NEW PRONY BRAKE.

At the recent fair of the American Institute, two students from the Stevens Institute—Messrs. Mitchell and Aldrich—made a partial test of the Straight Line Engine then on exhibition, and the Prony brake used embodied some features we had not seen before, and we herewith produce a cut of it from a sketch furnished us by the Straight Line Engine Company.

It is of the ordinary belt kind, with blocks of pine wood bound to the face of the iron pulley by two leather bands, though band iron hoops are better, as the stretch of the leather calls for more constant attention. It will be seen that the force exerted to overcome the friction between the pulley and the friction blocks is transmitted to the platform of an ordinary scale, by the end of one of the arms resting on the top of a small roller, supported by the stand set on the scale.

The top of the roller is level with the center of the shaft, and just five feet three inches from it, and when once set the radius will not vary, however much the brake blocks may wear. The circumference of a circle, whose radius is five feet three inches, being 33 feet, the distance selected is one that saves many figures in calculating the results; for, instead of multiplying by 33 feet. and then dividing by 33,000 to arrive at the horse-power, it is only necessary to divide by 1,000. Thus, all the figures that are necessary is to multiply the number of revolutions by the pressure on the platform and divide by 1,000, the weight of the stand and levers having first been counterbalanced.

The pulley is made as shown in Fig. 2, with a flange on each side projecting in about two inches, forming a circular trough, into and out of which a stream of water is kept flowing. The water enters through the inlet pipe, fixed to deliver the water on one side of the arms in the direction the wheel is turning, and the outlet pipe, scoops out the water after it attains any determined depth. Just before stopping the water is shut off, and the outlet pipe crowded out, until it comes in contact with the inside of the pulley, so that nearly all of the water is removed, and splashing prevented when the wheels come to rest. Pieces of salt pork, secured between the blocks, furnish a constant supply of grease, increasing as the temperature of the pulley increases. With this brake, the pulley of which is 42" × 7", a test of 30 or 40 horse-power may be made, and continued for any length of time.

In the test mentioned one or two points were brought out in regard to the engine. First, the great accuracy with which the speed was controlled, there being a variation of but two revolutions both by a change from no load to 55 horse-power, and with a variation of several pounds in the steam pressure. The engine tested had an 8" × 14" cylinder, was run from 230 to 232 revolutions, and the steam pressure ranged from 60 to 80 or 90 pounds. The friction as determined by deducting the work recorded by the brake, from that shown by the indicators, varied from 100 per cent. when running light to $4\frac{3}{10}$ per cent. when doing 55 horse-power of work. In fact the actual work required to run the engine was very nearly constant, being $\frac{1}{16}$ of one horse-power less at 35 horse-power than at 6 horse-power and 55 horse-power. This condition, Prof. Sweet argues, agrees with his theory that the compression was, as it ought to be, viz.: just what will arrest the reciprocating parts and start them back, relieving the crank pin and bearings of all the friction possible while the engine is passing its dead centers.

It is a common thing to recommend the use of the indicator, but its work combined with the Prony brake, or some other means of determining the amount of actual work performed, becomes far more valuable, and had we some ready means of determining the actual amount of steam used, or perhaps we should say the character of the steam used, both the indicator and the Prony brake would settle points in engine construction and economy much more conclusively. To determine the amount of water used it may be measured, as it is pumped into the boiler, or condensed as it leaves the engine, but to determine how much of it goes into the engine in the form of steam, and how much as water, is not so easy, as the present known methods are not so uniform under like conditions as to give confidence in their accuracy.—*Ex.*

LIEUT. GREELY has accepted the invitation of the Scottish Geographical Society to address its members when he visits Great Britain; but he could not fix an approximate date, as he had not yet finished his official report of the Arctic expedition.

THE BALL ENGINE AND GOVERNOR.

This is a view of an automatic cut-off engine, designed for heavy duty, long continuous runs and high speed when necessary, built by the Ball Engine Co., of Erie, Pa. The starting point or first requirement of an engine of this kind is a rigid frame, having sufficient metal so distributed as to receive all strains without deflection or vibration. This frame possesses this quality, it is said, in the highest degree. Absolute alignment is obtained by a special system of construction, and the self contained form of the engine insures the continuance of these conditions. The very large wearing surfaces used are additional guarantees of continued alignment. They also result in cool, quiet running and long life of the engine. No expense or trouble is spared in the construction of this engine. Every detail receives the most careful attention, and the most skillful men are employed, who follow a rigid system of working to gauge, and this work is inspected with regard to quality and not quantity. The wearing surfaces are all scraped by hand to surface plates, and the steam joints are done in the same manner, no packing being used. The valve and valve seat are submitted to the same process. This scraping of the valve is repeated when testing the engine until the valve shows no leakage under full boiler pressure. These engines are especially adapted to electric lighting which requires perfection in design and workmanship, and the best attainable economy and regulation. In meeting the greatest possible requirements for an engine, it makes it an easy problem to meet the wants of all others where the duty is less exacting. In the regulation this engine can be absolutely held to speed under full changes of load, or when the character of the work is such as to make it desirable, the governor is adjusted to accelerate the speed when the engine is loaded. This is an advantage in saw mills and many other kind of work, but particularly in electric lighting when separate engines are used for each dynamo. When so arranged, the governor is adjusted so that the standard speed is only reached when the full number of lights are burning, and as lights are turned out the speed decreases. Their system of governing is believed to be as near perfection as it is possible to get. The theory of this governor is based on the logical principle that if a varying load requires a change of steam supply, this change should be the direct result of the load and should exactly correspond with it. In other words, the governor of a steam engine should not depend upon the very variation of speed which it is intended to obviate for its motive power to act, but should recognize the variation of load, thereby becoming a weighing machine—the result of this weighing producing a corresponding change in the steam supply, thus making it possible to keep up an absolutely uniform speed. Comparing this system with the old one, we see that with the old systems the supply of steam is in proportion to the speed, but with the new system the supply is in proportion to the load and the speed is constant. The process of governing may be briefly described as follows: Suppose the engine to be started without any load. As the speed approaches the desired point the weights of the governor acquire centrifugal force sufficient to overcome the springs, and they move outward, cutting off the steam and retaining the engine within the prescribed limits of speed. Now, if work be put upon the engine, the usual process is for the momentum of the engine to be overcome, reducing its speed until the loss of centrifugal force in the weights allows the springs to draw them in to a position that will admit the necessary amount of steam to meet the load, and if still more load be added the speed is reduced still further. In the case of this governor the addition of load does not overcome the momentum of the engine, but acts directly on the weights, drawing them into a position that admits the necessary steam. When load is thrown off the weights are immediately released just in proportion to change of load. In this way the conditions of load are communicated directly to the steam valve without going through the engine, and the change of load on the belt is met by a corresponding change of steam in the cylinders the two being simultaneous. The successful operation of this new force, producing, as it does, a result so long sought and never before obtained, is a matter of no small importance in the development of the steam engine, and particularly so since the demand in this particular has of late been so exacting. The Ball Engine Co. will be pleased to send their catalogue, describing minutely the action of the governor and the different sized engines they build, to any one who will make application to them.