No. 727,777. PATENTED MAY 12, 1903.

L. M. FOSTER.

EXPLOSION ENGINE.

APPLICATION FILED SEPT. 12, 1900.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.

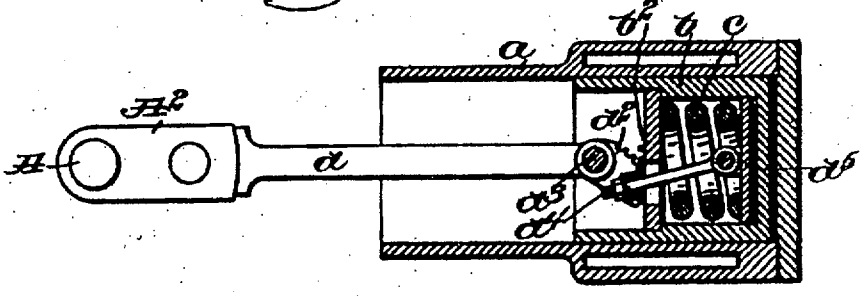
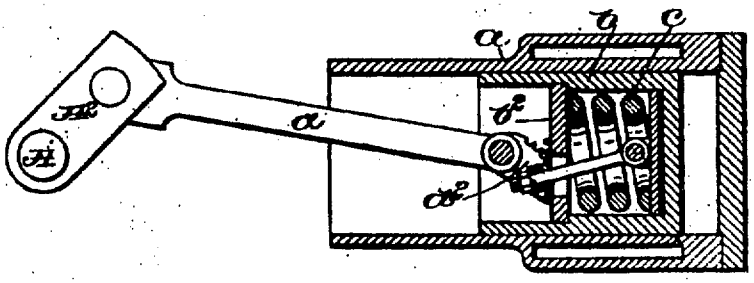


Fig. 2.



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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 3.

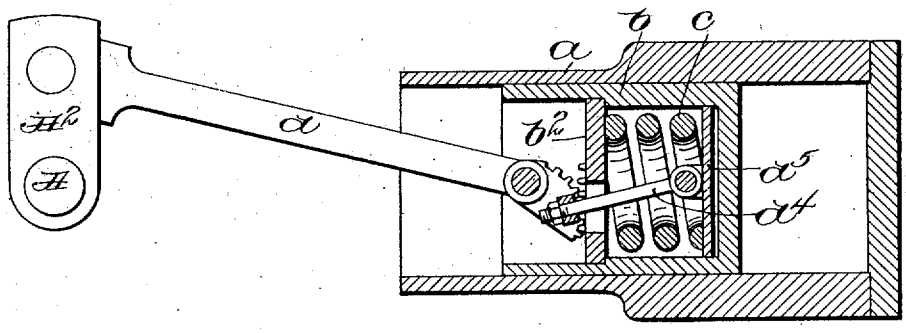
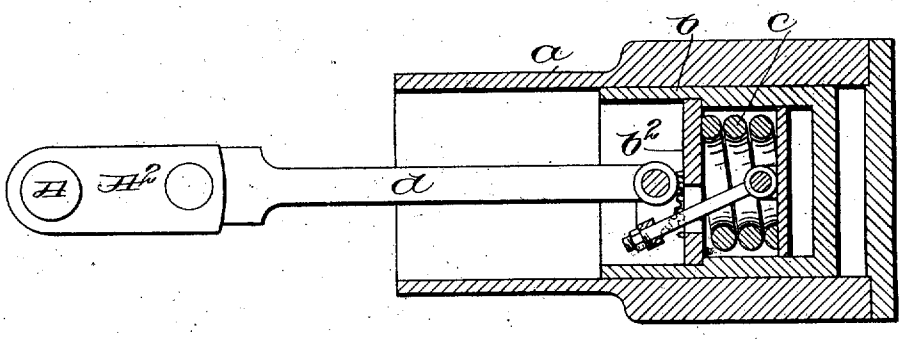


Fig. 4.



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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 727,777. Patented May 12, 1903.

UNITED STATES PATENT OFFICE.

LUCIAN M. FOSTER, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO UNITED STATES CONSTRUCTION AND ENGINE COMPANY, A CORPORATION OF MAINE.

EXPLOSION-ENGINE.

SPECIFICATION forming part of Letters Patent No. 727,777, dated May 12, 1903.

Application filed September 12, 1900. Serial No. 29,796. (No model.)

To all whom it may concern:

Be it known that I, LUCIAN M. FOSTER, of Boston, county of Suffolk, and State of Massachusetts, have invented an Improvement in Explosion-Engines, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

The present invention relates to an explosive-engine, and is embodied in a novel construction and arrangement whereby a variable-stroke of the reciprocating member or piston is obtained for the purpose in a four-cycle engine of clearing the cylinder at every other stroke by causing the piston to move wholly to the end of the cylinder and at alternate strokes to provide a space for the charge by causing the piston to stop before it reaches the end of the cylinder. This is accomplished in accordance with the present invention by interposing between the piston and its connecting-rod or pitman a yielding connecting device of novel construction and arrangement, the normal position of said pitman and piston being such that the piston during the instroke will travel substantially to the end of the cylinder, this being the condition during the exhaust-stroke of the engine. During the alternate strokes, however, when a charge has been admitted to the cylinder the resistance of the charge under compression acting upon the yielding connecting device aforesaid will arrest the piston before it reaches the inner end of the cylinder, thus leaving a space or explosion-chamber which is occupied by the compressed charge. By this construction it is obvious that the compression will depend upon the strength of the yielding connecting device, so that if the charge is reduced in quantity there will be less resistance to the piston, and the compression of the reduced charge which depends upon the action of the yielding connection will be substantially the same as the compression of a larger charge, so that uniformity in the quality of the charges will be secured under different conditions of power and speed, as is desired for governing purposes.

In accordance with the invention the piston is connected with the crank through the agency of a pitman, and the pitman is yieldingly connected with the piston through the agency of a coupling member and yielding connecting device, such as a spring, the coupling member being jointed to the pitman and having a bearing against a supporting-surface connected with the piston, the said coupling member having a yielding connection with the piston, so that the actual position of the piston may be varied with relation to the pitman for the purpose above stated.

Figure 1 is a longitudinal vertical section of a cylinder and piston constructed in accordance with the invention, the other operating parts of the machine, with the exception of the crank and shaft, being omitted, the parts in this view being shown as at the end of the exhaust-stroke; Fig. 2, a similar view showing the parts after the beginning of the next stroke, during which period the charge is being introduced into the cylinder; Fig. 3, a similar view showing the piston in an intermediate position, and Fig. 4 a simiiar view showing the piston at the end of the compression-stroke.

The piston or reciprocating member b is contained in the cylinder a in the usual way, the said cylinder being provided with the proper mechanism for the admission and exhaust of the charge, the ignition of the same, &c., these parts not being shown, since they may be of any ordinary construction.

In accordance with the invention the piston instead of being rigidly connected with the crank A^2 of the main or driving shaft A is yieldingly connected therewith through the agency of a spring or equivalent yielding connecting device c, by means of which the pitman d and the piston b are connected through the agency of a coupling member or rocker d^2, which is jointed at d^3 to the connecting-rod or pitman d, the said rocker coacting with a bearing-face b^2, formed in the piston b, one of the said coöperating bearing parts or faces being curved, the rocker d^2 being herein shown as having a curved surface. The rocker is held in engagement with the bearing-face b^2 by means of a coupling member d^4, which is connected with a plunger d^5, between which and the rear of the bearing-face

b^2 is interposed the spring c. It is obvious, therefore, that the piston as a whole can move independently of the pitman d, for the reason that the spring c will yield, thus permitting the point where the pitman d and the rocker d^2 are jointed to move toward the bearing-face b^2, the movement in the opposite direction taking place when the spring expands.

In Fig. 1 the parts are shown in normal position, the piston being substantially in contact with the end of the cylinder, so that if the exhaust-valve is open the cylinder will be completely cleaned of the products of combustion of the previous charge. In the operation of a four-cycle engine during the next outstroke the inlet-valve will be opened, and as the piston travels outward the fresh charge will be drawn in ready for compression during the next instroke, during which the inlet-valve will be closed, the piston being shown in Fig. 2 as having traveled part way out. When, therefore, the piston starts back with the fresh charge confined in the cylinder, it will tend to compress the said charge, and the spring will yield to such extent as is necessary, the parts finally coming to approximately the position shown in Fig. 4, with the compressed charge inclosed in the space behind the piston, the compression of the charge depending upon the strength of the spring, since the movement of the jointed end of the pitman is constant. The charge being ignited will expand and act upon the piston in the usual way, and at the end of the outstroke the exhaust will be open, so that during the next instroke the action of the spring will not be resisted, leaving the piston free to travel completely to the end of the cylinder to fully clear the same of the products of combustion.

I claim—

1. An explosive-engine comprising a reciprocating member, such as a piston, having a bearing-face, a coupling member jointed to the connecting-rod or part which receives motion from the piston and adapted to stand at different angles with the connecting-rod, said coupling member having a complemental bearing-face, and a yielding connection between the two members, whereby a yielding contact is maintained between the said bearing-faces, one of said faces being curved.

2. An explosive-engine comprising a reciprocating member, such as a piston, having a bearing-face, a coupling member jointed to the connecting-rod or part which receives motion from the piston and adapted to stand at different angles with the connecting-rod, said coupling member having a complemental bearing-face, a rod jointed to the outer portion of said coupling member, and a spring interposed between a bearing on said rod and a bearing on the piston, whereby a yielding contact is maintained between the said bearing-faces, one of said faces being curved.

3. An explosive-engine comprising a piston having a flat bearing-face, a coupling member jointed to the connecting-rod which receives motion from the piston and having a curved bearing-face resting against the flat bearing-face of the piston, a rod jointed to the outer portion of the coupling member, and a spring interposed between a bearing on the outer portion of the rod and a bearing on the piston, whereby a yielding contact is maintained between the said bearing-faces.

4. An explosive-engine comprising a recessed piston, a fitting seated in the recess of the piston and having a flat bearing-face, a coupling member jointed to the connecting-rod which receives motion from the piston and having a curved bearing-face resting against the said flat bearing-face, a rod jointed to the outer portion of the coupling member and extending through the said fitting into a cavity between the fitting and the head of the piston, a bearing-head jointed to the outer portion of the rod, and a spring interposed between the said bearing-head and the fitting.

5. An explosive-engine comprising a piston having a flat bearing-face, a coupling member jointed to the connecting-rod which receives motion from the piston and having a curved bearing-face resting against the flat bearing-face of the piston, a rod jointed to the outer portion of the coupling member, a spring interposed between a bearing on the outer portion of the rod and a bearing on the piston, whereby a yielding contact is maintained between the said bearing-faces, and a coupling-retainer on the piston having a segmental retaining-face engaging a portion of the coupling.

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

LUCIAN M. FOSTER.

Witnesses:
NANCY P. FORD,
JAS. J. MALONEY.