THE IVEL AGRICULTURAL MOTOR.

BY HERBERT C. FYFE.

For some few weeks past there has been at work in England a new portable petrol agricultural motor, the invention of Mr. Dan Albone, of the Ivel Motor Works, Biggleswade, Bedfordshire.

This new motor has been designed and made chiefly for the use of farmers. It is constructed to draw motors, reapers, plows, scuffles, wagons, etc., by attaching these machines to the back of the motor. The connection is formed by taking out the long pole of the mower, etc., and substituting a shorter one, the latter being joined to the motor by a spring coupling. Almost any agricultural machine can be attached to the motor in a few minutes, and apart from working in the fields it can be utilized on the farm for cutting chaff, pulping roots, grinding corn and other operations.

THE IVEL MOTOR LAWN-MOWER.

The petrol motor is an 8 horse power double-cylinder with water circulation. It has electric ignition, one speed forward and reverse, and it is claimed that any ordinarily intelligent farm hand could drive it after a few lessons. The engine is free, and when put in motion a friction clutch is employed to transmit the power through an intermediate shaft to the balance gear shaft of road wheels, by means of patent silent running chains. The wheels have extra wide rims with grips on to prevent them from skidding round. The machine complete weighs 17 hundredweight, 7 pounds, and for traveling on the high-road detachable rubber pads are attached to the rims of the wheels by means of thumb screws. These rubber pads lessen the vibration and enable the motor to run more silently than it would do otherwise.

They are easily fitted or taken off in a very short time. The cost of fuel and necessities in running the new agricultural motor is very small and Mr. Dan Albone claims that it works out considerably less than the cost of horse labor.

During the past autumn the Ivel agricultural motor has been employed in harvesting operations in Bedfordshire, Lincolnshire and other English counties. The motor attached to a Hornsby 6-foot reaper and binder cut heavy crops of wheat and it was found that the cost of fuel worked out at about 8d. an acre and that less time was taken than formerly when horse labor had been employed. Besides this, two horses and a man were dispensed with, for the motor requires only one man to manipulate it.

The Ivel motor also cut a field of barley, and after cutting the crop it drew the loaded wagon from the field. In order also to prove its capabilities Mr. Dan Albone attached a two-furrowed Hornsby plow to the motor and a piece of oat stubble land was plowed. The work was declared by farmers, who witnessed the trials, to be exceedingly well done, the furrows being even and of good depth. Martin's cultivators were also tried attached to the motor and the work in this case was equally well done. The motor plow can easily cut two furrows in one operation, about 20 inches wide and 5 inches deep. There is no doubt that in agricultural operations there is a great future before the mechanically-propelled vehicle. Hitherto in Great Britain the stationary engine has been almost exclusively employed, though in some places traction engines are used to haul plows, mowers, reapers, binders, etc., across the fields. The motor in the field itself running up and down the land is a new departure in England and there is no doubt that such a motor as the Ivel will prove of very great value to the farmer. There is much agricultural depression in Britain, yet it was estimated that last autumn there were more than six and a half million acres of wheat, barley, and oats to be reaped, to say nothing of nearly eight million acres of hay to be cut in England alone.

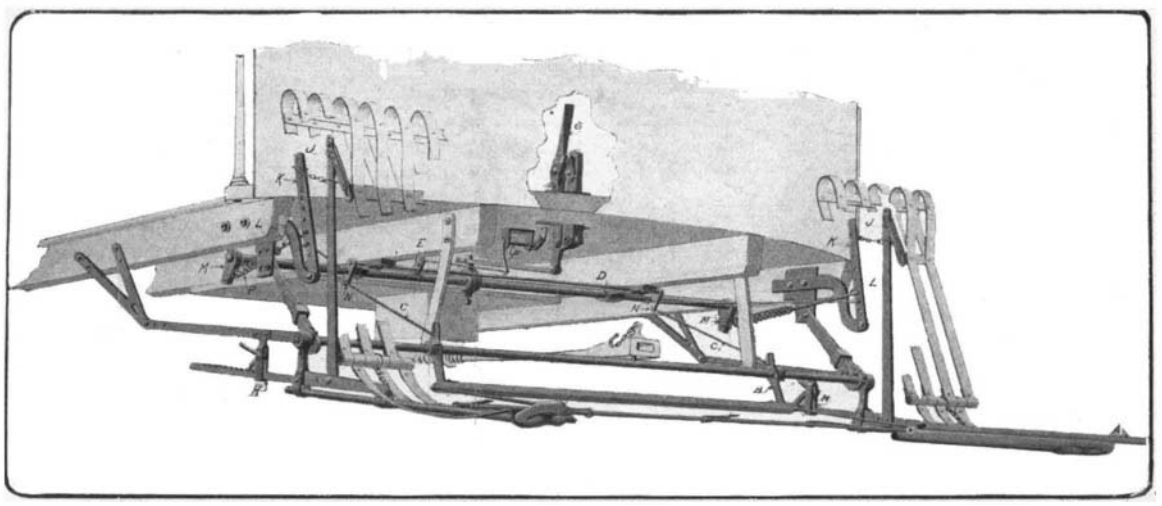
THE IVEL MOTOR-PLOW.

Labor, however, is scarce (due in great part to the South African campaign) and dear and horses are costly, machines which require to be fed and looked after even when the conditions of weather make it impossible to use them either in the fields or about the farm. The motor is a tireless worker, and after a hard day's work in the fields it can be sent up to town at night with loads for the market, returning with household necessaries and all those things necessary for the daily work of the farm.

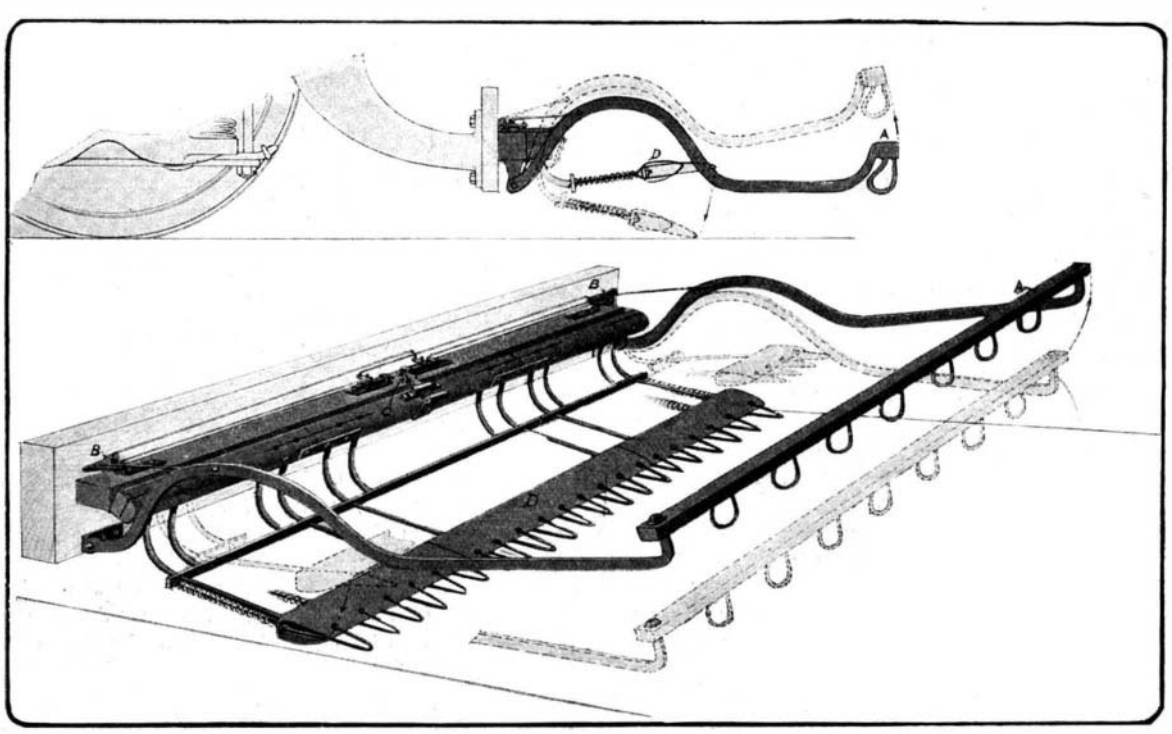
NEW AUTOMATIC FENDER AND WHEEL GUARD.

The fender most commonly used on street railway cars belongs to what is known as the "foot-drop" type, so called because the motorman must operate a foot-pawl in order to drop the fender to the track. In an emergency, however, for example, when a person suddenly appears from behind a car going in the opposite direction, the motorman is very liable to forget the foot-pawl in his efforts to stop the car, and as a result the victim is rolled under the fender and crushed by the wheels. The daily occurrence of such accidents is gradually forcing street railway managers to adopt fenders which will drop automatically. The motorman can then devote his entire attention to the control of the power, brake, sand, and gong.

A fender of the automatic type which is now meeting with great favor is shown in the accompanying illustration, in which the fender strips have been partly broken away to bring out details of construction. This fender may be operated in three different ways; first by the foot-drop, second by what is called the "front receding trip," and third by an entirely new device called the "automatic release." Where objection is raised to the front trip this may be discarded, and only the foot-drop and automatic release used. To operate the foot-drop the pawl *G* is pressed, releasing the bell crank located immediately thereunder and permitting the rockshaft, on which the arms *M* are secured, to rotate. The rocker-arms are connected by the connections *L* to the levers *K*, which in turn are connected by chains to the levers *J* and the fender cushion attached thereto. Operation of the foot-pawl *G* therefore, releases the fender, permitting the cushion to swing forward and the cradle to drop downward by their own weight.



THE WATSON AUTOMATIC DROP CAR FENDER.



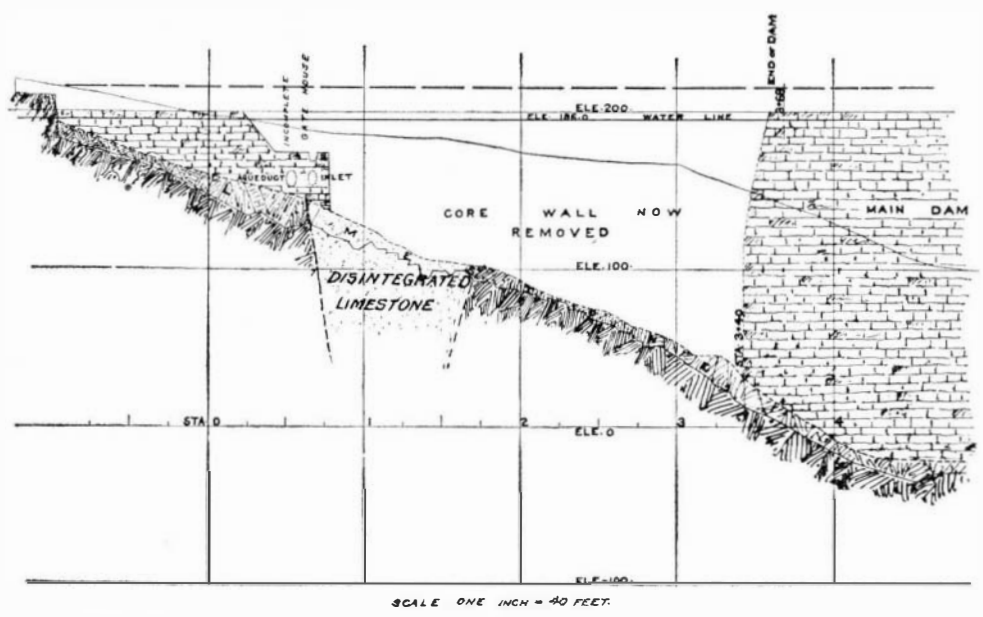
AUTOMATIC DROP WHEEL GUARD SHOWING NORMAL AND OPERATING POSITION.

In the front receding trip, the foot pawl is operated as follows: The front trip-bar *A* on striking an obstruction is forced back, swinging the levers *B* on their fulcrum and throwing forward the rocker-arms *N*. The rod *D* on which these rocker-arms are mounted is also provided with an arm *E* connected to a crank *F* whereby the motion of the trip bar *A* is communicated to the foot-pawl *G*. On release of the foot-trip, the action of the fender takes place as stated above.

In winter time, should the trip-bar *A* come in contact with snow drifts, it may be turned up against the back of the fender. When in that position the automatic release comes particularly into use. The weight of a person falling on the cradle causes the fender to drop to the roadbed. By the use of springs in the connections *L* between the fender and the rocker arms *M* the fender is allowed to fall forward slightly under the additional weight on the cradle, and the rocker-arms *N* are pulled forward because of their connection with the levers *K*. The foot-trip *G* is then operated through the rocker-arm *E* and crank *F*, as described above. In order to prevent the fender from falling of its own weight on being jounced up and down over

an uneven track, the connecting rods from lever *K* are not rigidly secured to the arms *N*, but slide freely therethrough until the springs on the connections *L* have been sufficiently distended to bring the collars on the rods into engagement with the arms *N*. Obviously the collars can be so placed that the crank arms will not be moved until a considerable weight has been imposed upon the fender. When the fender drops, whether automatically or otherwise, it is locked in this position by means of lock bars, which swing backward from the common pivot and are held by pawls *H* engaging ratchet teeth formed on the bars. The fender can be easily attached to a car, two bolts on each outside sill of the car platform being all that are necessary to hold the fender, hangers, and adjustments. It can be compactly folded, and does not interfere with the headlight or offer any obstruction when coupling. The rods each have a direct pull, so that the fender is not liable to get out of order. The cushion front of the fender is made of rubber tubing with a small steel wire cable passing through it, which, together with the telescopic frame, makes a most flexible fender for contact with an obstacle.

The fender is the invention of Mr. W. T. Watson, of Newark, N. J., who has also invented a wheel guard for use on cars not provided with fenders. In our illustration of the wheel guard, the upper view shows the guard in its normal position with the operating position indicated by dotted lines, while the lower view shows the guard dropped and the normal position indicated by dotted lines. The wheel guard is dropped by means of the trip-bar *A* which is raised on coming in contact with a body larger than would pass under the truck pilot board. Through the intermediary of star wheels *B* the motion of the trip-bar is made to release the catch *C*, permitting the guard *D* to drop to the roadbed. The construction of this guard is very ingenious. It comprises a buffer, from which a number of fingers project, the latter being held outward by light coil springs, as shown. In passing over rough pavements, cross tracks, and the like, the fingers play in and out independently. A finger on striking a stone or similar object will be pressed back into the buffer until the latter, owing to its beveled under surface, slides over the obstruction and permits the finger to spring clear of the same. This construction, it will be observed, prevents injury to the parts and at the same time allows the guard to hug the roadbed in order to prevent it from passing over a body. The guard can be readily attached to any pilot board of standard make. It has no connection with any part of the car body and therefore swings around curves with the truck, being held directly over the rails at all times. This feature is particularly important for double-truck cars. The trip-bar *A*, being well in advance of the wheel-bar, when rising over an obstacle gives ample time for the wheel guard to drop. Snow does not interfere with this type of wheel guard because a lifting motion of the trip-bar is necessary to cause the buffer to drop, and in this construction the bar on coming into contact with a drift is forced directly forward, cutting through the snow instead of passing over it.

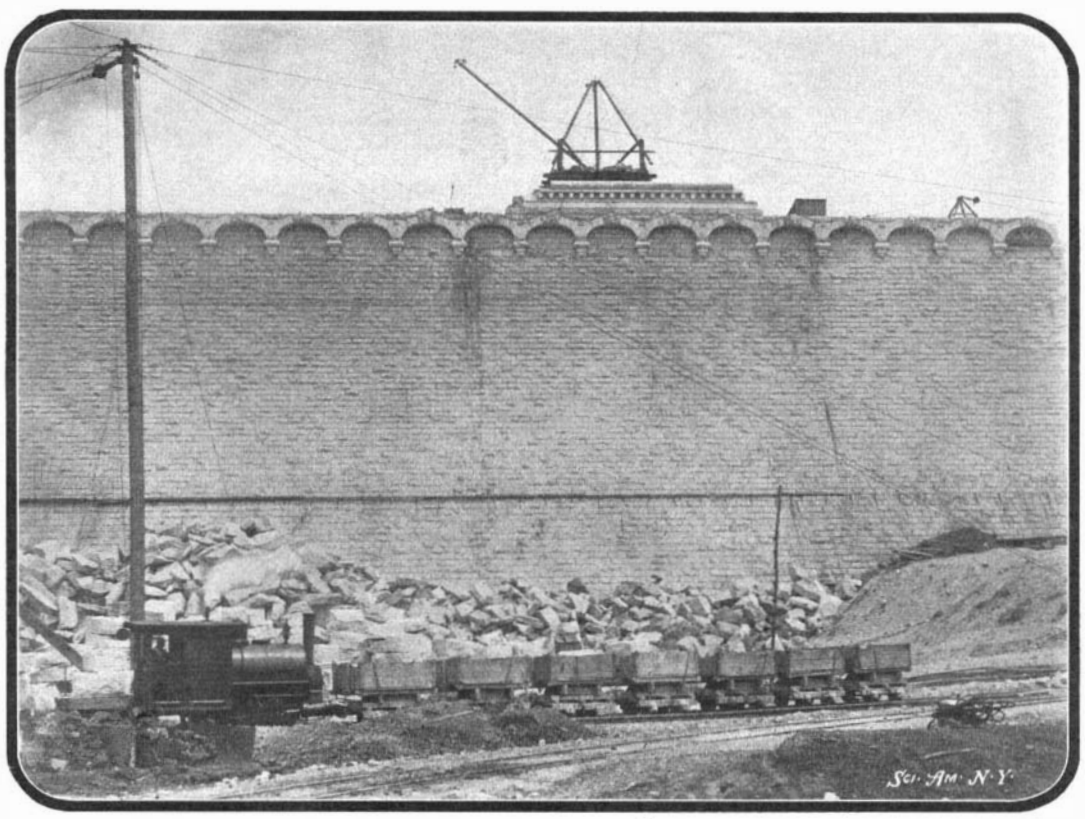


Longitudinal Section on Axis of Dam, Showing Masonry Dam, Part of Core-Wall, and Defective Limestone Foundation.

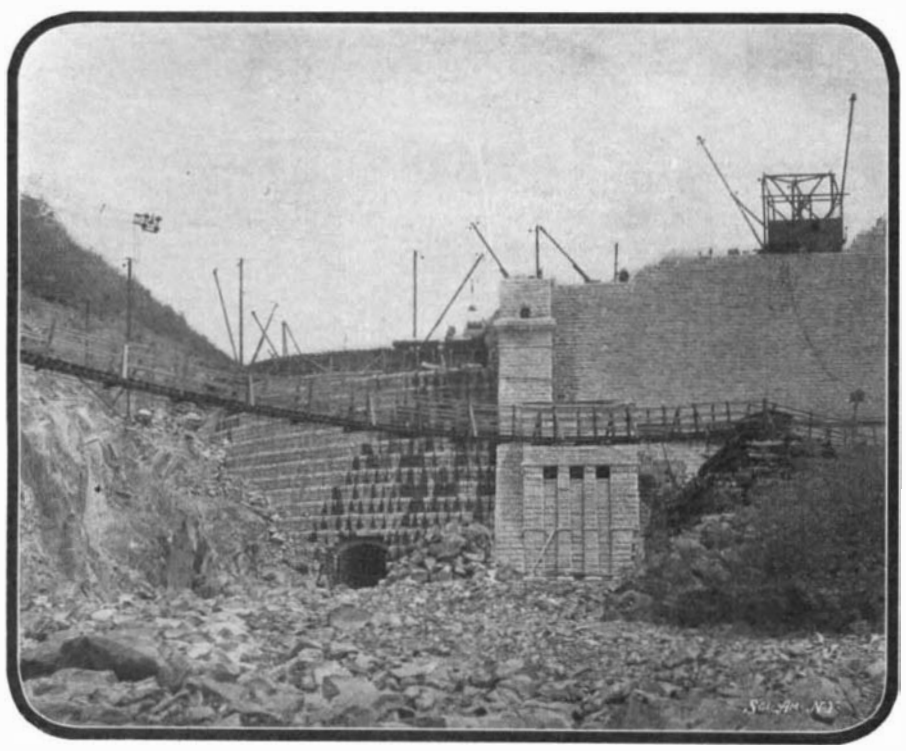
THE PROBLEM OF THE GREAT CROTON DAM—NEW YORK CITY WATER SUPPLY.

The public alarm over the reported defects of the great Cornell Dam, which, when it is completed, will impound an additional 32,000,000,000 gallons of water for the supply of New York city, is perfectly natural and to a certain extent justified. It is natural, for the reason that if the structure after its completion should give way, not only would the additional supply of water be lost, but probably the present Croton Dam behind it, further up the valley, would be swept away in a terrific downward rush of the water, and New York city would be immediately brought face to face with a water famine that would be tragic in its results. Public concern about the dam is justified, moreover, to the extent that the natural foundations below the existing core-wall-and-earth dam have been proved to be exceedingly treacherous, and unless they are improved by carrying down the excavations until they reach a solid, impervious rock, they will constitute a serious menace to the future safety of the whole structure.

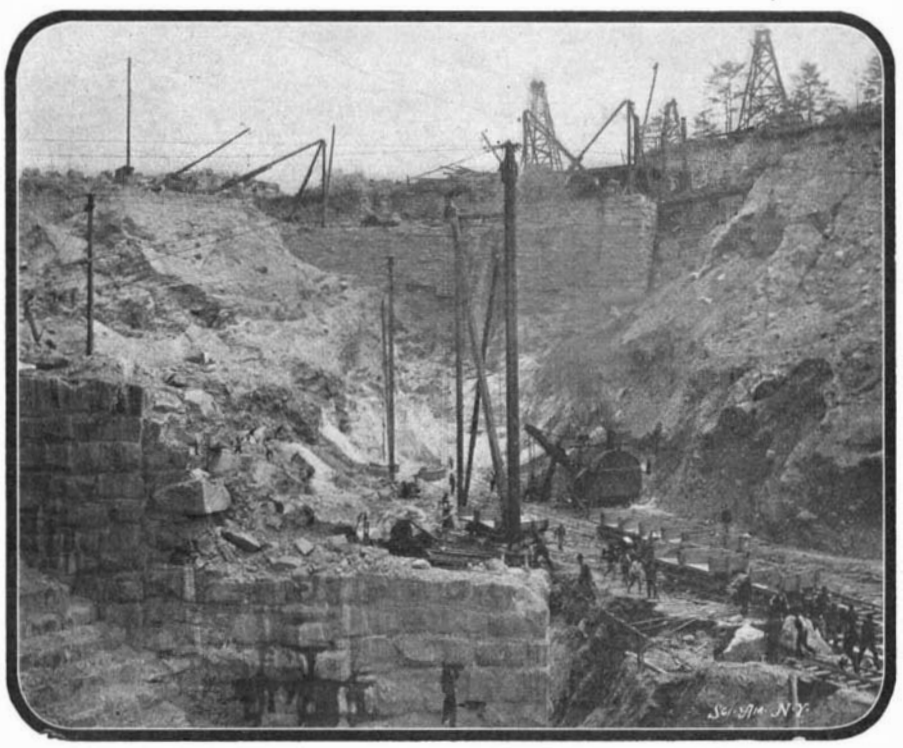
The dam as originally laid out, and now nearly four-fifths completed, consisted of 1,000 feet of masonry spillway, 1,000 feet of masonry dam, and about 600 feet of dam at the southern end of the structure, built on the core-wall-and-earth system. The masonry dam proper consists of an enormous mass of rubble work laid in cement, which is over 200 feet in width at its base and extends for about 300 feet in height from base to crest. In building this portion of the dam a huge trench, extending 160 feet below the bed of the Croton River, was excavated, all the loose, disintegrated rock that was at all pervious



A Portion of the Dam Completed to Its Full Height.



The Northerly End of the Dam, and the Steps of the Spillway.



View of Excavation Below Core-Wall, Showing by Lighter Tint the Defective Rock.

THE GREAT CORNELL DAM.