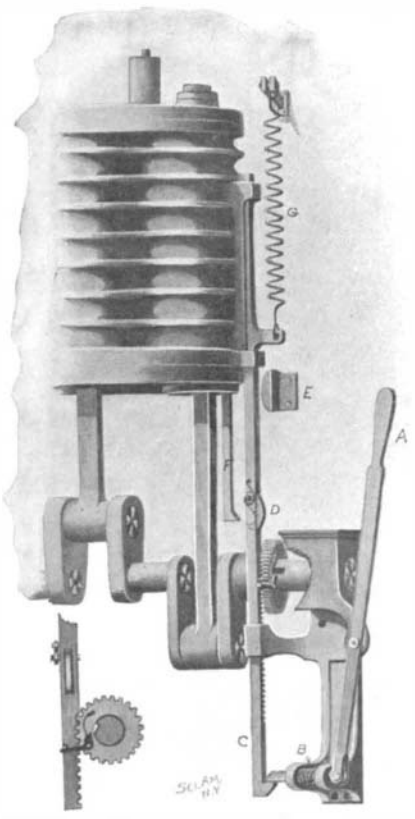
A STARTING-DEVICE FOR HYDROCARBON MOTORS.

Mechanical devices for starting hydrocarbon motors have been invented, but have never been widely used for the reason that they are too often expensive, cumbersome, and inefficient. The chauffeur has therefore decided to retain the customary hand-wheel, by the turning of which he finally succeeds in inducing the gasoline motor of his automobile to start. A mechanical starter of unusual simplicity has, however, been



A STARTING-DEVICE FOR HYDROCARBON MOTORS.

invented by Dr. Z. S. Taylor, of 29 West 126th Street, Manhattan, New York city, that seems to be free from the faults which marked the old contrivances and which shows an intelligent endeavor to overcome hitherto apparently insurmountable difficulties. On the driving shaft of his engine Dr. Taylor loosely mounts a pinion, meshing with a rack, *C*, controlled by a coil-spring, *G*. The pinion can be locked to the shaft by means of a spring-pressed pawl designed to engage a notch in the shaft. Normally the pawl is held out of engagement with the shaft-notches by a pin on the rack.

Near its middle the rack carries a pivoted spring-pressed catch, *D*, designed to engage the hooked end of a rod, *F*, secured to the piston. To throw the catch, *D*, into the path of the rod, *F*, a cam, *E*, is employed.

The outer end of the rack, *C*, is also hooked to engage a spring-pressed catch, *B*, operated by the lever, *A*.

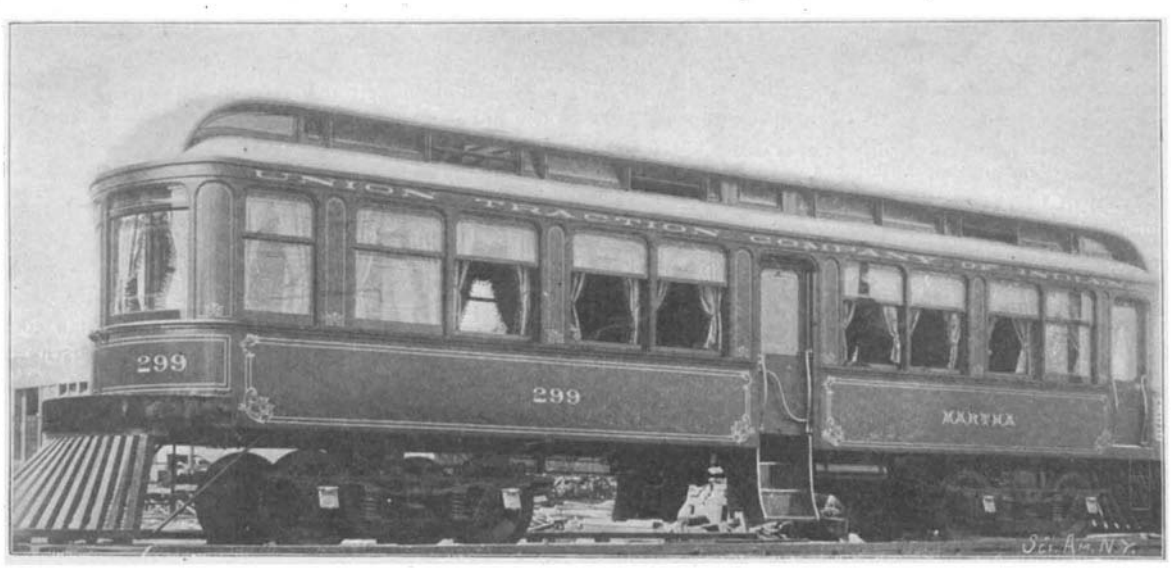
In order to start the engine, the lever, *A*, is swung over to withdraw the catch, *B*, from the rack-hook, whereupon the spring, *G*, pulls the rack inwardly. This movement of the rack withdraws the pin on the rack from the pinion-pawl, whereby the pawl is forced by its spring into the shaft notch, thus locking shaft and pinion together, and causing the shaft to turn. The rotary movement given to the shaft causes the drawing in of an explosive charge into the cylinder, so that an impulse is given to the piston after ignition.

At the end of the rack's travel the catch, *D*, is projected by the cam, *E*, into the path of the hook on rod, *F*. On the out stroke of the piston, the rack is consequently moved back against the tension of its spring, *G*, and is automatically locked to the catch, *B*. And there the rack remains until again released by the lever, *A*.

A TROLLEY PALACE CAR.

Our engraving shows the new palace car "Martha," built for General-Manager George F. McCullough, of the Union Traction Co. of Indiana, by the St. Louis Car Company, of St. Louis, Mo. The conditions which led to the building of this car are peculiar. The Traction Company has a terminal in cities like Indianapolis, Anderson, Muncie and Marion; the system is 140 miles long and competes for traffic with steam roads for most of its length. The presence of the General-Manager is required at various centers, and in order to be able to move quickly from place to place, the car was designed so as to afford him an office on wheels, and, if necessary, a home as well. The total cost of the car was $12,000, probably the largest sum ever expended for a single electric car. It is 60 feet long, and there is a cowcatcher on each end of the car. It is mounted on two four-wheel trucks, and is equipped with two 250 horse power motors, so that it can attain a speed of 60 miles an hour if desired. It is equipped with Christensen air brakes.

The decorations and furnishings are most elaborate. It is painted a dark olive green, and in some of the panels we read "Martha." The interior finish is French Renaissance. One apartment is termed the red room, the other the green room. The finest South African mahogany and the finest plate glass are used, and the carvings are most elaborate. The ceilings are light blue and are decorated. The red room contains two desks, one for the general-manager, and the other for his stenographer. It also has a buffet, bookcase, water coolers, etc., in addition to two folding tables. In the rear end of the car there is a smoking compartment. The green room is fitted with an upper and lower berth, a complete bath room and lavatory, and kitchen with the necessary utensils and a china closet and ice box. There is a small compartment for the motorman at each end of the car. There are four electric chandeliers, two in each compartment, and 25 single lamps, so that there is ample light. The furnishings are the most elaborate which could be provided, the chairs being upholstered in silk damask except the office chairs, which are covered with red leather. Electric call bells are in every compartment, and in fact there is every convenience which could be looked for in any private car of a railroad president on a steam line.



PALACE TROLLEY CAR FOR A GENERAL MANAGER.

New Breech-loading Quick-firing Gun.

The British Naval Department are introducing a new breech-loading quick-firing gun into the great 18,000-ton battleships which are now in course of construction. The diameter of the bore is 7.5 inches and its total length from breech to muzzle is 386.7 inches. The gun weighs 15¾ tons and is equipped with a shield weighing 12 tons 16 hundredweight. The weight of the projectile is 209 pounds, which is twice the weight of that utilized with the 6-inch gun. The charge is 79 pounds of nitro-cellulose, which imparts a velocity of 3,000 feet per second and an energy of 12,480 foot-tons. The breech mechanism is very ingenious, being of a new hand-lever type, by which means the breech is opened and closed by a single motion of the lever. The one horizontal swing of the hand lever rotates the breech plug, swings it in and out of the gun, and cocks the firing striker. Considering its size it is the most powerful weapon is existence. It is more than twice the length of the former 6-inch gun and exceeds in length the former earlier type of 12-inch gun.

Iron-plating a Lighthouse.

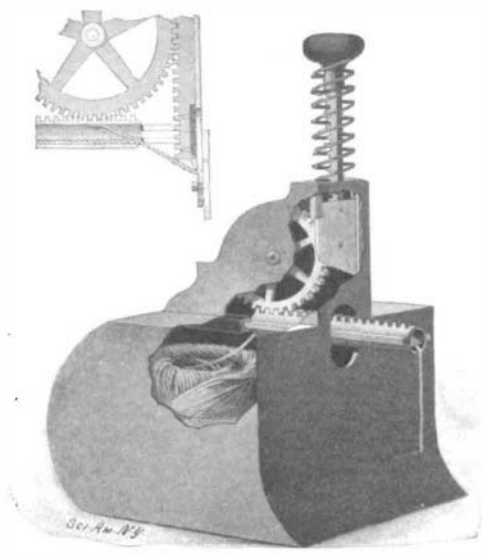
An ingenious use of steel plates has been made at a lighthouse at Grande Pointe au Sable, in Michigan, says The Architect. The lighthouse, which is about 80 feet high, is formed of brick with a stone base. It was erected in 1867, but almost from its completion it has suffered from the violent rain storms of the district. For a long time pointing was undertaken regularly, but at length it was determined to incase the lighthouse with metal. The bent plates used varied from 5-16 inch to 3-16 inch in thickness, and they were united by means of angle bars. As a further precaution, a space was allowed between the brickwork and the metalwork, which was filled in with concrete. The work was carried out by Mr. E. L. Woodruff, and the total cost has been about $5,000. For that outlay a serviceable lighthouse has been secured, and it is believed that owing to the success of the experiment several others of the numerous lighthouses that are required near the big lakes and rivers of America will be treated in a similar way.

A NOVEL TWINE HOLDER AND CUTTER.

A device which is specially adapted for guiding and cutting twine to be used in tying up packages has recently been patented in the United States by Raymond D. Weakley, of St. Louis, Mo.

As our illustration shows, the device comprises essentially a lower compartment and an upper compartment, the former of which contains the ball of twine and the upper of which incloses the operative mechanism.

This operative mechanism comprises a toothed wheel meshing with a rack formed on a carrier. The carrier is tubular in form and receives the free end of



A NOVEL TWINE HOLDER AND CUTTER.

the twine. A spring in the carrier prevents the twine from slipping.

Below the opening in the casing through which the carrier normally projects a knife is secured. In the upper section of the casing a plunger surrounded by a coiled spring is mounted, the plunger being provided with a rack which likewise meshes with the toothed wheel. When the plunger is partially depressed the toothed wheel is turned, whereby the carrier is forced within the casing. When the plunger is depressed to its fullest extent, a blade attached to its lower end will pass the fixed blade previously mentioned and sever that portion of the twine which extends through the opening in the casing. As soon as the plunger is released it will be restored to its normal position by the coiled spring.

Wood in Battleships.

The British Admiralty has always evinced an inexplicable partiality for the extensive employment of wood, even in their most modern battleships. Naval experts of every other country have almost unanimously considered this a grave error on the part of the British, while one authority even went so far as to remark that the latest battleships in the English navy would burn like tinder in a battle. It is indispensable that a certain amount of woodwork should be present in a warship, but the quantity should be restricted to the irreducible minimum. Not only does the presence of woodwork constitute a serious danger from fire, but it offers a severe menace to the crew, who would in all probability suffer extensively from flying splinters. This fact was incontrovertibly established in the course of the experiments with the old "Belleisle." The British Admiralty has attempted to remedy this defect by the use of non-inflammable wood. This, however, did not prove entirely satisfactory, and a short while ago it was announced that this chemically-treated wood would be no further employed. Now the Admiralty has gone a step further, and has announced that wood will not be used in future in the construction of battleships except where rendered absolutely necessary. There will be no wooden decks, and the cabins are to be built of steel, lined with corticine. This decision, it is stated, is due to the investigations of the havoc wrought upon the "Belleisle" and marks a decided step forward. Several new features which are being introduced into the British warships now in course of erection are attributed to the same cause, so that the object lesson given by the "Belleisle" has not proved unavailing. All those vessels now on the stocks which are not too advanced will have the woodwork removed and steelwork substituted.