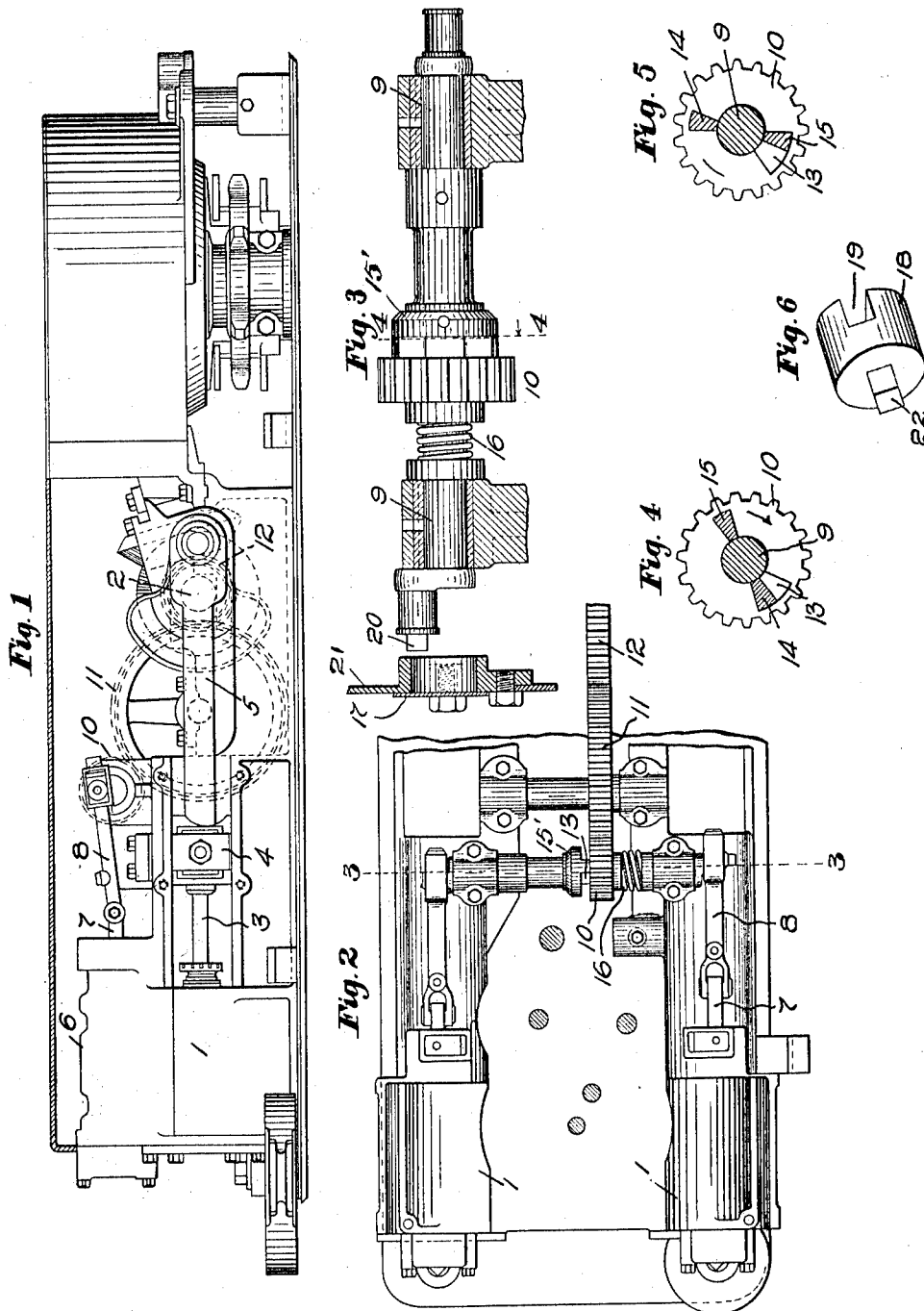


A. BALL,
ENGINE REVERSING MECHANISM.
APPLICATION FILED NOV. 4, 1909.

1,061,586.

Patented May 13, 1913.



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UNITED STATES PATENT OFFICE.

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ENGINE-REVERSING MECHANISM.

1,061,586.

Specification of Letters Patent.

Patented May 13, 1913.

Original application filed August 4, 1906, Serial No. 329,190. Divided and this application filed November 4, 1909. Serial No. 526,250.

To all whom it may concern:

Be it known that I, ALBERT BALL, a citizen of the United States, and a resident of Claremont, county of Sullivan, State of New Hampshire, have invented an Improvement in Engine-Reversing Mechanism, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to engine reversing mechanisms being intended to provide a simple and efficient form of reversing gear for pressure fluid engines.

This application is a division of my prior application Serial Number 329,190, filed August 4, 1906.

My invention will be best understood by reference to the following description when taken in connection with the accompanying illustration of one specific embodiment thereof, while its scope will be more particularly pointed out in the appended claims.

Referring to the drawings: Figure 1 shows a machine equipped with an engine embodying one form of my invention. Fig. 2 shows a plan view of the engine referred to in Fig. 1; Fig. 3 is a section on the line 3—3 in Fig. 2, showing the construction of the valve crank shaft; Fig. 4 is a sectional elevation on the line 4—4 in Fig. 3 showing the clutch members on the crank shaft in one relation; Fig. 5 is a sectional elevation similar to Fig. 4 showing the clutch members on the crank shaft in another relation; and Fig. 6 shows in perspective a reversing wrench for the valve shaft.

Referring to the drawings and the embodiment of my invention therein selected for illustration, I have shown the same embodied in an engine and applied to a mining or coal cutting machine, although obviously this is for purposes of illustration only and useful application may be made of the invention to any desired purpose.

In the drawings an engine is shown having the duplex cylinders 1 serving to drive the main power shaft 2. This engine may be of any usual or suitable construction, each cylinder being provided with the piston rod 3, cross head 4 and connecting rod 5. Each cylinder is surmounted by a valve chamber 6 within which is arranged any usual or suitable form of valve (not shown) to

which reciprocatory movement is imparted 55 through the valve rod 7, connecting rod 8 and valve crank shaft 9.

In a machine of the class referred to, and often where an engine is utilized for other purposes, it is desirable to provide means 60 for reversing the engine without sacrificing, however, for that purpose, the space required for the usual eccentrics and eccentric connections comprising the valve reversing mechanism. Herein I have shown means 65 for reversing the engine which take up substantially no additional space over that required for the valve operating shaft itself.

Referring to the drawings, the valve crank shaft 9 is provided with a gear 70 meshing with an intermediate gear 11, the latter driven by the driving pinion 12, on the main crank shaft 2. Driving movement is transmitted from the intermediate gear to the valve shaft 9 through the driving gear 75 10, the latter being loosely mounted on the valve shaft but adapted to turn the same through a suitable clutching device. For this purpose the gear is provided with a lateral lug 13 which presents opposite abutting 80 surfaces for engagement with one or the other of the lugs 14 or 15, the latter extending laterally from the adjacent sleeve 15' fixed on the valve shaft 9. During the operation of the engine, and with the gear 85 turning in the direction shown for example, by the arrow in Fig. 4, the valve shaft is turned in the same direction by engagement of its lug 13 with lug 14 on the sleeve. If the engine is stopped it may then 90 be reversed by merely turning the valve crank shaft ahead far enough to bring the lug 15 against the opposite face of the gear lug 13, as best shown in Fig. 5.

In order to prevent the valve shaft from 95 accidentally overthrowing and reversing the engine during its operation, the gear 10 is slidable on the shaft and frictionally held against the face of the sleeve by the compression spring 16. The frictional hold between the two clutch members, while sufficient to prevent the overthrow of the valve shaft, readily yields when the shaft is manually turned. 100

The machine shown in Fig. 1 is provided 105 with an inclosing casing partly indicated at 21 in Fig. 3, but broken away in Fig. 1. In order to turn the valve for reversing the

engine from without the outer casing, the latter is provided with a hinged or otherwise movable closure 17 covering an aperture opposite the valve shaft. This closure may be withdrawn or swung back and a key or wrench 18 (Fig. 6) inserted for turning the shaft. The key consists of a cylindrical roll fitting the aperture and having an inner slotted face at 19 which is adapted to engage the rectangular end 20 on the crank shaft. By turning the outer squared end 22 on the key, which projects through the case, by means of a wrench or other instrument, the position of the valve shaft may be readily reversed and the valve shaft thereby shifted through the requisite angular distance, the engine when it starts up will turn in the reverse direction.

While I have herein shown and described for purposes of illustration one specific embodiment of my invention, it is to be understood that the same is susceptible of extensive deviations from the illustrated details and from the form and relative arrangement of parts without departing from the spirit of the invention.

Claims—

1. The combination with an engine and its crank shaft, a valve operating shaft, a pinion loose on the valve operating shaft but driven from the crank shaft, a clutch member fast on the valve shaft, cooperating clutch surfaces on the clutch member and the pinion whereby the former is driven by the latter to actuate the valve mechanism, said clutching surfaces permitting relative movement between the clutch member and the pinion whereby the valve shaft may be turned to be driven in an advanced or posterior relation as the engine is reversed, and means for pressing the pinion laterally into frictional engagement with the clutch member to prevent accidental overthrow and reversal of the engine during its operation.
2. An engine reversing mechanism comprising valve operating means and driving means therefor, the latter including a driving and a driven member having interen-

gaging means permitting a free predetermined relative rotative movement of said members whereby the valve operating means may be turned by the driving means in either an advanced or posterior relation, and means for constantly urging said driving and driven members into uninterrupted frictional driving engagement to prevent accidental rotative movement therebetween.

3. In a fluid pressure engine the combination with a crank shaft, a valve operating shaft driven thereby, a pair of valve operating rods eccentrically connected one to each end of the valve operating shaft, a driven member fixed on said shaft at an intermediate point thereon, a pinion loose on said shaft and driven from said crank shaft and cooperating clutch surfaces on the driven member and on the pinion whereby the former is driven by the latter to actuate the valve shaft, said clutch surfaces permitting relative movement between the clutch member and the pinion whereby the valve shaft may be turned to be driven in an advanced or posterior relation, and both valve operating rods simultaneously moved to reverse the engine.

4. In a fluid pressure engine the combination with a crank shaft, a valve operating shaft driven thereby, reversing mechanism comprising a driving member loose on the operating shaft and connected to be driven by the crank shaft and a driven member connected to drive the valve operating shaft, said driven member being fixed on said operating shaft but movable relatively to the driving member whereby it may be driven in an advanced or posterior relation to the driving member for the reversal of the engine.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

ALBERT BALL.

Witnesses:

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