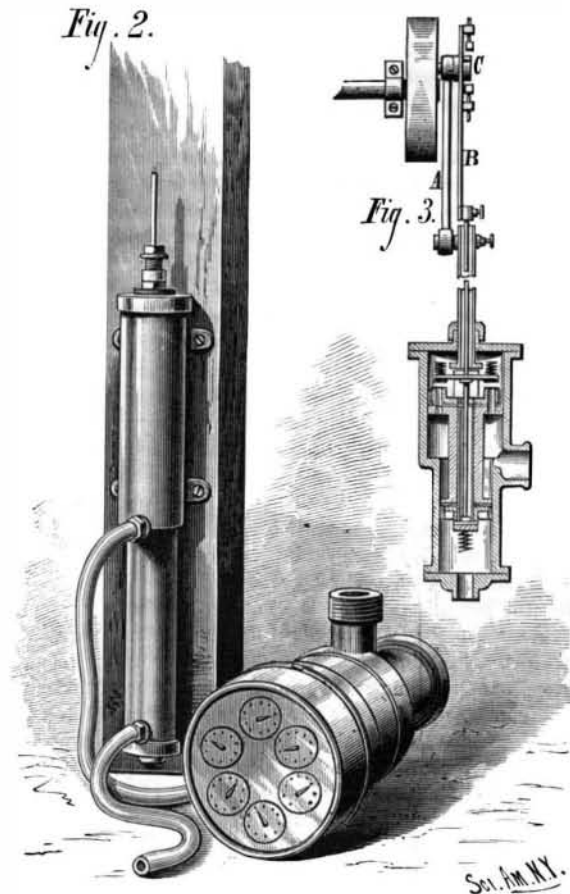


**NEW MOTOR AND METER.**

We give on this page engravings of a new reciprocating apparatus recently patented in the United States and Canada by Mr. Adam Knecht, of Quebec, Canada. The principle is applicable to air, steam, and hydraulic engines, reciprocating motors for blowing organs, pumping, etc., also to meters for measuring liquids and gas.

Fig. 1 represents a hydraulic motor built on this principle. Fig. 2 represents a reciprocating motor and a meter, and Fig. 3 is a longitudinal section of the motor showing the arrangement of internal working parts, and it is by an



**MOTOR AND METER.**

examination of this figure that the principle of the apparatus may be understood. When used as a reciprocating motor, the cylinder, which is made in two diameters, has an inlet at the lower end, and an outlet at the middle, and contains two pistons of different diameters connected by a tube, which affords communication between opposite ends of the cylinder. A rod extends through the connecting tube of the two pistons, and carries at its lower end a single valve which covers the tube, and at the upper end a crossbar carrying two valves adapted to openings in the larger piston. Surrounding a pin that projects from the back of each valve there is a spiral spring that is capable of touching the end of the cylinder at the end of the stroke of the pistons. The rod connecting the valve at the lower end of the piston tube with the crossbar of the upper valves, is of such length that when the valve at the lower end of the cylinders is seated the upper valves will be open, and vice versa. The lower valve being closed, the water entering at the lower end of the cylinder, pressing upon the smaller piston, raises both pistons until the springs above the upper valves touch the upper cylinder head with sufficient force to close the upper valves and open the lower one, the water passing through the tubular connection of the two pistons exerts a pressure on the upper surface of the upper piston, and forces it downward until the spring of the lower valve strikes the lower end of the cylinder and reverses the position of the valves, and the water again forces the pistons upward. As the pistons rise, the water between the upper piston and the upper cylinder head is discharged through the openings in the larger piston into the space between the two pistons, thence through the central opening of the cylinder to a pipe which conducts it away.

When used as a rotating motor, a tubular piston rod is connected with the larger piston by a yoke, and extends through a stuffing box in the cylinder head and is connected with a crank pin, which is movable in a governing device on the motor shaft by means of pitman, A, of ordinary construction. The valve rod is prolonged beyond the end of

the tubular piston rod, and is jointed to a rod, B, which is slotted at its free end so that it may slide upon the crank pin. The connecting rod, B, carries two spring tappets, which are alternately engaged by a cam, C, on the end of the crank pin, so as to open and close the valves at the proper instant.

The meter shown in Fig. 2 is substantially the same as the reciprocating motor, the only difference being that registering mechanism is added to the meter. By substituting rubber or leather diaphragms for the pistons, the device may be used as a gas meter. The vertical reciprocating motor shown in Fig. 2 is adapted to pumps, organ blowing, etc.; when used for the latter purpose a controlling valve is provided, which may be operated by a cord or wire from the keyboard of the instrument.

The inventor informs us that this device may be applied as an auxiliary to force pumps, enabling them to draw water from a depth of 200 feet, and by using the middle opening of the cylinder as a suction and the end opening as a discharge it forms a most efficient double-acting force pump.

Further particulars may be obtained from Mr. Adam Knecht, Lock Box 395, Quebec, Canada.

**ENGINEERING INVENTIONS.**

An improved spark arrester for locomotives, farm, and other engines, has been patented by Mr. Eliphalet N. Berry, of Money Creek, Minn. It consists in the combination of a horizontal partition having a hole through its center, and two pivoted disks connected and held parallel by links, and a rod for moving the disks, with the lower tubular part and the upper double cone part of a smoke stack.

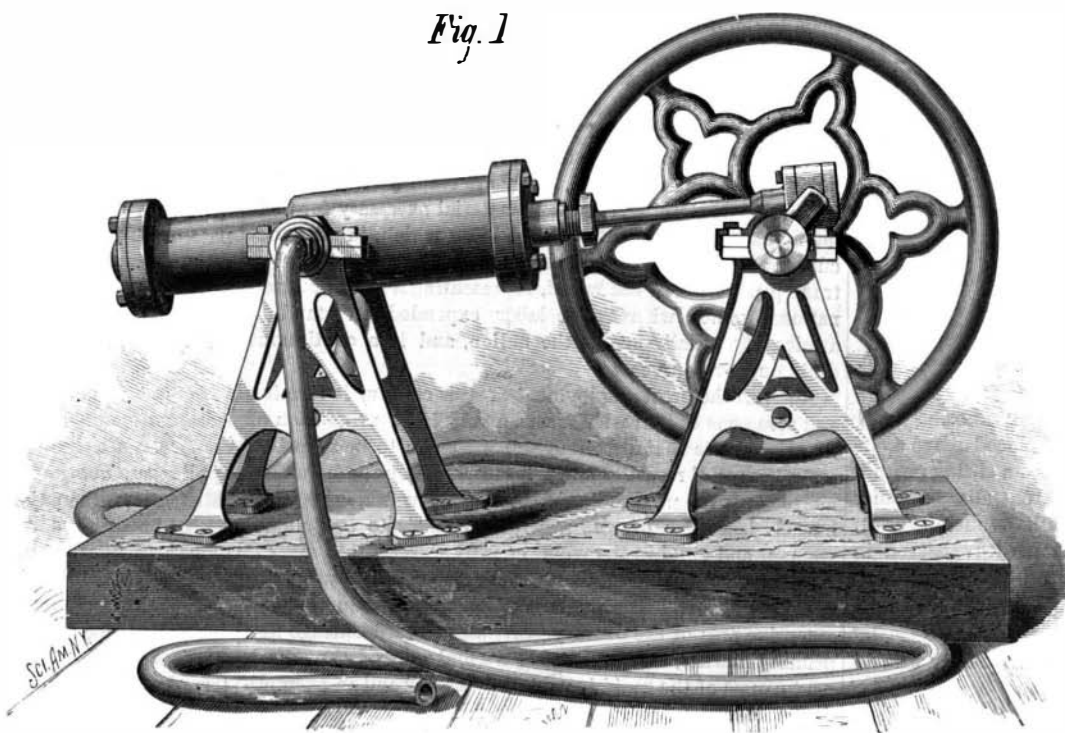
Mr. Ambrose N. Smith, of Portage, Wis., has patented a double derrick and crane to be placed on a dredge boat, for the purpose of receiving earth from a dredge, and conveying and depositing it away from the boat. The derrick and crane are so arranged that the weight which is being lifted by the one shall be counterbalanced on the opposite side by the other, so as to prevent the boat from listing or rolling.

Mr. Winfield S. Nearing, of Morris Run, Pa., has invented an improved car and cable coupling, to be attached to railroad cars or other moving devices for connecting them to wire or other cables that are in motion, so that whenever such car or device is disconnected by the clamp to the cable it will be propelled by it, while it will remain at rest as soon as disconnected.

Messrs. Eli T. Bangs and Moses L. Dolbey, of Fayetteville, N. Y., have invented an improvement in jetties. This relates to improvements in the construction of the foundation and hearings of jetties; and the object is to furnish a strong and durable foundation, thoroughly bound together, adapted to resist the undermining of the jetty, and of sufficient flexibility to yield to the variations in the bottom without becoming disintegrated.

Mr. Nathan M. Dibble, of Birmingham, Conn., has invented a new water wheel governor. The invention consists in combining with a speed governor for water wheels a pivoted arm connected with the gate stem and fitted to act upon the sliding shaft of governor; also in combining, with wheel stem, shaft, and balls, a lever, nut, and bearing block, which together form a safety check.

An improvement in smoke stacks, patented by Messrs.



**KNECHT'S MOTOR.**

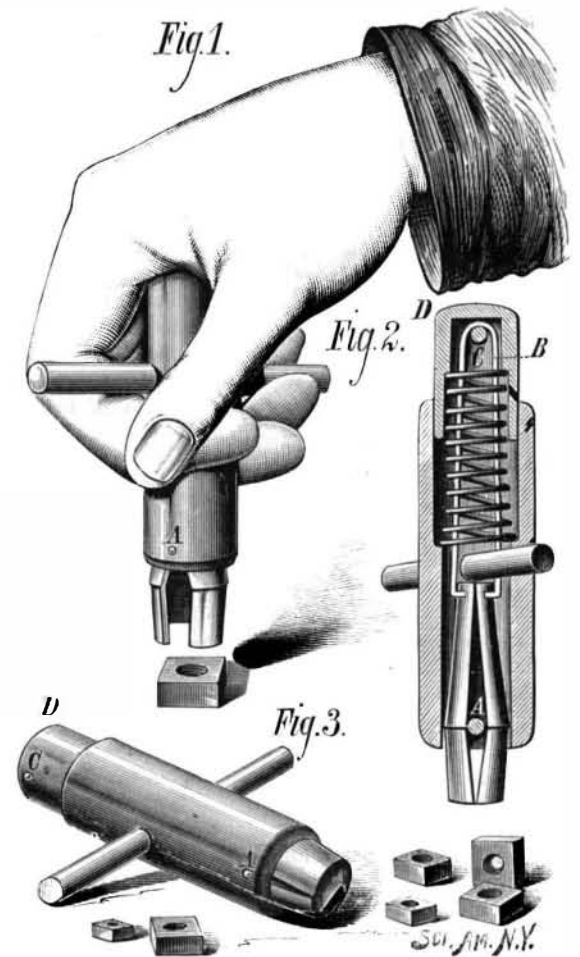
Walter A. Scott and George W. Williams, of Winona, Minn., relates to the manner of connecting the two parts of the stack between which the edge or the wire netting spark arrester is held. The object of this invention is to enable the joint between the two parts to be separated and remade quickly and easily; and it consists in fastening the two flanges together by means of a grooved or channeled tubular ring cut on one side placed over and around the two flanges, so

as to hold them together, and fastening the ring by a bolt passed through two outward projections on its ends.

**A NEW WRENCH.**

The novel and useful tool shown in the accompanying engraving is precisely the same in principle as Birch's well known watch key, and is manufactured in different sizes under patents by Messrs. J. S. Birch & Co., of New York city.

Fig. 1 shows the wrench as it is held in the hand ready to



**BIRCH'S AUTOMATIC WRENCH.**

be applied to a nut; Fig. 2 is a longitudinal section showing the internal construction; and Fig. 3 is a perspective view of the wrench.

The jaws that grasp the corners of the nut or screw are tapered and placed on opposite sides of the pin, A. Transverse slots at the upper end of the jaws receive the L-shaped ends of the loop spring, B, which extends around the pin, C, in the follower, D. The latter slides easily in the upper end of the barrel, and is counterbored to receive the upper end of the spiral spring, the lower end of which rests on a shoulder near the middle of the barrel.

A small rod passes through the middle of the barrel to afford leverage for the hand of the operator. The jaws are operated by pressing down the follower, D, by grasping the wrench in the manner shown in the engraving, and when the jaws are placed upon the nut or set screw, the follower is released and the spiral spring draws the jaws into the barrel, contracting them by the engagement of their tapering sides with the sides of the barrel, until the wrench fits the nut or screw to which it is applied.

This wrench adapts itself to nuts and screw heads of various forms, as well as different sizes. It is very convenient for picking up and applying nuts and set screws in inaccessible places, and is useful for holding and turning tools of various kinds, such as bits, drills, and reamers.

The smaller sized wrenches fit all sizes of nuts between  $\frac{1}{4}$  and  $\frac{1}{2}$  inch, the medium size fits all sizes between  $\frac{1}{2}$  inch and  $1\frac{1}{4}$  inch, and the larger size will fit all sizes from 1 to 2 inches.

Its capability of universal application makes it a desirable tool for the bench, and it is valuable as an accessory to printing, sewing, and other machines. Months of constant and severe usage have shown that this wrench has ample strength, and that it is practically incapable of wearing out. We are informed that one used in the factory of the manufacturers over two thousand times a day for more than a year shows very little wear and is perfectly good yet.

Further particulars may be obtained from Messrs. J. S. Birch & Co., 38 Dey St., New York City.