L. L. SCOTT.

INTERNAL COMBUSTION PERCUSSIVE MACHINE.

APPLICATION FILED NOV. 7, 1910.

1,049,276. Patented Dec. 31, 1912.

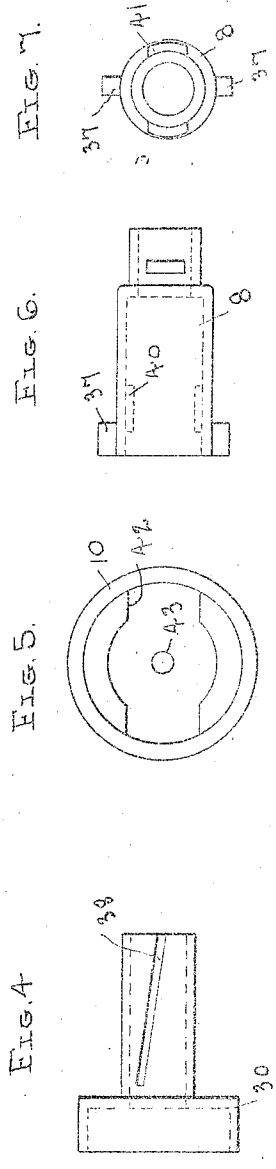

Fig. 7.

Fig. 6.

Fig. 5.

Fig. 4.

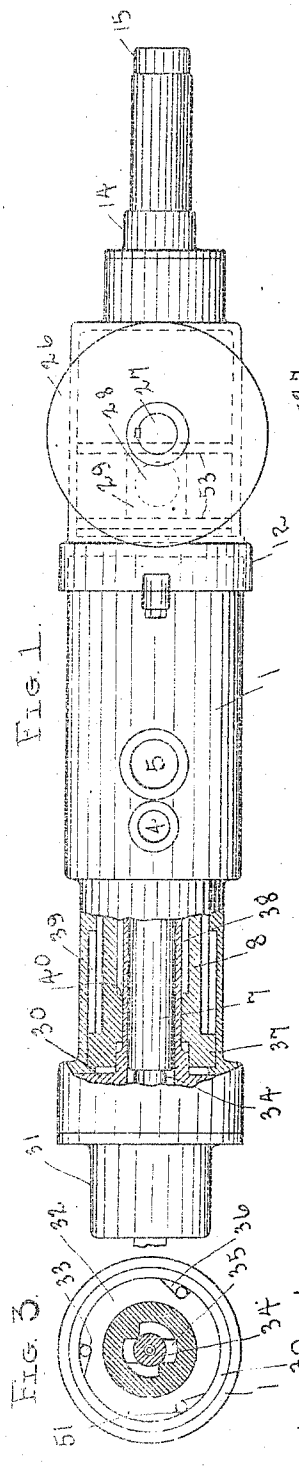

Fig. 1.

Fig. 3.

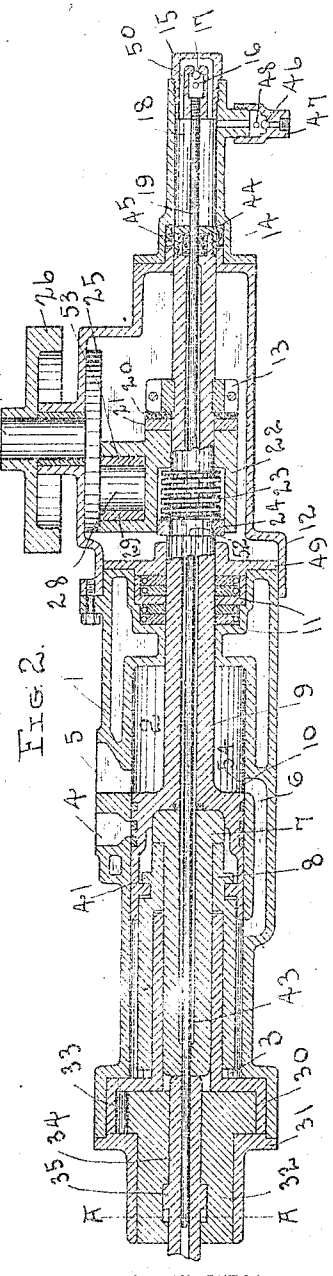

Fig. 2.

WITNESSES:

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INTERNAL-COMBUSTION PERCUSSIVE MACHINE.

1,049,276. Specification of Letters Patent. Patented Dec. 31, 1912.

Application filed November 7, 1910. Serial No. 591,160.

To all whom it may concern:

Be it known that I, LEWIS L. SCOTT, a citizen of the United States, residing at Joplin, in the county of Jasper and State of Missouri, have invented a new and Improved Internal-Combustion Percussive Machine, of which the following is a specification.

This invention relates to improvements in internal combustion percussive machines, intended to be used in connection with rock drills and the like.

The objects of this invention are: to produce a gas actuated percussive machine that will be of small dimensions of compact, simple and inexpensive construction; a further object is to provide a machine, the piston of which is practically free from the crank shaft when the said piston strikes the blow.

To these ends my invention consists of various features of construction and arrangement of parts, as hereinafter described, illustrated in the accompanying drawings and particularly pointed out in the appended claims.

Referring to the drawings which form a part of this specification, Figure 1 is a horizontal plan view, (shown partly in section), of my improved internal combustion percussive machine. Fig. 2 is a vertical longitudinal section of same. Fig. 3 is a section on the line A—A of Fig. 2, with head 31 removed. Fig. 4 is a side view of the rotating sleeve 30. Fig. 5 is an enlarged end view of the piston 10. Figs. 6 and 7 are side and end views of a casting employed.

Like parts are represented by similar numerals of reference in the several views.

The numeral 1 denotes the cylinder; the explosion chamber 2 being in one end of the cylinder, and the chamber 3, (which receives the charges of gas and air through the port 4), is located at the opposite end. The head 31 closes the chamber 3. Where this machine is used for rock drilling, the head 31 carries the chuck 32, the said chuck being adapted to rotate in the head 31. The piston 10 is adapted to reciprocate in the cylinder 1, and has a projecting hammer 7, which is adapted to strike a tool, such as the drill steel 34. Said hammer 7 is provided with a hole 43 through its center to allow for the passage of the tube 19. In the drilling of rock where it is required that the drill steel be rotated, the said drill steel may be provided with the lugs 35 which fit in corresponding slots in the chuck 32, so that if the chuck is rotated the said drill steel will be compelled to rotate with the said chuck. The chuck 32 is provided with two diameters; on the circumference of the larger diameter the slots 36 are cut. The pins or rollers 33 are carried in the slots 36. The ring 30 rotates, (by action of the piston 10, which will be explained later). The pins 33 contact with the inner surface of the ring 30. When the ring 30 rotates to the left (see Fig. 3), the pins 33 will roll up the inclined slot 36 until they lock the chuck 32 to the ring 30, so that the chuck will be rotated with the ring 30. If the ring 30 were rotated to the right, the pins 33 would rest against the shoulder 51 and the chuck would remain stationary. The piston 10 is provided with slots 42, (see Fig. 5). The casting 8 is secured to the piston 10 by means of the lugs 41 entering the slots 42, and turning the said casting 8 in either direction 90 degrees, so as to bring the lugs 41 in contact with the inner surface of the piston lug. The cylinder 1 is provided with the straight slots 39; the teeth 37 of the casting 8 work in said slots 39 and prevent the casting 8 from rotating in either direction. The casting 8 is provided with the spiral teeth 40 which work in the spiral grooves 38 of the ring 30.

As the piston 10 and all connected parts move upward, the teeth 40 working in the slots 38 will cause the ring 30 to rotate a small amount; rotation being transmitted to the drill steel as before described. On the down stroke of the piston the ring 30 will be rotated in the opposite direction and the chuck 32 will remain stationary as before described. The explosion chamber 2 is closed by a head which is a part of the cylinder casting 1. The piston rod 9, which is a part of the piston casting 10, passes through the explosion chamber head. The packing rings 11 prevent any leak of explosive pressure from the chamber 2. Said packing rings are held in place by the plate 49. The piston rod 9 is formed with a shoulder 52. The ring 24 bears against the shoulder 52 on one side and against the spring 23 on the other. The casting 22 is slidably fitted on the rod 9. The sliding movement of the casting 22 is limited, and is stopped on one side by the spring 23 and on

the other side by the cushioning washers 21 and 20 which bear against the piece 13, said piece 13 being rigidly secured to the rod 9. A slide-way 53 is formed on the casting 22 in which the box 29 is fitted. This box is adapted to receive a crank pin 28, which is secured to the disk 25 formed on the inner end of the shaft 27, which is rotatably mounted in the hub of the casing 12. The shaft 27 extends beyond the hub portion of the casing 12, upon which a fly-wheel 26 is attached and adapted to revolve with the shaft 27. The rod 9 projects into a small cylinder 18 and forms a piston in the said cylinder. This cylinder and piston are used for a water or air pump. The cylinder 18 has an enlarged gland 14 to carry packing 45. The tube 19 passes through the center of the piston rod 9 and is packed with any suitable packing such as 44. The head 15 closes the end of the cylinder 18. Said head is provided with passage 50 through which water or air passes from the cylinder 18 to the tube 19 through the check valve 17. The head 15 is provided with a chamber 16, which connects with the inside of the tube 19 and with the passage 50 through the check valve 17. The water or air is sucked in the cylinder 18 through a common check valve such as 46 on the down stroke of the piston. The numerals 47 and 48 point to the body and interior of said check valve. On the up stroke the water or air is forced through a check valve 17 into the tube 19 as described. The said tube 19 conducts the same to the drilling tool, which is made hollow. In rock drilling this air or water is used to force the rock cuttings out of the drill hole.

Any suitable sparking mechanism, (commonly used on gasolene engines), may be utilized to explode the charges after they have been introduced into the chamber 2. I do not wish to be restricted to any particular kind.

The operation of my improved internal combustion percussive machine is as follows: The mixture of gas and air is drawn into the chamber 3 through the port 4, on the up stroke of the piston 10. On the downward stroke of the piston the mixture in chamber 3 is compressed so that when the piston 10 uncovers the port 54, the charge will rush through the channel 6 into the chamber 2. On the up stroke a new charge is drawn in chamber 3, and the charge in chamber 2 is compressed. As the piston 10 reaches the terminus of the up stroke the charge in chamber 2 is exploded (by a spark commonly used on gasolene engines). The piston 2 will be driven downward under the pressure of the explosion in chamber 2. As the piston reaches the terminus of the down stroke, the burned gases in chamber 2 are exhausted through the port 5, while at the same time a new charge rushes through the passage 6 into the chamber 2. As these operations continue, it will be plainly seen that an explosion will occur in chamber 2 on every down stroke. Further, that as the piston 10 approaches the end of the down stroke, the hammer 7 on the piston 10 will strike the tool 34. It will also be seen that when the hammer 7 strikes the tool 34 the piston 10 will come to a stop. The energy stored in the fly-wheel 26, (said wheel is connected to casting 22 through the crank pin 28 and sliding yoke 29), will cause the casting 22 to slide forward on the rod 9 and compress the spring 23 enough to allow the crank to pass the dead center line without injury to the bearings. It will be plainly seen that the result of this action is that of a free piston blow; the piston striking the tool free and uncushioned, with its weight and pressure behind it. The fly-wheel 26 stores up energy to move the piston on the up stroke.

The rotation of the drilling tool will occur as before described. Water or air will be forced through the drilling tool as before described.

Various changes in details of construction of component parts of the machine may be made without departing from the principle and intended scope of the invention.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In an explosive engine of the character described the combination with a cylinder, of a hammer piston adapted to reciprocate therein, said piston having an extension projecting exteriorly of the cylinder; a fly wheel, a crank shaft connected therewith having a crank pin, and means yieldingly connecting the crank pin to the projecting extension of the said piston.

2. In an explosive engine of the character described the combination with a cylinder, of a hammer piston adapted to reciprocate therein, said piston having an extension projecting exteriorly of the cylinder; a rock cutting drill bit arranged in said cylinder in striking relation to the said piston, a fly wheel, a crank shaft connected therewith having a crank pin, and means yieldingly connecting the crank pin to the projecting extension of the said piston.

In testimony whereof, I affix my signature, in the presence of two witnesses.

LEWIS L. SCOTT.

Witnesses:
TILLIE A. KOHLMEYER,
B. C. ROSE.