C. H. HAESELER.

DRILLING MACHINE.

APPLICATION FILED JUNE 8, 1914.

1,146,870.

Patented July 20, 1915.

2 SHEETS—SHEET 1.

Fig. 1.

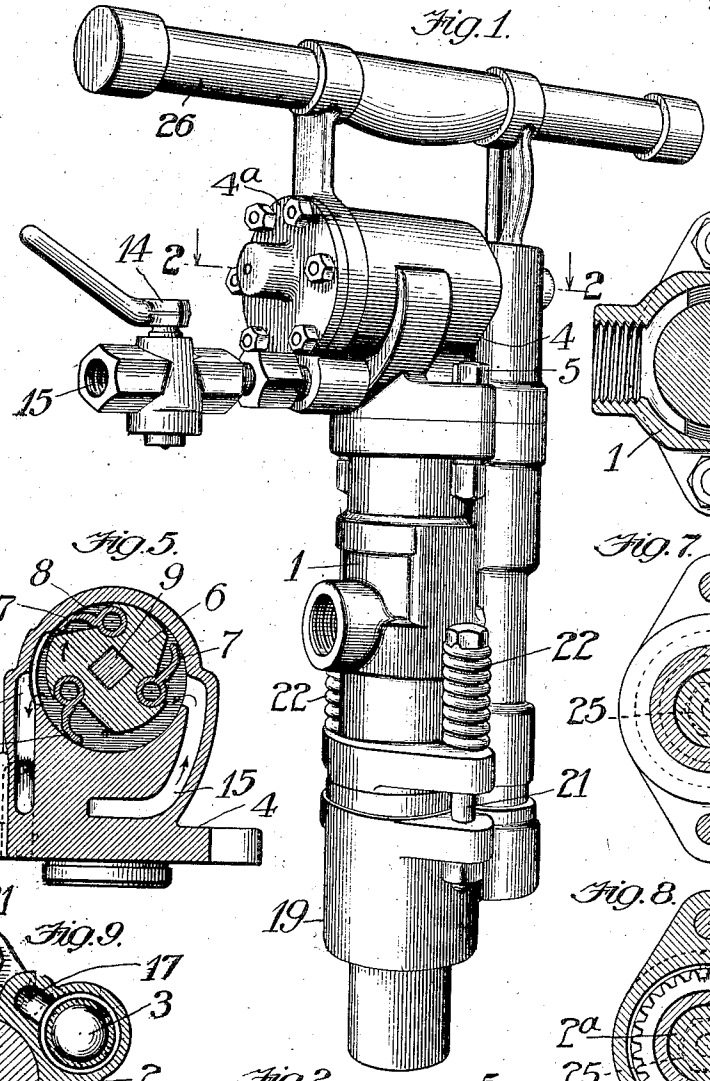


Fig. 6.

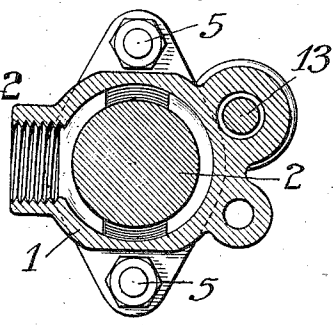


Fig. 5.

Fig. 7.

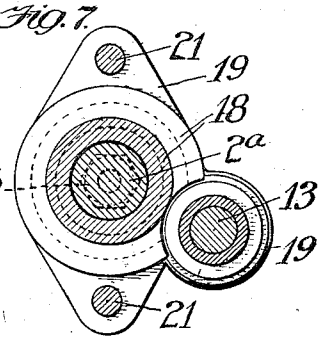


Fig. 9.

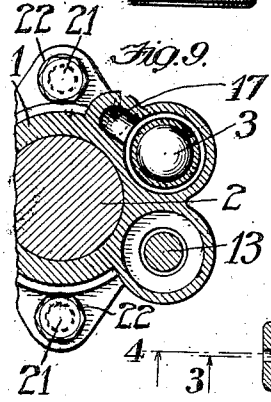


Fig. 8.

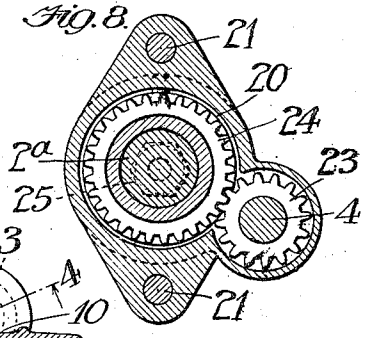
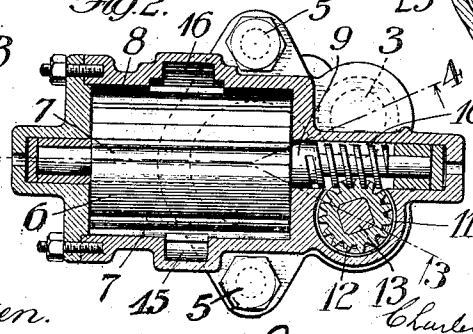


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 3.

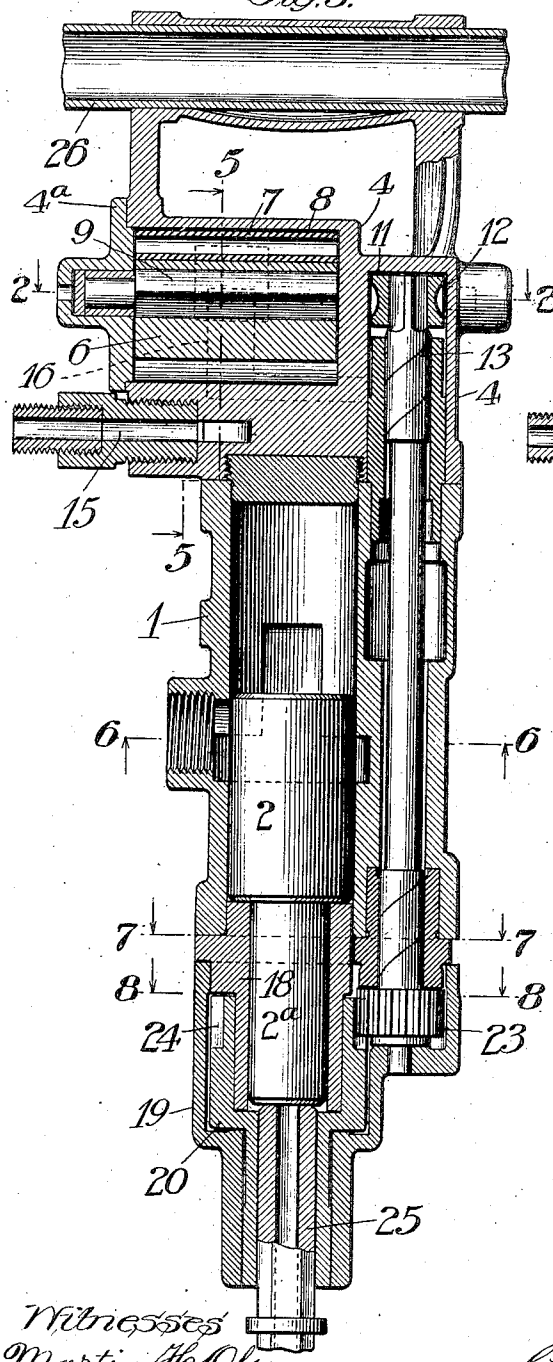
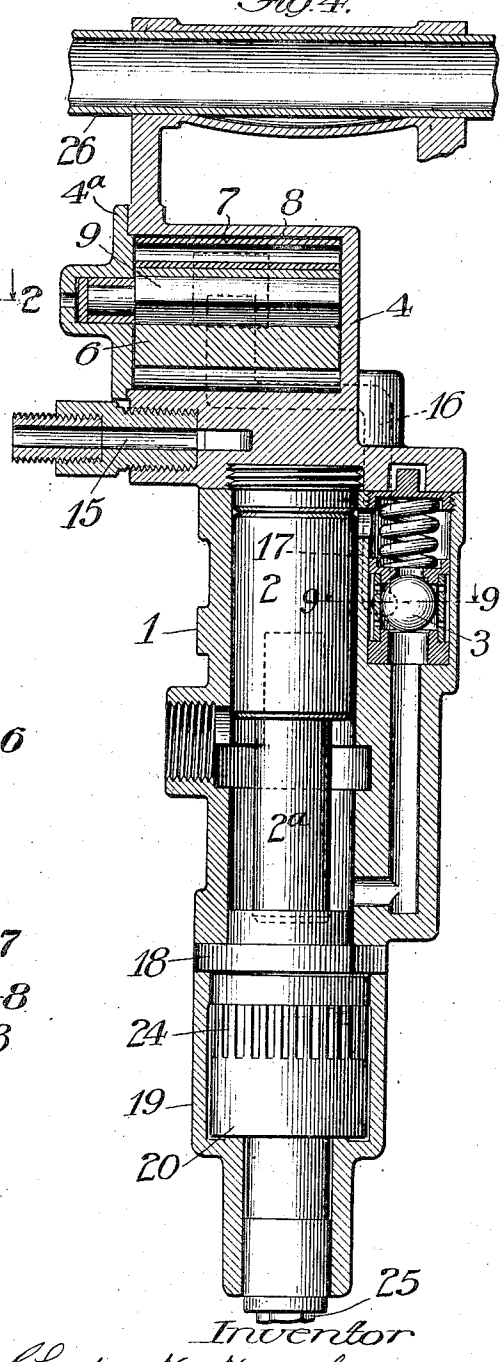


Fig. 4.



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UNITED STATES PATENT OFFICE.

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DRILLING-MACHINE.

1,146,870. Specification of Letters Patent. Patented July 20, 1915.

Application filed June 8, 1914. Serial No. 843,724.

To all whom it may concern:

Be it known that I, CHARLES H. HAESELER, a citizen of the United States, residing at Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented certain new and useful Improvements in Drilling-Machines, of which the following is a specification.

My invention relates to what are generally known as drilling machines, and the object thereof is to provide a simple, efficient and reliable means for automatically rotating the chuck or other tool-holding mechanism.

Speaking in general terms, my drill is characterized by a drilling engine of the percussive or impact type, on whose back head is mounted a rotation motor which is driven by the live motive fluid and whose exhaust drives the drilling engine, the rotation motor being operatively connected with the drill chuck, mounted at the front end of the machine.

The various advantages in the construction and mode of operation of my machine will be apparent from the description hereinafter given.

In the drawings, Figure 1 is a perspective of my drilling machine; Fig. 2 a cross section thereof on line 2—2 of Figs. 1 and 3; Fig. 3 a longitudinal section on the irregular line 3—3 of Fig. 2; Fig. 4 a longitudinal section on the irregular line 4—4 of Fig. 2; Figs. 5, 6, 7 and 8 cross sections on the lines 5, 6, 7 and 8 respectively of Fig. 3; and Fig. 9, a cross section on line 9—9 of Fig. 4.

My invention relates to drilling machines in general, but for purposes of illustrating and describing one embodiment of the invention, I have illustrated and will hereinafter describe the same in connection with a drill of the hand type, employed more particularly in the drilling of rock, coal, etc., but it will be understood that my invention is not to be limited to this particular application thereof.

Referring to the embodiment of my invention as herein shown, the machine includes, essentially, a drilling engine of any desired character, but preferably that shown, a rotation motor mounted in the top head of the engine, and a drill chuck or tool holder, mounted at the front end of the engine but operatively connected with the rotation motor by means of reduction gearing.

The drilling engine comprises a cylinder 1 of suitable shape and dimensions, and containing an impact or hammering piston 2 reciprocable therein, and governed in its reciprocations by means of a suitable distribution valve, which is here a ball valve 3. Inasmuch as the drilling engine may be of any desired or approved type, the same need not be further described, particularly as to the ports and passages necessary to the reciprocations of the piston, except that as hereinafter explained the exhaust of the rotation motor is employed as the motive fluid for operating the engine, the outlet of the motor and the inlet of the engine being in close proximity.

The drilling engine has a back head 4, which is secured to the cylinder 1 in suitable manner as by the bolts 5, and in which the rotation motor is mounted. This motor is of the rotary type, consisting of a rotary piston 6, carrying a series of pivoted blades 7 and operable within a piston chamber or cylinder 8 formed in the back head. This rotary piston has a detachable shaft 9, provided with an angular portion where it passes through the piston and having its opposite ends journaled respectively in the back head and in an end cap or plate 4^a, bolted or otherwise secured to such head. The inner end of the piston shaft is formed with a worm 10, which is adapted to mesh with the worm gear 11, located within a chamber 12 and slidably mounted upon the upper end of a drive shaft 13, extending longitudinally of the drilling machine and paralleled with the axis of the drilling engine cylinder.

The worm shaft and its worm are removable from the piston 6 and also the worm gear is removable from the drive shaft 13 in order that other worms and gears may be readily substituted for the purpose of providing different gear ratios for different speeds of rotation of the tool holder.

The supply of the live motive fluid to the rotary motor is controlled by the cock 14 in its passage through the inlet passage 15 entering the back head. This passage leads to one side of the rotary piston chamber as

seen in Fig. 5 and rotates the piston 6. The exhaust from the rotary piston chamber is through the passage 16, extending downwardly through the back head and through the passage 17 to the valve box of the drilling engine, as seen in Figs. 4 and 9. As a result the rotation motor is driven directly by the live motive fluid and the drilling engine is driven by the exhaust from the rotation motor.

The front head is formed as an extension 18 on the cylinder. This extension has a central bore or opening of a size to receive the shank or stem 2^a of the hammering piston, and is held clamped between the front end of the cylinder and a casing or shroud 19 for the tool holder 20 by means of the bolts 21 provided with springs 22.

The drill chuck or tool holder is formed as a sleeve of differential diameter, the upper portion having the larger diameter, and is mounted to rotate upon the exterior of the cylinder extension 18. The casing 19 incloses or forms a shroud for the chuck or tool holder, but may be dispensed with, except for such portion of its inner end which is required in the clamping together of the parts.

The drive shaft 13 rotates in suitable bearings on the engine cylinder, and such shaft is preferably, though not necessarily, inclosed, so that the hollow intermediate portion between the bearings may act as a lubricating chamber. This shaft carries at its lower end, either integral or a separate part secured thereto, a pinion gear 23, meshing with a spur gear 24 which is here formed on the tool holder 20.

Describing the operation of the machine, the live motive fluid is admitted by turning the cock or throttle valve 14 and flows to the rotation motor. As a result this motor is rotated, and the drive shaft 13, pinion gear 23 and the tool holder 20 are likewise rotated. The exhaust from the rotation motor operates the drilling engine, causing the reciprocations of the hammering piston, which delivers its blows upon the inner end of the inserted drill bit or steel 25 or other tool, whose inner angular end is inserted in the correspondingly angular opening of the tool holder in the lower end only of the tool holder. The sleeve 18 forms a continuation of the piston chamber of the drilling engine, and the shank or stem of such piston travels through the central bore of such extension and delivers its blows upon the inner end of the tool or drill steel 25.

The particular drill described being of the hand type, the same is provided with a handle 26 of suitable form so as to be held in the hands of the operator, and formed as a part of or connected with the back head.

I claim:

1. In a drilling machine, the combination of a drilling engine including a cylinder, a hammering piston reciprocable therein, a rotatable tool holder at the front end of the cylinder, a back head for the cylinder, a rotary motor mounted in the back head and reduction gearing between the motor and tool holder.

2. In a drilling machine, the combination of a drilling engine including a cylinder, a hammering piston reciprocable therein, a rotatable tool holder at the front end of the cylinder, a back head for the cylinder, a rotary motor mounted in the back head, operating connections between the motor and tool holder, and means for admitting the live motive fluid directly to the motor and admitting its exhaust to the drilling engine to reciprocate the piston of the latter, the outlet of the motor and the inlet of the engine being in close proximity.

3. In a drilling machine, the combination of a drilling engine including a cylinder, a hammering piston reciprocable therein, a rotatable tool holder at the front end of the cylinder, a back head for the cylinder, a rotary motor mounted in the back head and operating connections between the motor and tool holder, said back head having a live motive fluid connection leading to the rotary motor and an exhaust fluid connection leading from the outlet of said motor to the inlet of said drilling engine, said inlet and outlet being in close proximity.

4. In a drilling machine, the combination of a drilling engine including a cylinder having a back head, a hammering piston reciprocable therein, a rotatable tool holder at the front end of the cylinder, a rotary motor mounted in the back head including a rotary piston, a worm driven thereby, a drive shaft extending longitudinally of the cylinder, a worm gear meshing with the worm and mounted upon one end of the shaft and a pinion gear on the other end of the shaft, said tool holder having a gear with which the pinion gear meshes.

5. In a drilling machine, the combination of a drilling engine including a cylinde a hammering piston reciprocable therein, a rotatable tool holder at the front end of the cylinder, a back head for the cylinder, a rotary motor mounted in the back head and including a rotary piston, a worm driven thereby, a drive shaft extending longitudinally of the cylinder, a worm gear meshing with the worm and slidably and detachably mounted upon one end of the shaft, and a pinion gear on the other end of the shaft, said tool holder having gear with which the pinion gear meshes.

6. In a drilling machine, the combination of a drilling engine including a cylinder having a back head, a hammering piston reciprocable therein, a rotatable tool holder at the front end of the cylinder, a rotary mo-

tor mounted in the back head including a rotary piston, a shaft driven by and detachably connected with the piston, a worm on the shaft, a drive shaft extending longitudinally of the cylinder, a worm gear meshing with the worm and detachably mounted on one end of the drive shaft, and a pinion gear mounted on the other end thereof, said tool holder having a gear with which the pinion gear meshes.

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