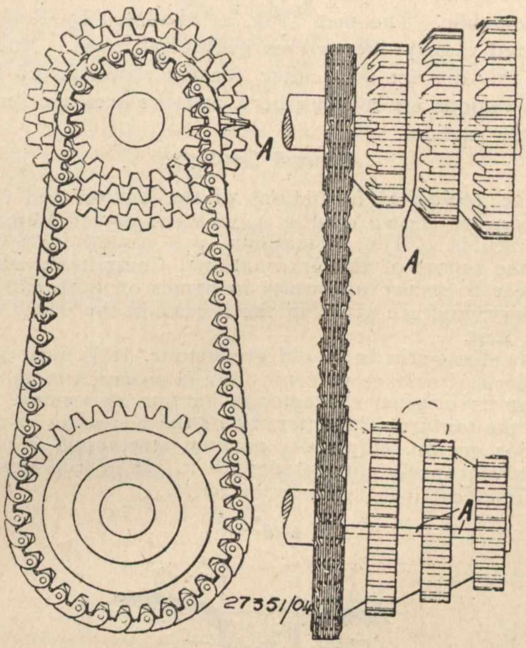
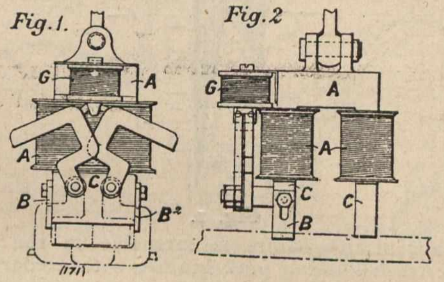
projections A for engaging the links of the chain, so as to keep the chain moving as it passes from one step of the sprocket wheel to the next.



27,351.

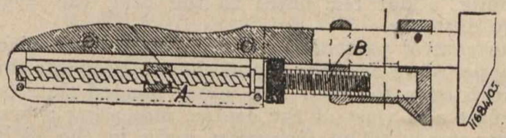
Safety Devices.—Steel, Peech and Tozer, Ltd., and H. E. Bowen, Sheffield.—171.—Safety devices to be used in combination with electro-magnets employed with cranes for raising and carrying rails, bars, ingots, and other metallic loads. From the crane is suspended a crosshead, and upon this is secured one or more electro-magnets, such as *A*, connected by line wires with the source of electricity, and generally arranged so that they can be operated by switches located in the crane attendant's cage. These magnets are provided with self-adjusting guide plates of gauges *B* and B^2, consisting of metal bars with elongated bolt-holes which are bolted to the outer ends of the lifting faces *C* of the magnets *A*, but so that they can move vertically on the bolts or studs. They are for the purpose of passing down a short distance on each side of the object or objects to be lifted,



171

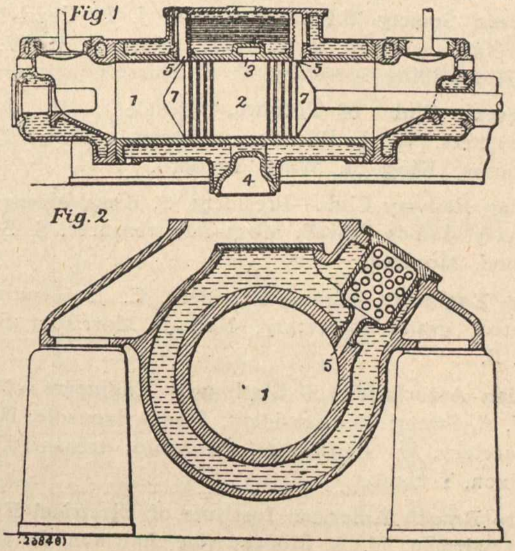
such, for example, as ingots, bars, or the one side rest upon the face of the load, they slide upwards until, as the magnets are moved laterally, they pass over the edge and drop back to their normal or lowest position, which indicate that the magnets are in position for lifting the load. The electro-magnets are constructed to retain a sufficiency of magnetic power after the main current is broken, to sustain the load for a short period, but sufficient to allow a number of pairs of safety claws sustained out of action by means of a small electro-magnet *G*, which loses its magnetic power immediately the circuit with the main magnets is broken from any cause to turn upon their axes, and drop instantly into the supporting position under the load, as indicated in both figures before the main or lifting magnets lose their sustaining power.

Wrenches.—Ellis and Batley.—11,684.—The slidable jaw is operated by an archimedean screw operated by a sliding member *A*, and the roughened collar, which is rigidly secured to stem *B*, is used for fine adjustments of the slidable jaw.



11,684.

Internal-Combustion Engines.—Mather and Platt, Limited, and A. E. L. Chorlton, Salford.—23,843.—Improvements in and relating to internal-combustion engines especially applicable to engines of the two-cycle type. It is well known that in engines as at present constructed, especially when of large size and working with combustible gases of high calorific value, difficulties occur owing to pre-ignitions in the combustion-cylinder during the compression stroke, and the object of the present invention is to obviate such difficulties by mixing with the combustible gases a proportion of inert gas in the cylinder itself. The combustion cylinder 1, in which moves the piston 2, has its exhaust ports 3, which communicate with the exhaust exit 4, situated at the middle. Opening into the cylinder 1 are two ports 5, one towards either end, which, when both are left open by the piston 2 at mid-stroke in the course of its travel, as shown in Fig. 1, place the two ends of the cylinder 1 in communication through the by-pass and cooling arrangement. This cooling arrangement may consist of pipes through which the gases



23843

pass, surrounded by water either in communication with the general water-cooling arrangements of the engine, or separately supplied, and may be conveniently arranged on the top of the cylinder, as shown in Fig. 1, or towards the side, as in Fig. 2; or the by-pass and cooling arrangement may obviously be separate from the cylinder, but connected therewith by pipes opening from the ports 5. The ends 7 of the piston 2 are inclined or curved in such manner as to deflect the products of combustion escaping from either port 5 into the middle of the charge in the cylinder 1. In the position shown in Fig. 1, the piston 2 is at mid-stroke supposed moving towards the left hand, in which case, the ports 5 both being open, the gaseous products of combustion from the last explosion in the right-hand end of cylinder 1 will escape through the cooling arrangement, wherein their temperature is reduced, into the charge of mixed combustible gas and air in the left-hand end of the cylinder 1, thus reducing the activity of the combustible gas and at the same time increasing the degree of compression of the charge for the next explosion without the expenditure of additional power. As the piston 2 moves further toward the left, it closes the port 5, and later on opens the port 3 to the exhaust. On the return stroke towards the right after the next explosion, the piston 2 after closing the port 3, will again open 5, and the products of combustion will then pass from the left-hand end of the cylinder 1 to the right-hand end.

HORSE-POWER AND MAN-POWER.

The measurement of a horse's power of work, first ascertained by Watt, the inventor of the steam engine, was founded upon the basis that the average brewery horse was capable of doing work equal to that required to raise 330 pounds of weight 100 feet in one minute, or 33,000 pounds one foot in one minute. This estimate, however, was for one minute; it would not be possible for a horse to perform this amount of work continuously for eight consecutive hours. One horse could exhaust twelve men in a single day, for where a strong man could perhaps pull half of 330 pounds to a height of 100 feet in two minutes, he probably could not repeat the operation more than a few times. A man's power is about one-tenth of a horse's power. That is, where a horse could pull 330 pounds to a height of 100 feet, one minute, and then slack up and repeat the operation, for eight hours, thus pulling four hours, and slacking up four hours, it would require ten strong men to perform the same amount in that length of time. When man put horses to work the gain in labor for the world was thus ten-fold. Multiply this by steam-power, water-power, air-power, and above all, electric power, and one has a problem in mechanical progression.—"Popular Mechanics."