

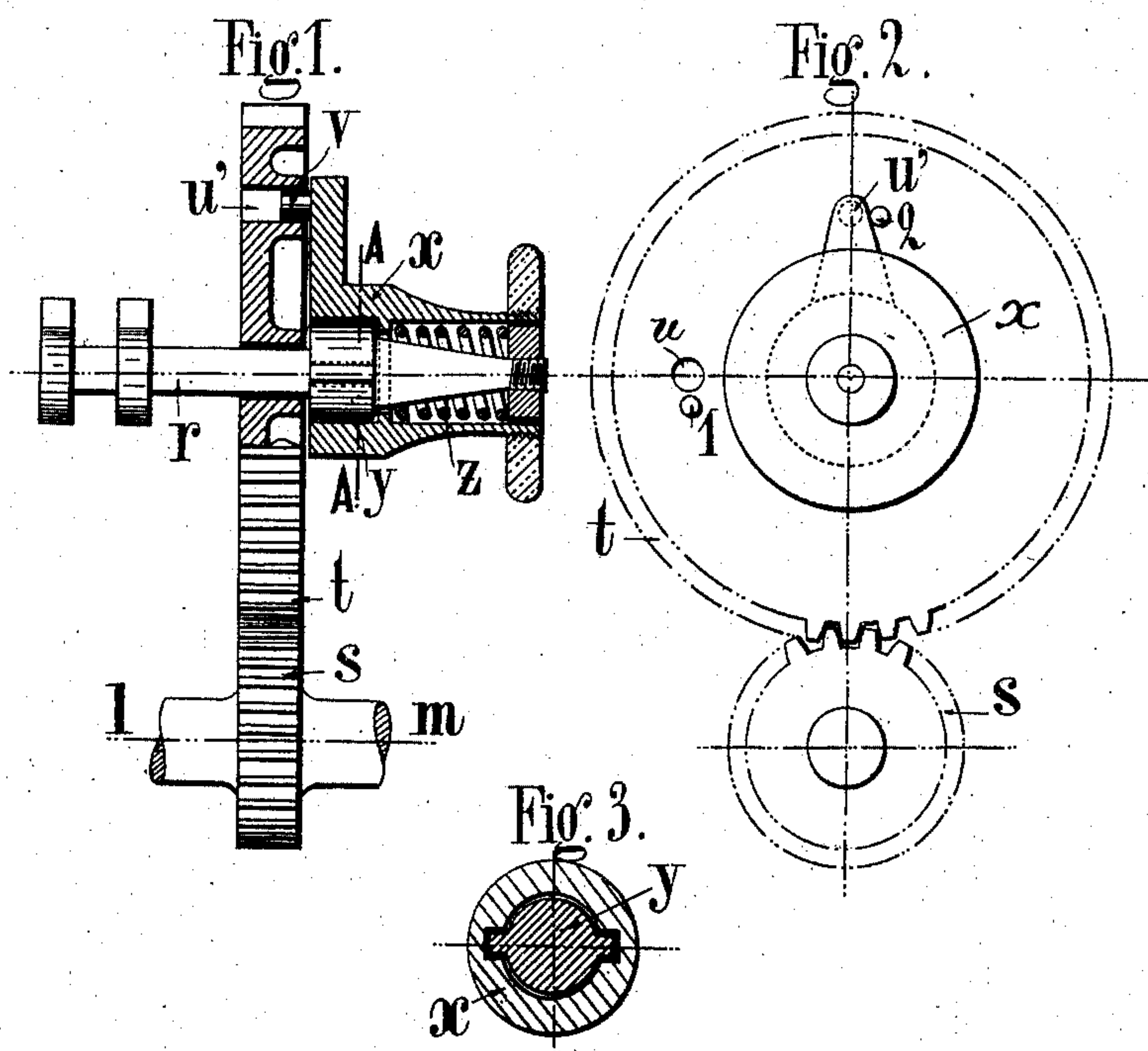
No. 846,487.

PATENTED MAR. 12, 1907.

L. M. J. C. LEVAVASSEUR.
REVERSING MECHANISM FOR EXPLOSIVE ENGINES.

APPLICATION FILED OCT. 20, 1904.

2 SHEETS--SHEET 1.



WITNESSES:

Henry J. Suhrbier.
H. H. Rockwell

INVENTOR
Leon Marie Joseph Clement Levavasseur
BY *James Niles*
ATTORNEYS.

No. 846,487.

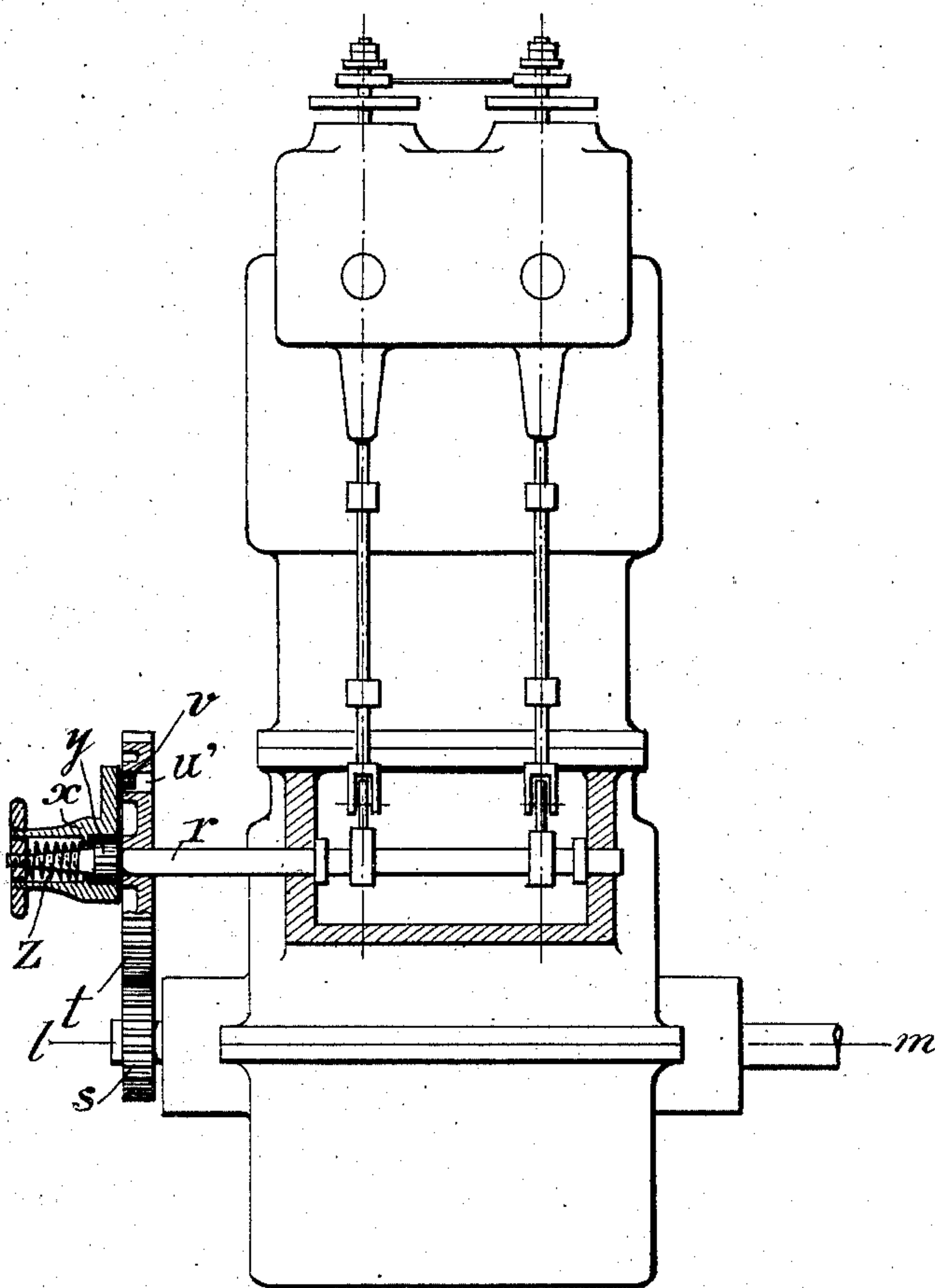
PATENTED MAR. 12, 1907.

L. M. J. C. LEVAVASSEUR.
REVERSING MECHANISM FOR EXPLOSIVE ENGINES.

APPLICATION FILED OCT. 20, 1904.

2 SHEETS—SHEET 2.

Fig: 4.



Witnesses
Edward A. Pear
H. F. Suhrbier.

Inventor
Leon M. J. C. Levavasseur
By his Attorney, James S. Gouge.

UNITED STATES PATENT OFFICE.

LEON MARIE JOSEPH CLÉMENT LEVAVASSEUR, OF PUTEAUX, FRANCE.

REVERSING MECHANISM FOR EXPLOSIVE-ENGINES.

No. 846,487.

Specification of Letters Patent.

Patented March 12, 1907.

Application filed October 20, 1904. Serial No. 229,303.

To all whom it may concern:

Be it known that I, LEON MARIE JOSEPH CLÉMENT LEVAVASSEUR, a citizen of the Republic of France, and a resident in Puteaux, France, have invented a new and useful Reversing Mechanism for Explosive-Engines, which is fully set forth in the following specification.

This invention relates to a reversing-gear. The reversing is effected by altering the angle of advance of the spindle operating the cams relatively to the driving-shaft by means of the device illustrated, by way of example, in the accompanying drawing, without, however, altering the angle of advance of the igniter relatively to the driving-shaft.

In the drawing, Figure 1 is a part-sectional side elevation of the device. Fig. 2 is a front elevation; Fig. 3, a front vertical section on line A A, Fig. 1, through the operating-knob of the device; and Fig. 4 is a front elevation, partly in section, of an explosive-engine embodying the improved reversing mechanism.

$l m$ is the driving-shaft of the engine, and r the cam-spindle, and these are provided, respectively, with gear-wheels s and t . The wheel t of the spindle r is provided with two openings u and u' , Figs. 1 and 2, situated at a predetermined angular distance apart in the body of the said wheel. A pin v , secured to an operating-knob x , can engage with either of the said holes u u' . Owing to the knob x being longitudinally movable on the part y of the spindle r , the pin v may be disengaged and the spindle r rotated independently of the pinion t , which is loose on the spindle r and is coupled thereto by the pin v engaging with one or the other of the holes u u' .

The knob x is locked to the cam-shaft r by means of internal longitudinal grooves in the hub thereof which engage longitudinally-extending ribs or keys on said shaft, as shown in Fig. 3, said keys and grooves serving to prevent the rotation of said shaft independently of said knob, but permitting the axial displacement or shifting of the latter in order to engage or disengage either hole or seat in the gear-wheel t . The pin v of said knob is normally kept in engagement with one of said seats by means of an internal helical spring in said knob.

Reversing can thus be obtained by pulling the knob x , and so allowing the spindle r to remain stationary while the pinion t con-

tinues to rotate until the hole u or u' , according to the direction of movement, comes in front of the pin v , which then enters the other of said openings u or u' than the one from which it has just been drawn, so that the engine will consequently start in the opposite direction. Such reversal is rendered possible by the fact that the engine has no fly-wheel. Two stops 1 and 2, one adjacent each opening, limit the movement of the pinion t relatively to the finger v , so that when the knob is released said finger or pin will be guided to its seat in one of said openings.

In operation, supposing the driving-shaft $l m$ of the engine rotates from left to right and the cam-spindle r in the opposite direction, the explosions will take place in the cylinders according to the order one, two, three, four, five, six, seven, eight, &c. If after having switched out the ignition the angle of advance of the cam-spindle is modified, as hereinbefore explained, and the ignition switched in again, the engine begins rotating in the opposite direction—that is to say, from right to left—and the explosions take place in the reverse order—that is to say, in the order of cylinders eight, seven, six, five, four, three, two, one, &c., supposing the ignition to have begun at the cylinders 8 7, which at the moment of reversing were in communication with the electric igniter. Supposing the ignition to take place, say, in the cylinder 3, the first stroke is the working stroke, the second the exhaust, and so on. It will be readily understood, therefore, that the cylinder in question immediately after the reversing must complete the same cycle in spite of the change in the direction of rotation—the first stroke, working; the second, exhaust, and so on. This is obtained by causing the exhaust-cam to turn through an angle of ninety degrees in the direction opposite to that of the original movement.

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

In a reversing device for explosive-engines, the combination, with the cam-shaft having longitudinal ribs thereon, of a gear-wheel rotatable on said shaft adjacent to said ribs and provided on one face with openings or seats, stop-pins adjacent to said seats, means for rotating said gear-wheel from the engine-shaft, a knob having grooves engaging said ribs on said cam-shaft and slidable axi-

ally of the latter though rotatable therewith,
said knob being limited in its angular move-
ment with respect to said gear-wheel by said
stop-pins, a pin on said knob to engage
5 either of said seats in said gear-wheel, and a
spring confined within said knob and serving
to normally maintain the latter against said
gear-wheel.

In testimony whereof I have signed this
specification in the presence of two subscrib- 10
ing witnesses.

LEON MARIE JOSEPH CLÉMENT LEVAVASSEUR.

Witnesses:

EMILE LEIDRET,
ARCHIBALD R. BAKER.