

No. 858,281.

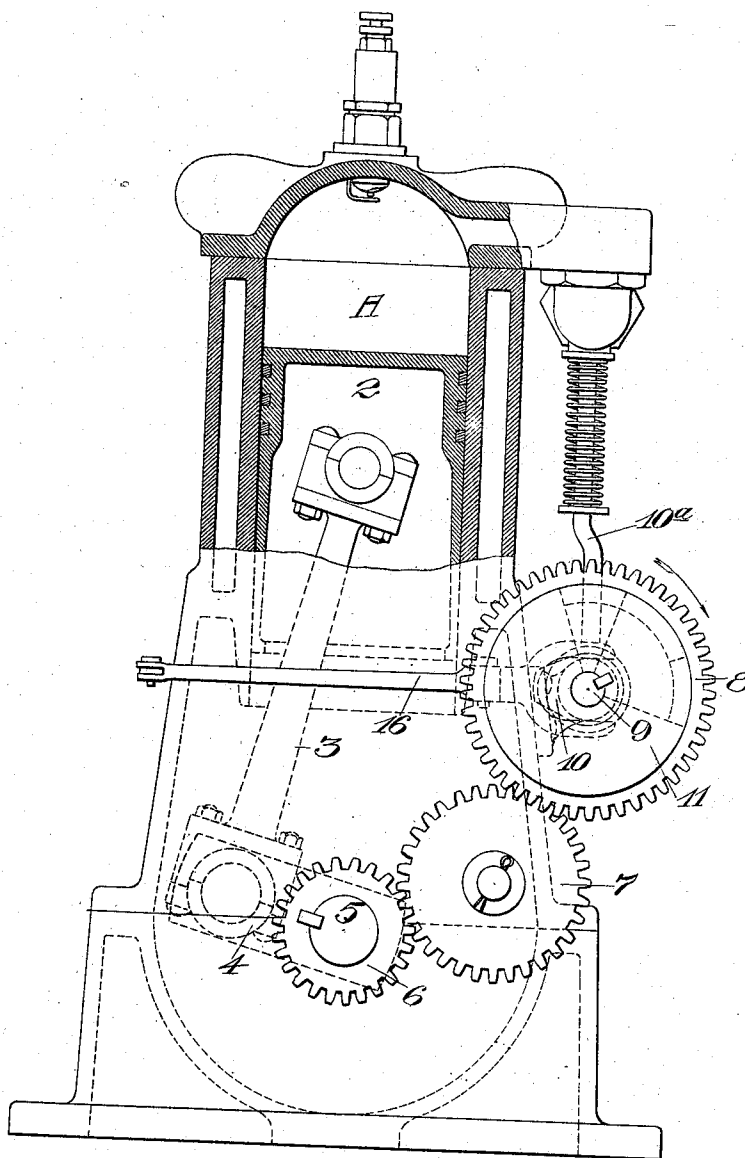
PATENTED JUNE 25, 1907.

W. A. HANSEN.
GAS ENGINE REVERSING MECHANISM.

APPLICATION FILED FEB. 23, 1906.

2 SHEETS—SHEET 1.

Fig. 1.



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2 SHEETS—SHEET 2.

Fig. 2.

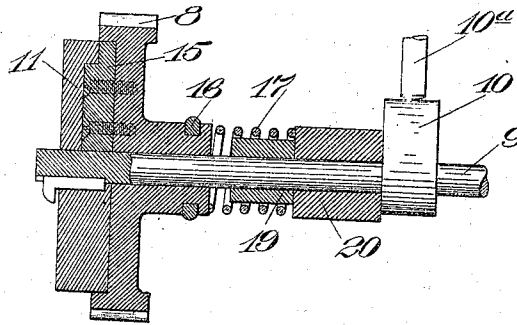
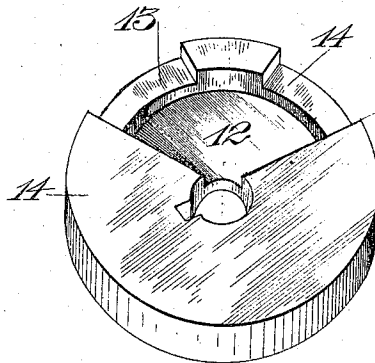


Fig. 3.

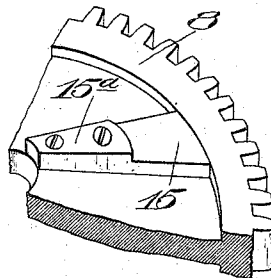


Fig. 4.

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UNITED STATES PATENT OFFICE.

WILLIAM A. HANSEN, OF SAN FRANCISCO, CALIFORNIA.

GAS-ENGINE-REVERSING MECHANISM.

No. 858,281.

Specification of Letters Patent.

Patented June 25, 1907.

Application filed February 23, 1906. Serial No. 302,520.

To all whom it may concern:

Be it known that I, WILLIAM A. HANSEN, a citizen of the United States, residing at the city and county of San Francisco and State of California, have invented new and useful Improvements in Gas-Engine-Reversing Mechanism, of which the following is a specification.

My invention relates to a means for reversing the revolutions of gas engine crank shaft and associated mechanism.

It consists in a combination of parts and details of construction which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 is an end sectional view illustrating my device. Fig. 2 is a section taken in the plane of the axis of the cam shaft, showing a section of my reversing mechanism. Figs. 3 and 4 are perspective views of the faces of the clutch members.

My invention is designed to provide a means for reversing the direction of motion of the engine shaft so that the engine itself may be run in either direction, and reversing gears may be dispensed with.

As shown in the present drawing, A represents a gas engine cylinder having the piston 2, pitman or connecting-rod 3, crank 4 and crank shaft 5. I have here only shown a single cylinder, but it will be understood that the device is applicable to multiple cylinder engines. Upon the shaft 5 is keyed a pinion 6, and this, through the interposition of an idler 7 transmits motion to a pinion 8, which is mounted upon what is known as the half-time shaft 9 which carries the cam or cams 10 through which the engine valves are actuated through a push rod 10^a.

The present view illustrates only a single cam actuating the single push rod of a single exhaust valve for the sake of clearness; but it will be understood that the device is applicable, as previously stated, to both mechanically actuated exhaust and inlet valves, and to any number of cylinders connected with the common crank shaft.

The cams represented by the one marked 10 whereby the valves are opened, are fixed with a certain relation to the crank so that at the proper moment in the stroke of the piston the exhaust valve is opened for the escape of the products of combustion which are ejected during the upward movement of the piston, and if the inlet valve is mechanically actu-

ated, it is also opened by suitable cams to admit the new charge upon the outward stroke of the piston.

If the inlet valves are automatic, they will simply be opened by the vacuum caused by the outward movement of the piston, and the charge will be drawn in, in this manner.

In order to reverse the movement of the engine, it will be manifest that the cams 10 must have their position changed with relation to the position of the crank, so that the engine crank shaft when turning in the opposite direction will bring the cams to the proper relative position for opening the valves. This is effected as follows: 11 is a disk keyed upon the cam shaft 9 and carrying clutch members 13 and 14, while the gear 8 carries the other interlocking clutch member 15, and these members are capable of being shifted with relation to each other 90°. The gear 8 turns loosely upon the cam shaft, and by means of a clutch lever it may be moved outwardly until the clutches are disengaged. The momentum of the engine shaft will continue the revolution of the cam shaft during this disengagement, and the disk 11 will be turned as far in the direction of motion while the clutch is disengaged until it arrives at the point for the engagement of the other clutch. When thus engaged, the position of the cam or cams will have been so changed that the engine must run in the opposite direction, and this reversing can take place while the engine is running; since the momentum will compress charges of gas in one or more of the cylinders so that the moment the reverse position has been reached, the ignition of the charge will cause the engine to revolve in the opposite direction. The mechanism of the clutches may be varied without materially altering the character of the device or its operation.

I have here illustrated the device as follows: Upon the face of the disk 11 which is contiguous to the face of the gear 8, I have shown a depression 12, and upon the periphery of that side of the gear are two notches 13 and 14. Upon the corresponding face of the gear 8 is a radial segment 15 which is adapted to fall into either of the notches 13 and 14, and thus interlock the gear with the cam. The hub of the gear is grooved or channeled to receive the forks of a clutch lever 16. Beyond this hub is a spring 17 surrounding the cam shaft, and normally press-

ing the gear so that the clutch member 15 is in engagement with either the notch 13 or 14 on the disk 11. Retraction of the gear by means of the lever 16 disengages these interlocking members, and the momentum of the engine will carry the shaft around the gear running loosely until the clutch member 15 disengaged from one notch, has arrived opposite the other with which it may then be engaged.

The limit of the movement to produce the reverse movement of the engine I have found to be 90° and in order to insure that no more than 90° movement will take place, the inner portion of the clutch member 15 is made thicker than the portion which engages with the notches of the disk, as shown at 15^a. This portion extends into the depressed space 12 after the part 15 has been disengaged from either 13 or 14, so that while the part 15 will pass the portion of the rim intermediate between the notches 13 and 14, the projecting portion 15^a will still extend far enough into the depression 12 so that it will contact with either one side or the other of this depression when that point is reached, and when thus in contact, the engaging member 15 of the clutch will be in line with the corresponding depression 13 or 14.

The movement of the engine and connected parts is always in such a direction that when the clutch members are disengaged, the movement of the gear 8 will carry the clutch member 15 to the opposite side of the depression 12, and into engagement with the other member which reverses the motion.

In order to limit the movement of the gear 8 so that it can only be retracted sufficiently to disengage the clutch member, I have shown a sleeve 19 mounted upon the cam shaft within the spring 17, and abutting against the cam shaft journal-box 20. This sleeve is of such length that the opposite end forms a stop to limit the movement of the

gear, and this movement is not sufficient to disengage the gear from its fellow 7.

Having thus described my invention, what I claim and desire to secure by Letters Patent is—

1. In an internal combustion engine, a crank shaft, a cam shaft and a cam whereby the engine valve is opened, a gear fixed upon the crank shaft, a gear loosely turnable upon the cam shaft and receiving motion from the crank shaft gear, a disk fixed upon the cam shaft having clutch members 90° apart, a clutch member upon the gear adapted to engage either of the disk clutch members, a spring acting upon the gear and normally holding the engaged clutch in place, a lever by which the gear may be retracted, and the clutch members disengaged whereby the cam shaft and cam are released and idle, and the clutch members are re-engaged in position to reverse the engine movements.

2. In an internal combustion engine, a means for changing the position of the valve-opening cam to reverse the engine, said means consisting of a disk fixed to the cam shaft having clutch members corresponding to the forward and reverse position of the valve-opening cam, a gear loosely turnable upon the cam shaft and normally engaged with one of the disk clutches, a gear fixed to the crank shaft and transmitting motion to revolve the cam shaft gear, an intermediate gear, and means for disengaging one clutch member and engaging the other, and stops or shoulders on the disk between the clutch members thereof whereby the movement between the two clutch engagements is limited.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

WILLIAM A. HANSEN.

Witnesses:

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