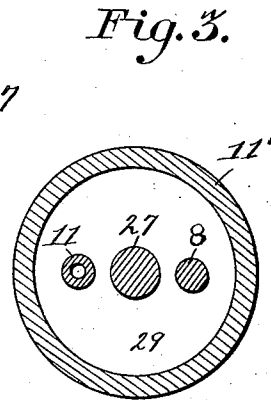
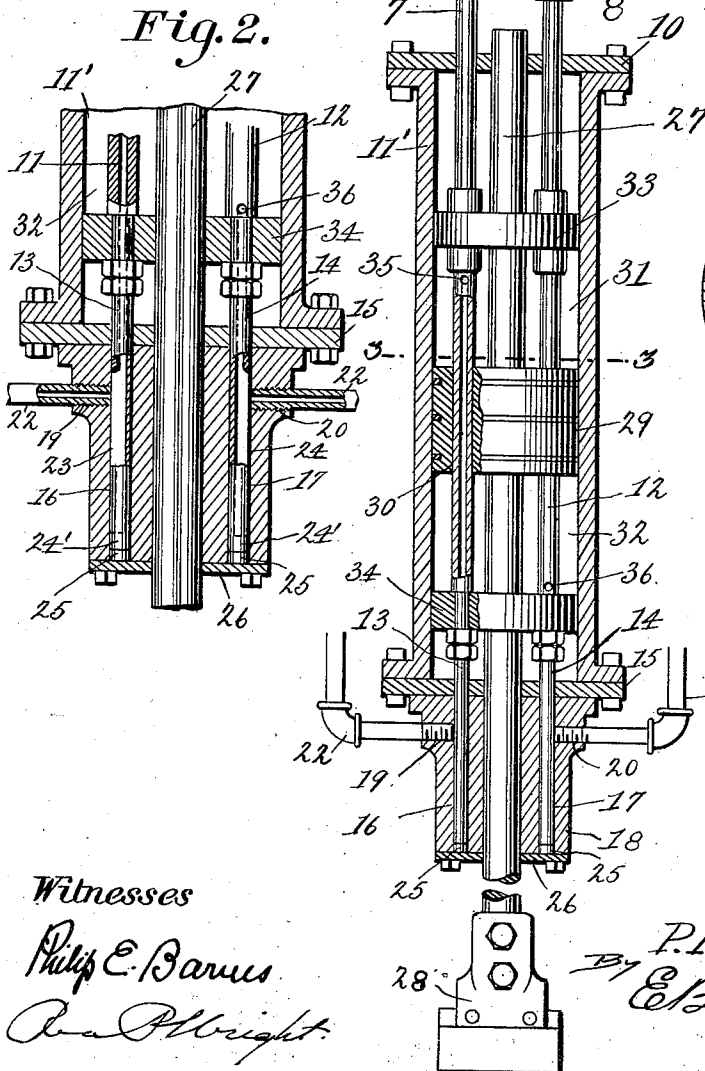
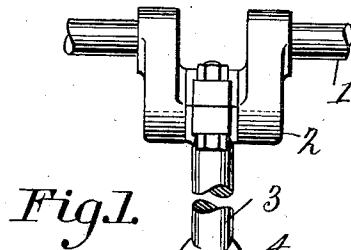


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CRANK DRIVEN PISTON STROKE MOTION.
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UNITED STATES PATENT OFFICE.

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CRANK-DRIVEN PISTON-STROKE MOTION.

1,065,955.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, PATRICK F. McCORMACK, a citizen of the United States of America, residing at West Rutland, in the county of Rutland and State of Vermont, have invented certain new and useful Improvements in Crank-Driven Piston-Stroke Motions, of which the following is a specification.

This invention relates to certain new and useful improvements in crank driven piston stroke motions, especially adapted to be used in connection with power hammers, rock channeling and rock drilling machines; the object being to provide means for reciprocating a piston by a crank through the medium of compressed air in order to allow the crank to turn on the spring of the air whereby the piston will be driven in such a manner that all danger of injuring the crank is prevented.

Another object of my invention is to provide a mechanism which is so constructed that the blow of the piston can be regulated by the air pressure so as to deliver a blow of the desired strength without injuring the mechanism in any way.

I am aware that cushioning means for piston strokes used in connection with power hammers have been provided, but in constructions as now in use, no means is provided for regulating the air pressure within the cylinder by forcing compressed air into chambers arranged to each side of the piston in which are mounted plungers operated by the crank.

Other and further objects and advantages of the invention will be hereinafter set forth and the novel features thereof defined by the appended claims.

In the drawings—Figure 1, is a vertical longitudinal section through my improved mechanism partly in elevation; Fig. 2, is an enlarged vertical section through a lower portion of the cylinder; and Fig. 3, is a horizontal section taken on the line 3—3 of Fig. 1.

Like numerals of reference, refer to like parts in the several figures of the drawings.

In the drawing, 1 indicates a driven shaft having a crank 2 carrying a pitman rod 3 provided with a bifurcated lower end 4 which is mounted on the eye 5 of a cross-head 6. This construction is especially

adapted to be used in connection with a power hammer and it is of course understood that the crank and pitman connection can be changed without departing from the spirit of my invention, in order to provide a construction suitable for rock channeling and drilling machines.

The cross-head 6 carries a pair of parallel rods 7 and 8 which are secured in position therein by lock-nuts 9; said rods working through the head 10 of a cylinder 11' and while I have shown the rods extending through openings formed in the head, it is of course understood that stuffing boxes can be employed if desired, in order to form an exceedingly tight joint, but this is not essential as it is not necessary to have the heads of the cylinder air-tight as will be later described.

The rods 7 and 8 are provided with tubular portions 11 and 12 reduced as shown at 13 and 14; said portions extending through the lower head 15 of the cylinder into bearings 16 and 17 formed in member 18 carried by the head 15; said member being provided with oppositely disposed threaded bores 19 and 20, in which are arranged the threaded ends of inlet pipes 22 through which compressed air is adapted to be forced, as will be later described. The threaded bores 19 and 20 communicate with cut-away portions 23 and 24 forming the reduced portions 13 and 14 of the rods 7 and 8 so that as the rods are reciprocated the bores and passages thereof will be maintained in communication, in order to allow compressed air to pass through the same. The reduced ends 13 and 14 of the rods 7 and 8 are provided with closed portions 24' which engage stops 25 supported within the bearings by a plate 26 as clearly shown, and while I have shown this particular construction in order to provide a bearing for the rods in order to maintain the same in true position as they are reciprocated by the crank and pitman, it is of course understood that various changes can be made in order to provide means for accomplishing the same result without departing from the spirit of the invention.

Extending through the heads 10 and 15 and the member 18 is a piston rod 27 forming a stamp-shaft at its lower end on which is arranged a hammer 28 said piston rod working through bores formed in the heads

and member 18, in order to allow the same to reciprocate freely therethrough and any suitable bearings can be provided for centering and supporting the piston rod in its proper position, but I have found that by providing the heads and member 18 with bores as set forth, a substantially strong and durable bearing will be formed in order to meet the demand.

Secured on the piston rod 27 within the cylinder is a piston head 29 for forcing the piston downwardly, said piston head being preferably arranged centrally of the cylinder, and is provided with openings 30 through which the tubular portions 11 and 12 of the rods 7 and 8 move freely, and it will be seen that by this construction, the cylinder is divided so as to form chambers 31 and 32.

Secured on the rods 7 and 8 to each side of the piston head 29 are plungers 33 and 34, provided with openings through which the piston rod 27 has a free movement, as clearly shown in Fig. 2, and said plungers 33 and 34 can be secured in position upon the rods by any suitable means such as shown and are preferably spaced at equal distances from the normal position of the piston head in order to form an air cushion on each side of the head so that when the crank is rotated by the driven shaft 1 the piston will be reciprocated.

The tubular portions 11 and 12 of the rods 7 and 8 are provided with inlet ports 35 and 36; the port 35 being arranged above the piston head 29 in order to communicate with the chamber 31 and the port 36 below the piston head 29 in order to communicate with the chamber 32, so that each chamber can be filled with compressed air of the desired pressure in order to support the cylinder upon an air cushion. The inlet pipes 22 are adapted to be connected to a suitable air compressor not shown, and are preferably provided with gages in order to determine the pressure in each chamber within the cylinder.

In the operation of my improved mechanism, when the chambers are filled with compressed air, by the rotation of the driven shaft 1, the pitman 3 is driven through the medium of the crank 2 which in turn reciprocates the rods 7 and 8, causing the plungers to move longitudinally within the cylinder and it will be seen that on the downward stroke of the crank, the compressed air within the chamber 31 will be slightly more compressed by the movement of the plunger 33, which will force the piston downwardly so as to strike a blow by an air cushion between the plunger and piston; the plunger and piston being free to move in respect to each other so that when the upper plunger is being moved downwardly toward the piston head, the lower plunger

will move away therefrom in order to allow the piston to be forced downwardly, and by regulating the pressure of air in each chamber, the stroke of the hammer can be regulated in such a manner that all shock upon the crank is prevented, and the strength of the stroke is regulated. After a blow has been struck, the upward movement of the crank will draw the piston back into its normal position by air being compressed by the lower plunger.

I claim:

1. In a mechanism of the kind described, the combination with a crank-operated pitman, of a cylinder, plungers mounted within said cylinder, rods carried by said plungers connected to said pitman, a piston head independently mounted in said cylinder between said plungers and provided with openings to receive said rods, and a piston rod carried by said piston working through said plungers.

2. In a mechanism of the kind described, the combination with a crank-operated pitman, of a cylinder, a piston head arranged within said cylinder, a plunger arranged within said cylinder to each side of said head, a connection from said plungers to said pitman, and means for admitting air to and maintaining the air under pressure in said cylinder to each side of said piston head.

3. In a mechanism of the kind described, the combination with a cylinder, of a piston head mounted therein, a piston rod carried by said head, a plunger arranged to each side of said piston head within said cylinder, means for admitting air to said cylinder upon the opposite sides of the piston head thereof, a driven crank, and a connection from said plungers to said crank.

4. In a mechanism of the kind described, the combination with a cylinder, of a piston head working in said cylinder, a piston rod carried by said head, a plunger arranged within said cylinder to each side of said head and movable independently of said head, a connection between said plungers, a driven crank, a connection from said plungers to said crank, and means for admitting air to said cylinder upon the opposite sides of the piston head thereof.

5. In a crank driven piston stroke motion, the combination with a cylinder, of a piston head working therein, a piston rod carried by said head, a driven crank, a pitman carried by said crank, a cross-head carried by said pitman, a plunger mounted in said cylinder to each side of said piston head and movable independently of said head, rods carried by said cross-head connected to said plungers, and means for admitting compressed air to said cylinder upon the opposite sides of the piston head thereof.

6. In a mechanism of the kind described,

the combination with a cylinder having a bearing member at one end, of a piston rod extending through said bearing member, a piston head mounted upon said rod, a plunger provided with an opening to receive said piston rod mounted within said cylinder at each side of the piston head thereof, rods connecting said plungers and extending through openings formed in said piston head, said rods being provided with tubular portions provided with inlet ports communicating with the chambers formed by said plungers upon the opposite sides of said head, a connection from said crank to said rods, and inlet pipes communicating with the tubular portion of each rod for admitting air to said chambers.

7. In a mechanism of the kind described, the combination with a cylinder having a bearing member at one end, of a piston rod working through said bearing member, a head upon said piston rod within said cylinder, tubular rods working through openings formed in said head and having bearings within the bearing member of said cylinder, plungers carried by said rods forming chambers upon opposite sides of said head, said rods being provided with inlet ports communicating with said chambers, inlet pipes communicating with said rods for supplying air to said chambers, a driven crank, and a connection from said crank to said rods.

8. In a mechanism of the kind described, the combination with a cylinder having a bearing member at one end, of rods extending into said cylinder from the opposite end thereof having tubular portions reduced and mounted within the bearing member of said cylinder, said rods being provided with slotted portions, inlet pipes communicating with the slotted portions of said rods, a piston rod and piston head mounted within said cylinder, said head being provided with openings to receive said rods, plungers carried by said rods, said rods being provided with inlet ports communicating with the chambers formed by said plungers, a cross-head connected to said rod, a driven crank, and a connection from said cross-head to said crank.

9. In a mechanism of the kind described, the combination with a cylinder having a piston head mounted therein, of plungers independently movably mounted within said cylinder in respect to said piston head, one of said plungers being arranged to each side of said piston head forming a chamber upon opposite sides of said head, a connection between said plungers, a driven crank, a connection between said plungers and crank, and means for admitting and maintaining air under pressure in the chambers of said cylinder upon the opposite side of the piston head thereof.

10. In a mechanism of the kind described, the combination with a cylinder, of a piston head mounted therein, a piston rod carried by said head and extending outwardly therefrom, a hammer carried by said rod, a plunger arranged within said cylinder to each side of said piston head, a connection between said plungers, a driven crank, a connection between said crank and plungers, and means for maintaining air under pressure in the chambers formed by said plunger and piston head.

11. In a mechanism of the kind described, the combination with a driven crank, of a cylinder, plungers mounted in said cylinder, a connection between said plungers and crank, an independently movable piston head arranged between said plungers within said cylinder, a piston rod carried by said piston head, a hammer carried by said piston rod, and means for maintaining air under pressure in said cylinder upon the opposite sides of the piston head thereof.

12. In a mechanism of the kind described, the combination with a cylinder having a piston mounted therein, of connected plungers arranged within said cylinder and movable independently of said piston head, one of said plungers being arranged to each side of said piston head, means for reciprocating said plungers, and means for admitting and maintaining air under pressure within said cylinder upon the opposite sides of the piston head thereof.

13. In a mechanism of the kind described, the combination with a cylinder having a centrally located piston working therein, of a plunger mounted within said cylinder to each side of said head and forming a chamber upon the opposite side of said head, means for admitting air under pressure to said cylinder upon the opposite sides of the head thereof, and mechanism for operating said plungers independently of said piston head.

14. In a mechanism of the kind described, the combination with a cylinder having a head and provided with a bearing at one end thereof, of a crank arranged in longitudinal alinement with said cylinder, said bearing being provided with inlet pipes, rods extending through said cylinder having tubular portions mounted within the bearing member of said cylinder, said tubular portions being provided with slots registering with the inlet pipes, a connection between said rods and said crank, a piston working within said cylinder having openings to receive said rods, plungers carried by said rods having openings to receive the rod of said piston, a hammer carried by said piston rod, and inlet ports formed in said rods for admitting air under pressure to said cylinder upon the opposite sides of the head thereof.

15. In a mechanism of the kind described, the combination with a cylinder, of spaced reciprocating plungers mounted in said cylinder, an independently mounted piston
5 head arranged in said cylinder between said plungers, and means for admitting air to said cylinder upon the opposite sides of said piston head.

16. In a mechanism of the kind described,
10 the combination with a cylinder, of spaced connected reciprocating plungers mounted in said cylinder, an independently mounted piston head arranged in said cylinder between said plungers, and means for admit-
15 ting air to and maintaining the air under pressure in said cylinder to each side of said piston head.

17. In a mechanism of the kind described,

the combination with a cylinder provided with a bearing at one end having inlet pipes, 20 of spaced reciprocating plungers mounted in said cylinder, rods connecting said plungers having tubular portions provided with slots, connecting with the inlet pipes, said rods being provided with ports, an inde- 25 pendently movable mounted piston arranged in said cylinder between said plungers forming chambers to each side thereof, and a piston rod carried by said piston head carrying a hammer. 30

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

PATRICK F. McCORMACK.

Witnesses:

CHARLES T. HICKS,
HELEN SHELTRY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."
