HORIZONTAL CONDENSING ENGINE AT THE PARIS EXHIBITION.

We illustrate in the annexed engraving a new horizontal engine of peculiar construction, exhibited at the Paris Exhibition by La Société Anonyme des Usines St. Maurice, Lille. The framing is of cast iron, really in four pieces, but so well put together, and so clean in the joints, that it is not easy to believe that it has not been cast in two pieces, one at each side. The piston rod head is guided by a vertical parallel motion, the joints of which are made with straps and cotters on solid blocks forged in one with the rods. The upper levers of this motion are keyed on a cross shaft turning in bearings on the side frames, and on each end of this shaft is keyed a double horizontal lever. That on the right hand of the engine looking toward the fly wheel from the cylinder works two single acting vertical air pumps drawing from the jet condenser, which is seen right beneath the cylinder. The lever at the other side works two ordinary plunger pumps. On the parallel motion horizontal shaft, just noticed, are two sleeves; one of these carries a lever, which is connected with the main slide valve on the one hand, and with a crank on the other. The crank is made in a horizontal shaft, carried in bearings in two castings, one of which supports the governor. This crank shaft is driven by spur gearing from the main shaft.

Above the main slide is a gridiron expansion valve, actuated by an arm on a vertical shaft, shown at the side of the governor. On the lower end of the governor rod is a sleeve fitted with two cams. The sleeve rises and falls with the governor, the weight of which is partially balanced by the two balls supported on arms seen in the elevation of the engine. The position of the cam sleeve is controlled by the governor, and so determines the point of cut off in a way that will be readily understood. The cut off valve is worked by a second lever and sleeve rocking on the horizontal parallel motion shaft.

The whole engine is self contained in the sense that little or no excavation is required; and abnormal as the engine appears, the *Engineer*, from which we take our engraving, states that it runs exceedingly well, and compares favorably with many other engines in the Exhibition.

The admission of steam which corresponds with an effective duty of 100 horse power is stated to be one tenth of the stroke of the piston. The principal dimensions are as follows: Diameter of cylinder, 23·6 inches; stroke of piston, 3 feet 8 inches; number of revolutions per minute, 46; diameter of air pumps, 13·6 inches; length of stroke of buckets, 10·8 inches; proportion of steam cylinder to air pump, 12 to 1; diameter of fly wheel, 16 feet 9 inches; width of fly wheel, 25·6 inches.

A CORRESPONDENT suggests the construction of projectiles on the principle of the boomerang, for reaching an enemy behind earthworks or embankments. The usual way of surmounting obstacles of this sort is to make the balls ricochet or bounce over the parapet after first striking the ground.

ELECTRICAL INDICATOR FOR SHOWING THE ROTATION OF THE EARTH.

[*Continued from first page.*]

If the index were absolutely motionless the scale would move under it at the rate of 15° an hour, but owing to friction the motion of the scale or apparent motion of the index is less.

It makes no difference whether the index points northward or southward, its apparent motion is always westward, thus affording visible evidence that the earth rotates.

The instrument I have thus described may be easily modified, so as to illustrate other interesting phenomena of rotary motion.

By removing the index and point from the insulated stud at the lower part of the frame and unscrewing the supporting piece from the top of the frame, the frame may be suspended in a horizontal position upon pointed screws in a fork which is supported upon a vertical pivot, as shown in the second engraving.

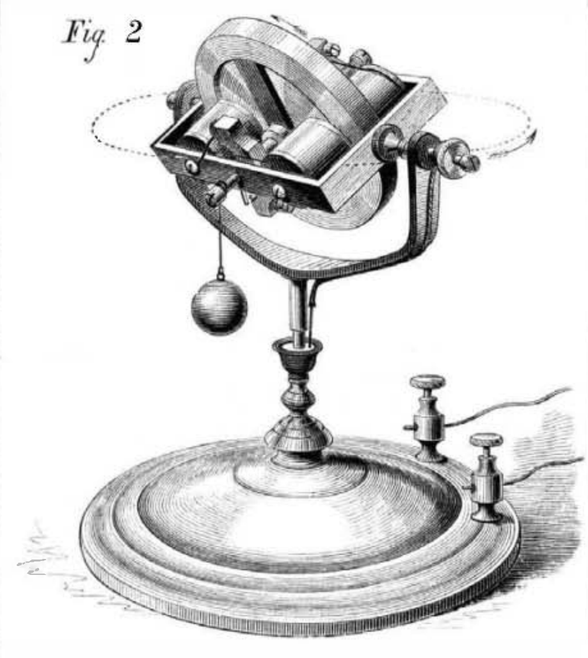

Fig. 2.—ELECTRICAL INDICATOR.
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The pointed screw that enters the insulated stud is insulated, and communicates, by an insulated wire, with mercury contained in an annular vulcanite cup on the fork supporting pivot. One of the binding posts is connected with the pivot of the fork and the other communicates with the mercury in the vulcanite cup.

When the instrument is connected with a battery the wheel revolves rapidly, and if undisturbed will remain in the position in which it was started. If a small weight, such as a key, be hung upon one of the pivot screws of the wheel spindle, the frame containing the wheel does not turn quickly on its pivots as might be expected, or as it would if the wheel were not revolving, but the entire apparatus immediately begins to revolve slowly on the vertical pivot, while the weighted side of the frame descends almost imperceptibly. Transfer the weight to the opposite pivot, and while the wheel still revolves in the same direction the apparatus will revolve on the vertical pivot in the opposite direction. The rotary movement on the vertical pivot is in opposition to the friction of the wheel, that is, the apparatus if rotated on the vertical pivot by the friction of the wheel on its pivots would be in the opposite direction.

By removing the weight from the pivot screw and turning the apparatus on the vertical pivot the converse of what has just been described will result; that is, the wheel besides revolving on its own axis will turn in a plane parallel with its axis.

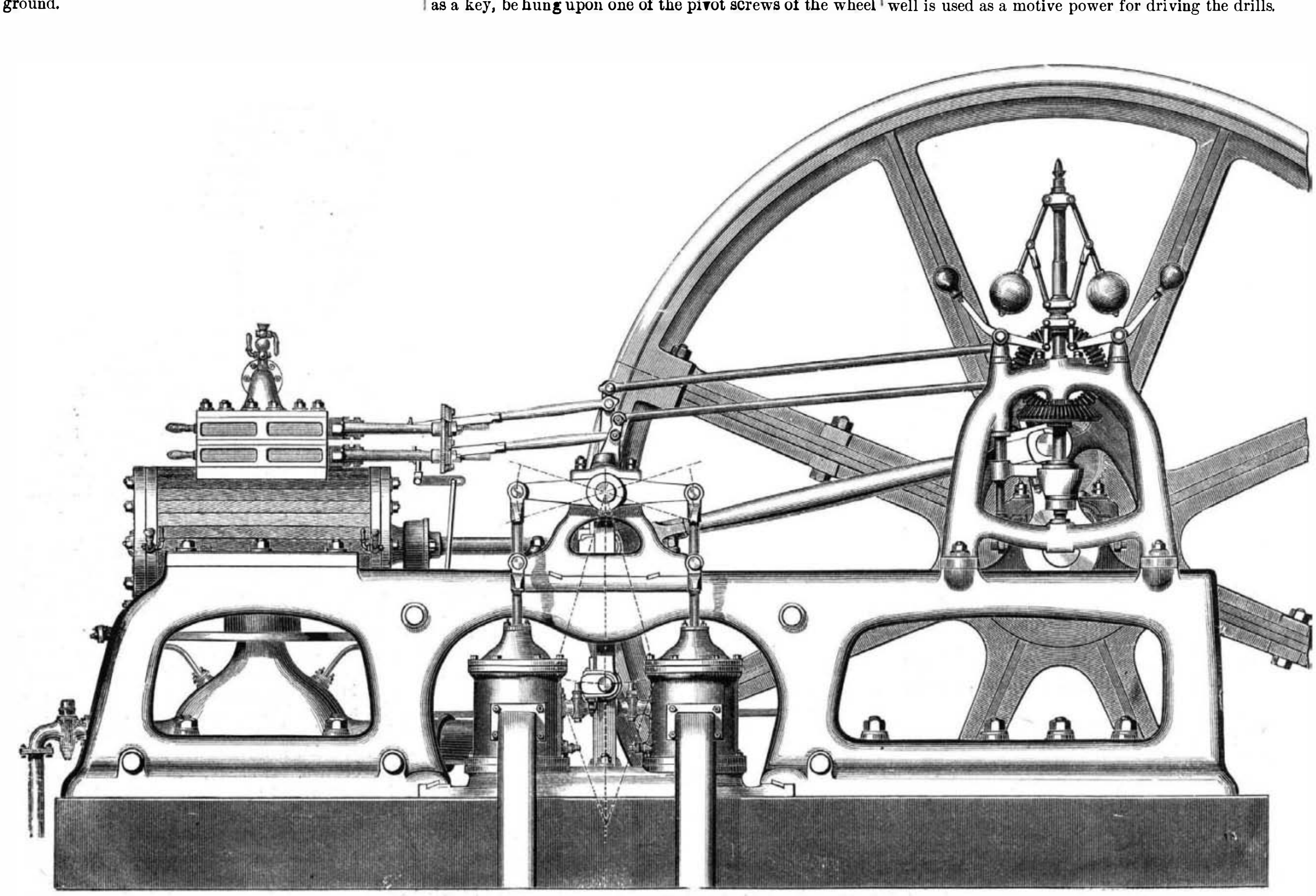
If the apparatus be turned on the vertical pivot in the opposite direction the rotation of the wheel on its new axis will be reversed, and by oscillating the apparatus on the vertical pivot the wheel and frame will revolve rapidly on the pointed screws that support the frame.

The law controlling these movements is as follows: "Where a body is acted upon by two systems of forces, tending to produce rotations about two separate axes lying in the same plane, the resultant motion will be rotation about a new axis situated in the same plane between the directions of the other two."

By means of this continuously operating gyroscope Dr. Magnus' experiments showing some of the causes of deviation of projectiles may be nicely exhibited.

Deep Boring.

A deep artesian well is being bored at Pesth, and has reached a depth of nearly 1,000 meters, over 3,300 feet. The work is undertaken by the Brothers Zsigmondy, partially at the expense of the city, which has granted £40,000 for the purpose, with the intention of obtaining an unlimited supply of warm water for the municipal establishments and public baths. A temperature of 161° Fah. is shown by the water at present issuing from the well, and the work will be prosecuted until water of 178° is obtained. About 175,000 gallons of warm water stream out daily, rising to a height of 35 feet. This amount will not only supply all the wants of the city, but converts the surrounding region into a tropical garden. Since last June the boring had penetrated through 200 feet of dolomite. The preceding strata have supplied a number of interesting facts to the geologist, which have been recorded from time to time in the Hungarian Academy of Sciences. Among some of the ingenious engineering devices invented during the course of the borings are especially noteworthy the arrangements for driving in nails at the enormous depth mentioned above, for pulling them out, for cutting off and pulling up broken tubes, and a mechanical apparatus by means of which the water rising from the well is used as a motive power for driving the drills.



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