No. 750,318. PATENTED JAN. 26, 1904.

J. W. SWAN.

STARTING DEVICE FOR EXPLOSIVE ENGINES.

APPLICATION FILED AUG. 13, 1902.

NO MODEL.

Fig. 1,

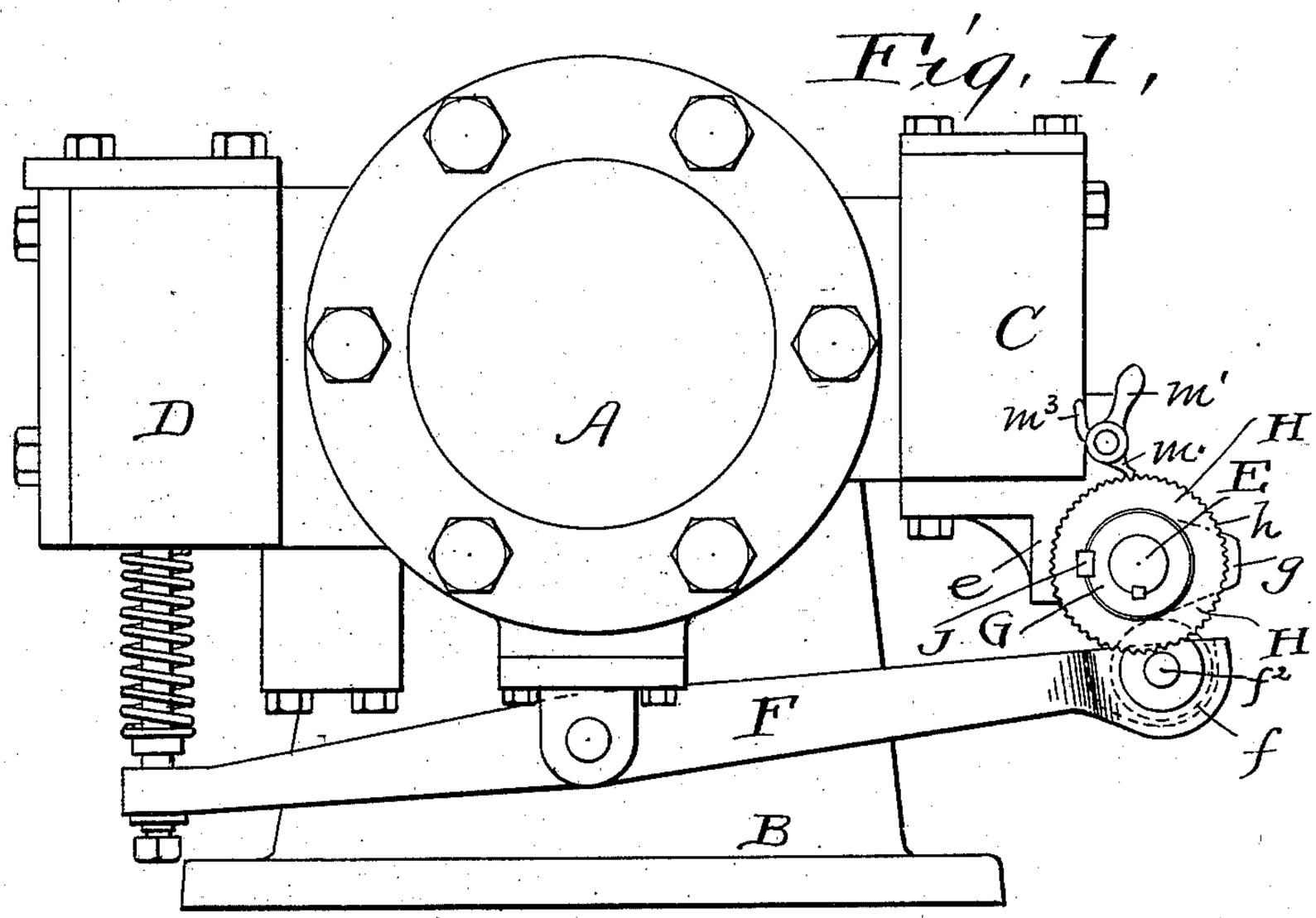


Fig. 2,

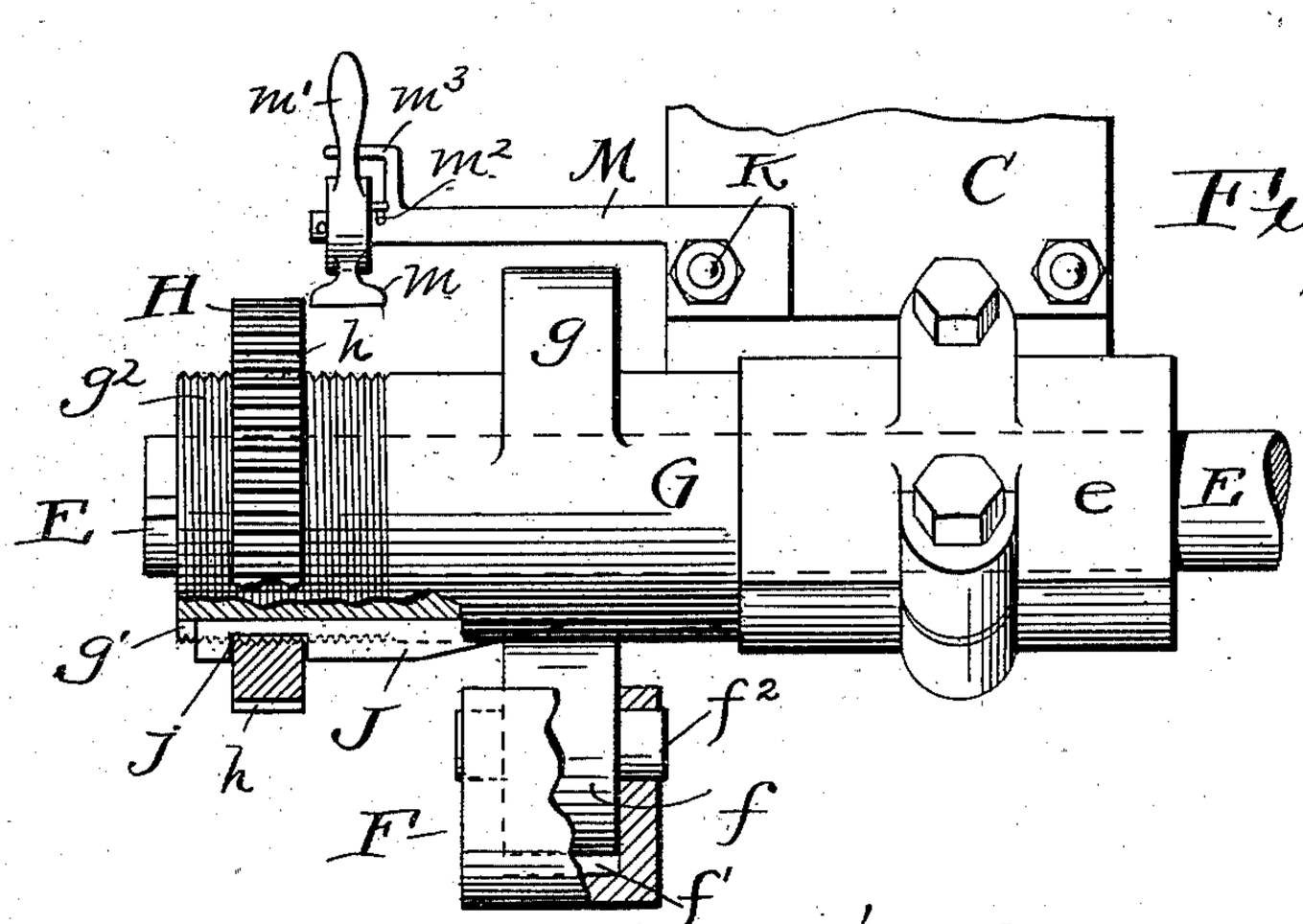
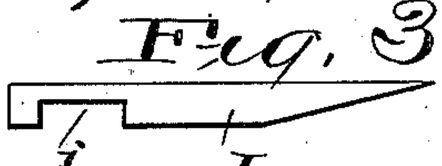


Fig. 3,



Witnesses.
E. B. Gilchrist
H. M. Wise.

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John W. Swan
By his attorneys
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No. 750,318. Patented January 26, 1904.

UNITED STATES PATENT OFFICE.

JOHN W. SWAN, OF LIMA, OHIO, ASSIGNOR TO THE JOHN W. SWAN COMPANY, OF LIMA, OHIO, A CORPORATION OF OHIO.

STARTING DEVICE FOR EXPLOSIVE-ENGINES.

SPECIFICATION forming part of Letters Patent No. 750,318, dated January 26, 1904.

Application filed August 13, 1902. Serial No. 119,470. (No model.)

To all whom it may concern:

Be it known that I, JOHN W. SWAN, a citizen of the United States, residing at Lima, in the county of Allen and State of Ohio, have invented a certain new and useful Improvement in a Starting Device for Explosive-Engines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

My invention relates to improvements in devices in connection with the exhaust of a gas-engine; and it consists in the novel features of construction hereinafter set forth in the following description and claims and illustrated in the drawings.

One of the objects of my invention is to provide in connection with the exhaust-valve-operating mechanism certain devices which when in operative position will open the exhaust and set free part of the charge in the cylinder upon the compression-stroke, and thereby make it possible to turn over the shaft and compress a remainder of the charge by hand until the engine is under way, when this opening device is automatically gradually withdrawn, increasing the amount of charge compressed as speed is attained.

Another object is to keep the exhaust-cam and roller continually lubricated.

Referring to the drawings, Figure 1 represents an end elevation of a gas-engine provided with my improved mechanism. Fig. 2 is a detailed view of the same with part of the sleeve broken away to more clearly show the operating wedge-block, and Fig. 3 is a detail view of the wedge-block.

Referring to the parts by letters, A represents the engine-cylinder; B, the bed; C, the gas-inlet valve; D, the exhaust-valve; E, the valve-operating shaft, and F the exhaust-valve-operating lever, which carries a roller *f*, coöperating with the exhaust-cam *e*.

On the end of the operating-lever F is formed an integral pocket f', and the roller *f* loosely occupies this pocket, being journaled on the pin f^2, carried by the sides thereof. Oil being placed in the pocket is taken up by the periphery of the roller, and thereby distributed to the surface of the cam and to the pin f^2, so that these parts are continually lubricated.

Keyed upon the shaft E, which is mounted in the box *e*, is a cam-sleeve G, carrying the exhaust-valve-operating cam *g* and having a longitudinal groove g' on the opposite side of the sleeve from said cam. The outer end of the sleeve is screw-threaded at g^2 and has operating upon the same a ring H, with serrations *h* upon its periphery. In the groove g' is a wedge-block J, having a notch *j* in the upper side thereof for receiving the ring H, the wedge being made of sufficient thickness so that enough stock metal extends beyond the groove to make the notch *j* possible. Upon one of the bolts K of the valve-casing or any other suitable part of the engine I secure a pawl-bracket M, which has pivoted thereto the pawl *m*. This pawl is so mounted that it may play upon the serrated periphery of the ring H and has a weighted tailpiece m' for retaining it in and out of operation, as desired. The pawl has a long blade for engagement with said serration and is limited in its movement by stops m^2 m^3.

The sleeve G is so placed upon the shaft E that the cam *g* may engage the friction-roller *f* of the exhaust-valve lever F, and the wedge-block J is so located in the sleeve that the edge of the same may also engage the friction-roller *f* when the ring H is in its inner positions.

In starting the engine the ring H is turned by hand to screw it toward the cam *g*, thus bringing the wedge-block J into position to engage the roller *f*. Now if the engine-shaft is turned over by hand when the compression-stroke comes the wedge-block J will engage the roller *f* and open the exhaust-valve, relieving the compression. This allows the engine to be easily started. The pawl M, however, having been first thrown into operation with the serrated periphery of the ring after it has been set up will keep this ring from rotating with the sleeve, the rotation thus gradually withdrawing the wedge-block from operative position with respect to said friction-roller by the ring traveling along said screw-threaded portion of said sleeve. When the inclined

surface of the wedge is entirely out of the path of said cam, the pawl has automatically become disengaged from the serrated periphery of said ring, thus allowing the ring to rotate with the sleeve.

It will be observed from the above description that the exhaust-port will be opened the maximum amount for discharging on the compression-stroke when the engine is first started, which opening will gradually decrease and cease altogether as the engine gets under way.

It is necessary in constructing the parts that the screw-threaded portion of the sleeve be threaded in such a manner and the operating-shaft E be so geared as to rotate in a direction which will withdraw the wedge-block from the path of the cam. When the ring is being screwed up to set the wedge-block in the path of the roller, the pawl is thrown back upon the stop m^3 out of the way.

Having described my invention, I claim—

1. In a gas-engine, the combination with the exhaust-valve-operating cam adapted to be held from endwise movement, a wedge-block slidably mounted with respect to said cam, and adapted to open said valve on the compression-stroke, and means for shifting said wedge-block into the path of operation, substantially as described.

2. In a gas-engine, in combination with the exhaust-valve-operating cam, a wedge-block slidably mounted on said cam, a ring engaging a screw-threaded portion of said cam and adapted to shift said block into the path of operation, and means for holding said ring from rotation, substantially as described.

3. In a gas-engine, the combination with the exhaust-valve-operating cam, a lever extending in the path of said cam, a wedge-block suitably mounted so as to move into the path of said cam, of a ring operating upon a suitable screw-threaded portion of said cam for moving said wedge-block, and a pawl for holding said ring against rotation with said cam, said ring traveling out of engagement with said pawl as the engine gets under way, substantially as described.

4. In a gas-engine, the combination with the exhaust-valve-operating cam carried by a sleeve having a screw-threaded portion, a lever in the path of said cam, a wedge-block slidable in a longitudinal groove in said screw-threaded portion and having a notch, a ring provided with serrations and operating upon said screw-threaded portion of said sleeve and occupying said notch, and a pawl operating in said serrations, said ring being adapted to travel out of engagement with said pawl when the engine gets under way, substantially as described.

5. In a gas-engine, the combination with the valve-operating cam, of a valve-operating lever extending approximately horizontally beneath the valve-operating cam, the end of said lever being formed into an upwardly-opening oil-pocket, and a frictional roller mounted in said oil-pocket and having its upper periphery adapted to engage said cam, and its lower periphery adapted to be immersed in oil in the pocket, substantially as described.

6. In a gas-engine, the combination with the shaft for carrying the exhaust-cam, a cam having a sleeve rigid upon said shaft, an operating-lever, an upwardly-opening pocket carried by said lever, a frictional roller mounted within said pocket and having the upper portion extending above the side walls thereof, and a wedge-block slidably mounted upon said cam-sleeve and adapted to extend across the wall of said pocket and engage said roller, substantially as described.

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

JOHN W. SWAN.

Witnesses:
CHAS. B. SELGATE,
EARL G. SWAN.