

with frequent long lakes and occasional rapids, to one channel, as it enters the Arctic waters at James' Bay. There is probably nothing to surpass it on earth, unless it be the east side of the Andes, and the north slope of the Altar mountains in Liberia.

Much of this plateau is arable, some well timbered, all healthy; and the fish, peat, mines and hunting will render it desirable, even though its winters sometimes touch 40 to 60 degrees at the highest points in extreme snaps. Its slopes are all available for the purposes of civilization; and a belt line of electric railway would practically encircle New Ontario and much of the older portions as well. Its fuel resources are grand—firewood, peat, coal or electric energy are available on the whole circuit; and a population of twenty millions might live sumptuously on its developed resources. Such a treasury of health, wealth, and power ought to remain ever in the hands of a Government whose sole aim would be to conserve its capabilities for the good of its inhabitants.

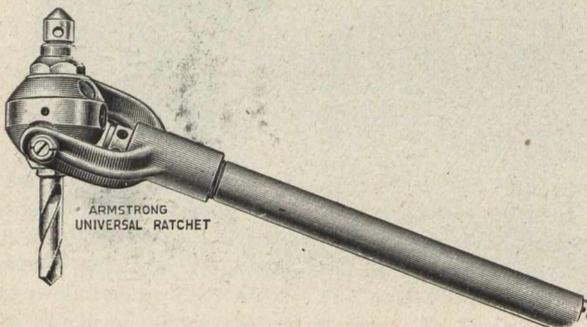
Only a competent examination of a circuit of about 2,700 miles, and say 100 up and down each stream would justify a definite valuation, but enough has been written to satisfy your readers that we are one of the great powers of the future, and allay all fears that we will become the servant of the coal miner for our energy at some distant date. While earth can feed her teeming billions, we can supply a large share of the heat and energy to keep them comfortable and busy.

THOS. FROOD.

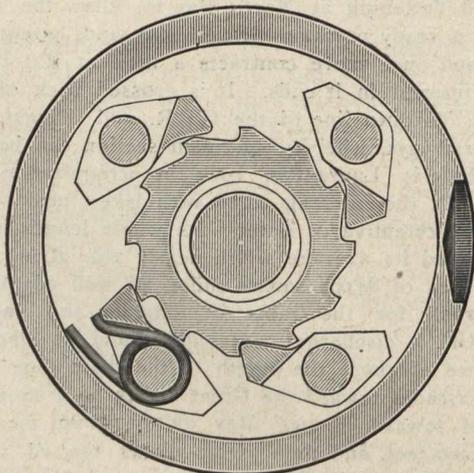
Little Current, March 20th, 1903.

THE ARMSTRONG UNIVERSAL RATCHET.

The illustrations show the Armstrong Universal Ratchet, a tool specially adapted to drilling holes in cramped places. The advantages claimed for it are that it will drive a drill in any position where it is possible to move the handle either in a vertical or horizontal direction or at any intermediate angle; it has no ball joints, bevel gears or other complicated parts; it is stronger and faster than any other



ratchet; it is useful where the ordinary ratchet is useless; for ordinary work the handle can be rigidly fixed, almost instantly; its use will often save the great expense and loss of time incident to the disconnection of heavy machinery



for needed repairs. The movement of the tool is a new one. Even a vertical motion of the handle will drive the drill, and two inches of motion is sufficient. In No. 6 size, there are

twelve large teeth in the ratchet and five pawls which engage one at a time. Thus the pawls catch sixty times in a revolution, giving greater speed than other ratchets. The ratchet has been adopted by the United States navy, and is made in two sizes, No. 4 and No. 6, by the Armstrong Bros'. Tool Co., Chicago, U.S.

THE ROBB-ARMSTRONG-SWEET GOVERNOR.

The design of centrifugal governors has occupied the attention of engine designers and builders ever since steam engines have been used, and particularly of late that form of governor which is placed in the fly-wheel of the engine and is attached to, or forms part of, the valve-driving mechanism and arranged to vary the point of cut-off of steam in the cylinder automatically. It has been found especially difficult to get a governor powerful enough to operate the valves and valve gear regularly and, at the same time, to give sufficiently close and quick regulation to meet the very exacting requirements for driving electric generators, particularly for lighting or combined lighting and power service and for parallel operation of alternating current generators. This type of governor has appeared in almost numberless forms, many of them more or less successful, but all lacking absolute perfection either in governing qualities or in mechanical details. In order to prevent disturbance of the governor by reciprocating valves, various friction devices have been used as a part of the governor or in connection with it, such as double eccentrics, dash pots, drag springs, etc., and while these give a certain measure of stability, they prevent quick regulation and are liable to cause the governor to race or hunt.

The governor invented by Professor John E. Sweet was a decided advance over earlier types, having a less number of parts, only one weight and one spring, the governor system in perfect gravity balance in all positions, and great centrifugal power with less friction in the moving parts than previous forms of governor.

The Rites' type of governor forms another step in advance, as it utilizes the inertia of a heavy weight suspended in the fly-wheel to give quick governing. The arrangement of the inertia governor is such that any change of speed causes the fly-wheel and the suspended inertia weight or arm to which the eccentric is attached to change their relative positions, so that the cut-off is changed quickly to meet a sudden change of load. The inertia of this heavy arm also prevents, to a certain extent, disturbance of the governor by the reciprocating motion of the valve. The disadvantages of this form of governor are (1) that the inertia weight and eccentric being all in one piece must be out of gravity balance in order to have centrifugal force, and the governor system not being in balance, is caused to oscillate, especially at slow speeds. (2) The strain due to the centrifugal force and gravity of the heavy inertia arm is carried directly by the suspension pin, making great pressure and friction on that pin, which is not easily lubricated; therefore, both from the absence of gravity balance and because of the increased strain and friction, the designer cannot introduce very much centrifugal force, with the result that the regulation is influenced greatly by any variation in the friction of the valve or valve gear, tight or loose packing of the valve rod, change of steam pressure, etc., and if the suspension pin gets dry, as it is liable to do while moving under heavy pressure, the governor is sure to regulate badly. (3) Although inertia tends to overcome friction and cause quick movement, unless the movement is controlled by powerful centrifugal and centripetal forces, the governor will not be stable, and the Rites' type of governor cannot have these powerful forces without being correspondingly out of gravity balance, nor without great strain and friction on the suspension pin.

The real controlling power in a governor depends upon the amount of the unbalancing of the centrifugal and centripetal forces, and this may be made sufficient in amount (1) by a great change of speed, or (2) if the centrifugal and centripetal forces are strong, a small change of speed will cause a considerable unbalancing of the forces and a cor-