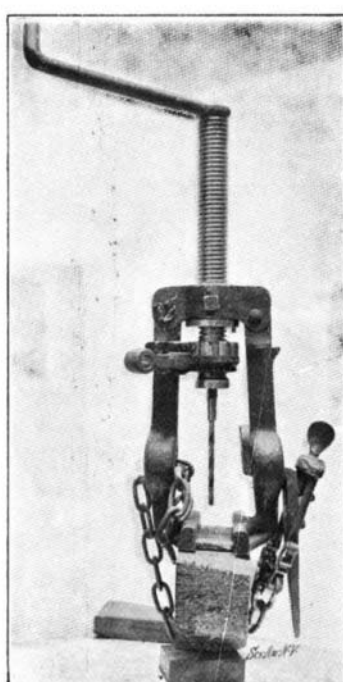
Component Parts of the Tool.



The Tool as a Lifting Jack.



How the Tool Forms a Vise.



The Tool Arranged as a Drill.

AN AUTOMOBILE TOOL THAT CAN BE USED IN SEVERAL WAYS.



Rambler Delivery Wagons

are fitted with 81-inch wheel-base and four full elliptic springs, insuring safe conveyance for delicate packages; carry one and one-quarter cubic yards of merchandise, accessible front and rear of wagon.

All adjustments of engine made from front of wagon; no need to remove packages to get at the mechanism. Delivery top can be easily detached from body, leaving one-seat runabout; or tonneau can be attached in place of top.

Price of Rambler Delivery Wagon, with brass side lamps and horn, \$850.00 at the factory. Tonneau to attach in place of delivery top, \$100.00 additional.

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Light Touring Car

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TONNEAU, \$2550, with top and front glass, two Solar No. 1 gas headlights, two Dietz Regal oil lights, tail light, horn with tube and full equipment; \$2450 without top and front glass.
LIGHT TOURING CAR, \$1450, having much the same outward appearance as our famous Runabout of 1903, but of higher power and capacity and distinctly a powerful touring car—not a Runabout—the most highly developed car of its type—the perfected product of the oldest makers of motor cars in America.

We make more nearly the entire car than any other factory in the world, and are, above all others, competent to guarantee our product.

These cars show fewer mechanical changes and contain more features that years of use have proved perfect in practice than any other, and are backed by an unequalled past record—seventeen contests entered—seventeen contests won, with stock cars.

Most Haynes-Apperson cars have practically been sold before they were built. Get your order in early.

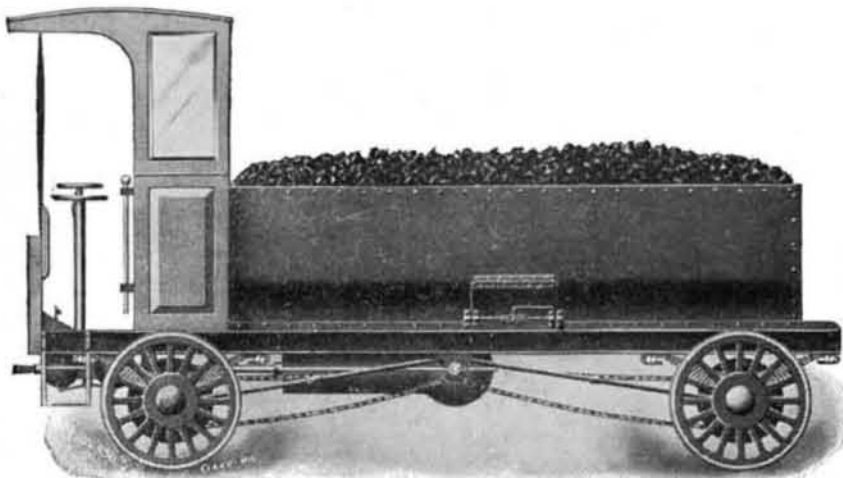
HAYNES-APPERSON CO. The Oldest Makers of Motor Cars in America
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Members of the Association of Licensed Automobile Manufacturers
EASTERN REPRESENTATIVES: Brooklyn Automobile Co., 1230-11-43 Fulton St., Brooklyn, N. Y., and 66 West 43d St., New York. National Automobile and Mfg. Co., Pacific Coast Agents, San Francisco.
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The "Mogul"

Business Wagon

Applies power from one engine or motor to all wheels. Busses and Freight and Delivery Wagons, one to ten ton capacity, any kind of power desired



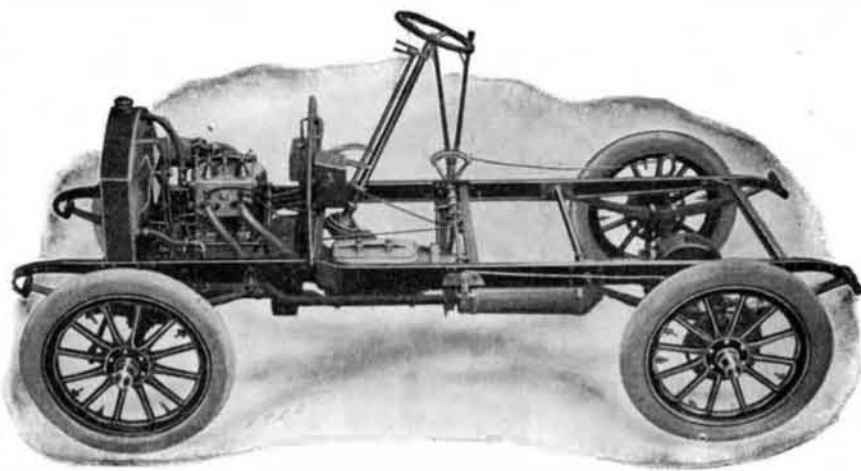
7-Ton Gasoline Coal Wagon

*Steers and Drives all Four
Wheels Without Slipping
or Skidding...*

THE FOUR-WHEEL DRIVE WAGON CO.
MILWAUKEE, WIS.

*A Practical Motor Car
with an Intrinsic Value*

The Royal Tourist



CHASSIS MODEL "O"

Shows Experience and Careful Attention to Detail

16 horse power, two cylinders, 1,800 pounds, \$2,300
32 horse power, four cylinders, 2,000 pounds, \$3,000
Aluminium Bodies, Complete Equipments

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Cleveland, Ohio

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.

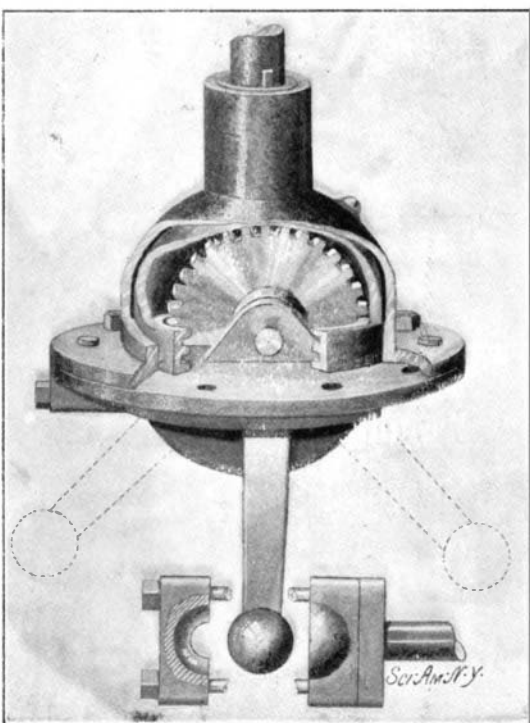
This combination tool is strongly constructed, so that it may withstand considerable hard wear and tear. Yet weight has been reduced as much as practicable, so as not to render it unwieldy. Furthermore, when the parts are detached, they can be packed up into such small compass as to occupy but very little 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.

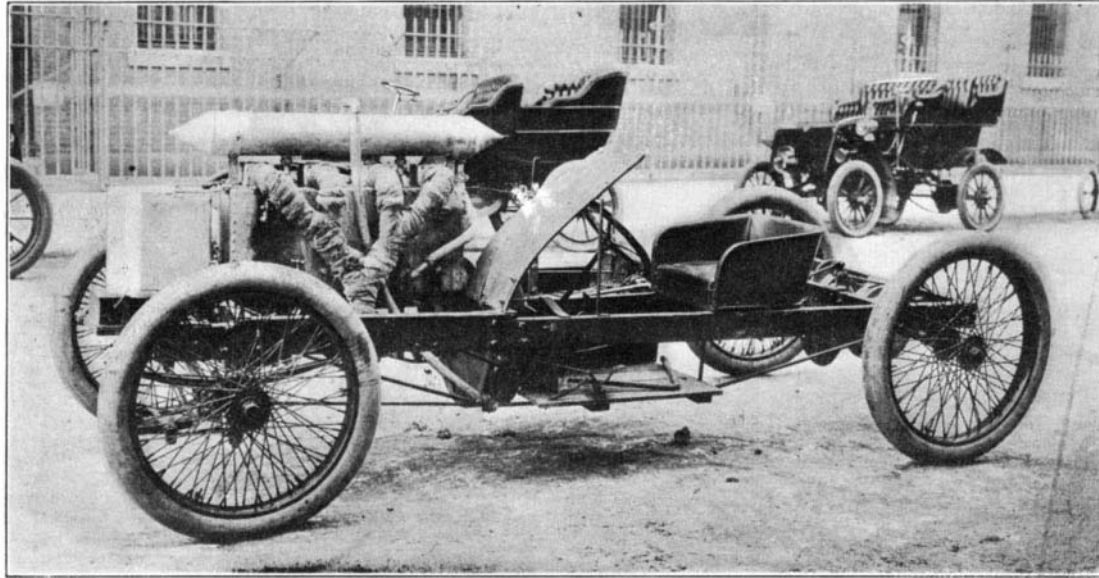
A model of the Assouan Dam, which is on the first cataract of the Nile, will be exhibited in Great Britain's display at the World's Fair. The model is 16 by 4 feet and is the property of Sir Benjamin Baker, the engineer of the dam.



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 39.25 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



FORD RACER WITH RECORD OF A MILE IN 39.25 SECONDS.

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.

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 carburetor 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 ultraviolet 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.