No. 662,507. Patented Nov. 27, 1900.

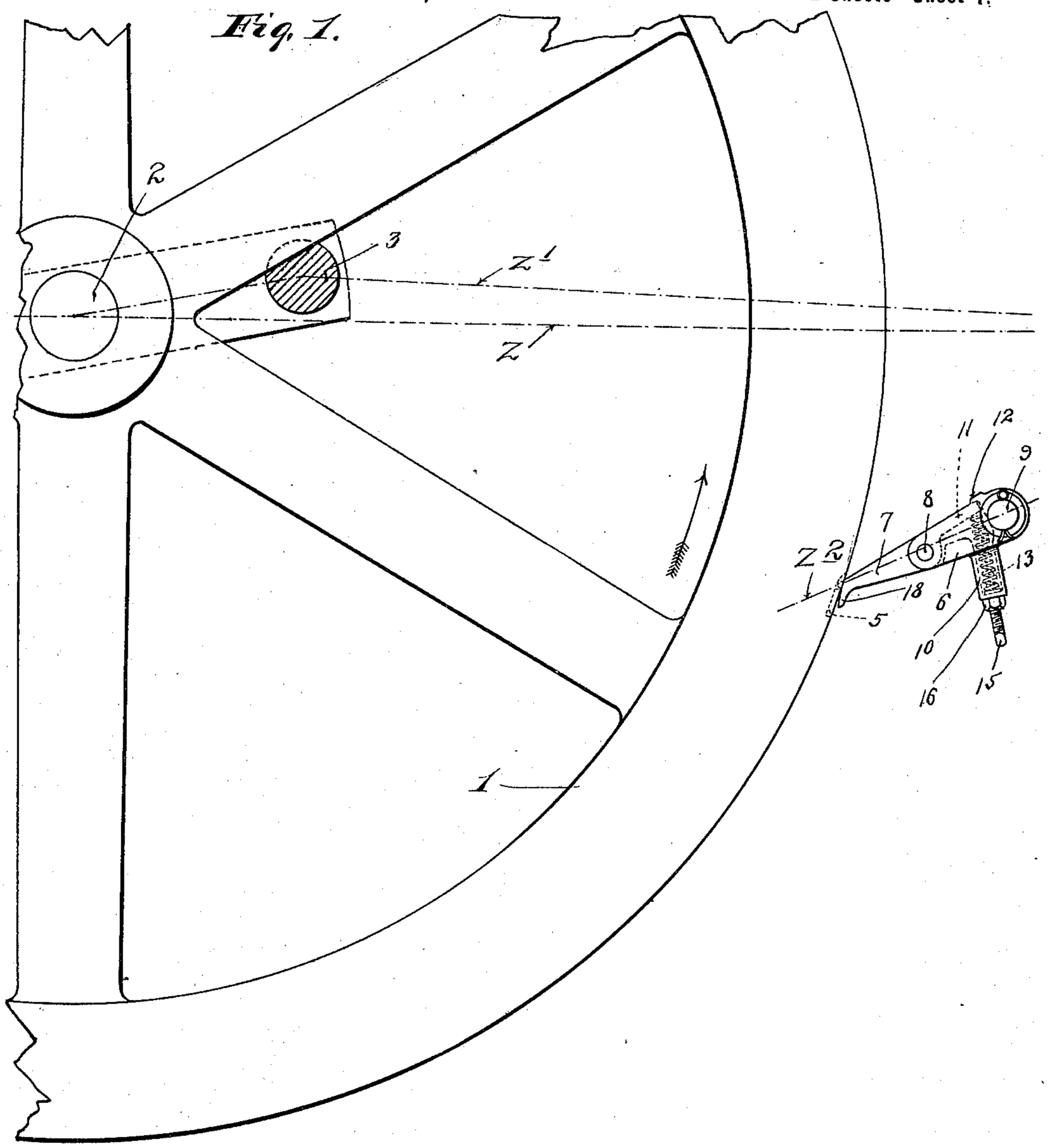
P. SWENSON.

TRIP LOCK FOR USE IN STARTING EXPLOSIVE ENGINES.

(Application filed Sept. 21, 1899.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.



Witnesses.
Harry Kilgore
F. D. Merchant.

Inventor.
Paul Swenson
By his Attorney.
Jas. F. Williamson

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Fig. 2.

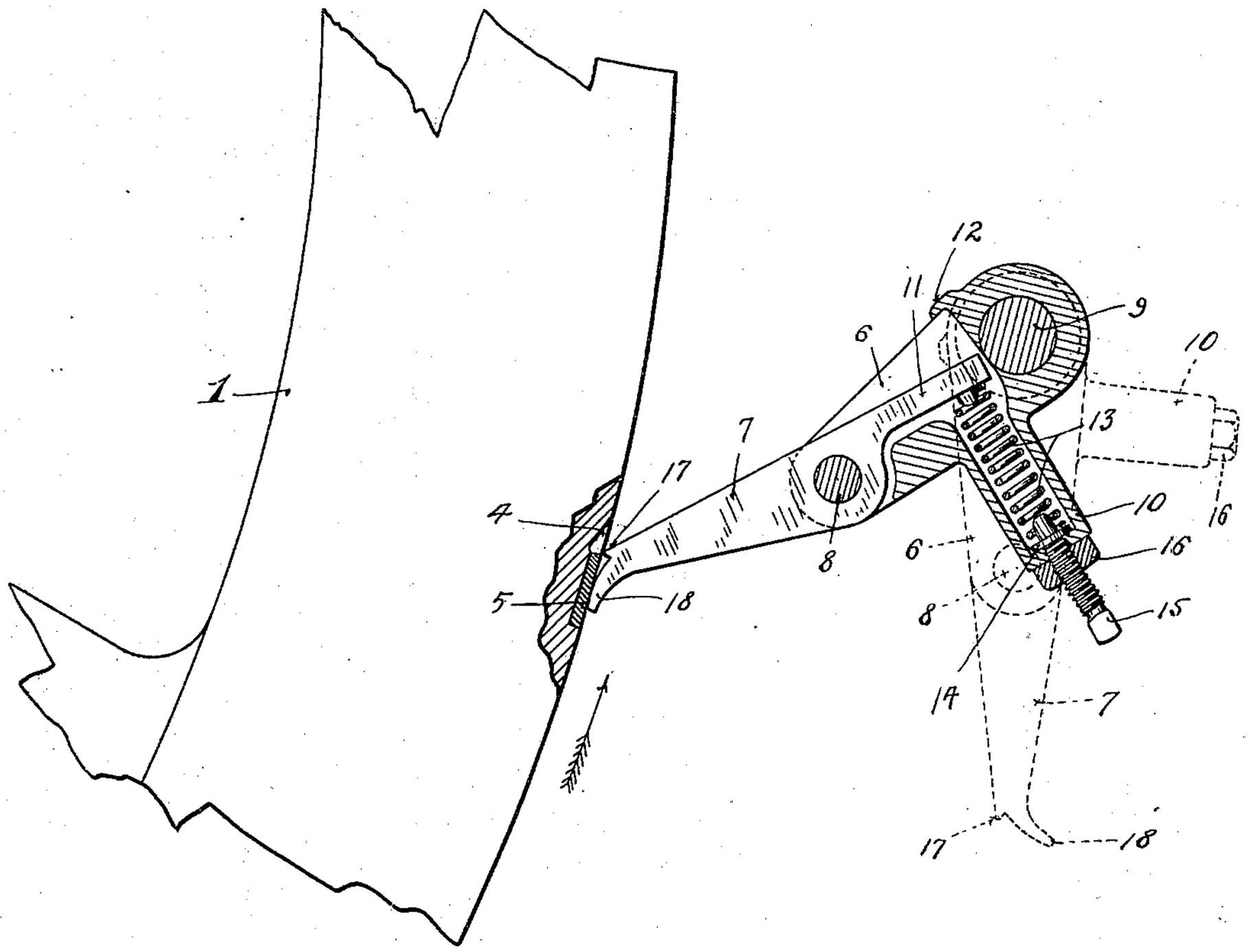
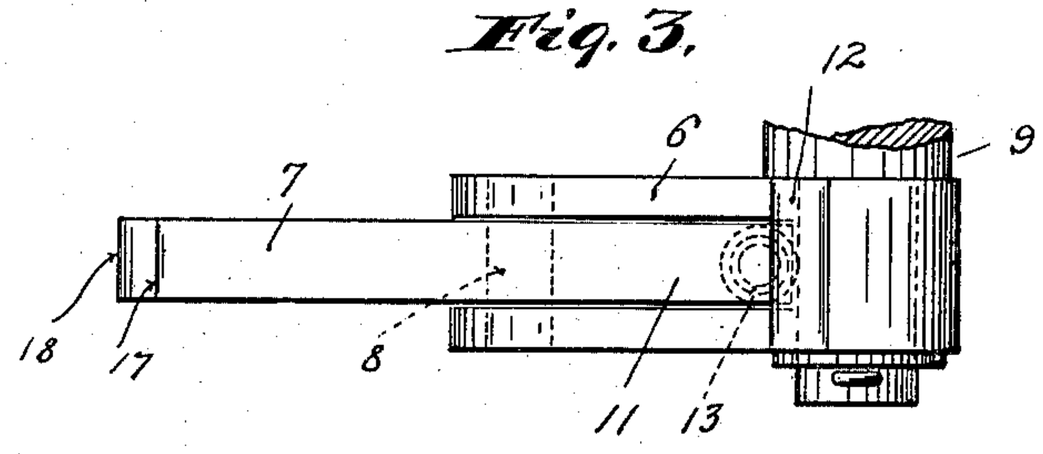


Fig. 3.



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UNITED STATES PATENT OFFICE.

PAUL SWENSON, OF HOPKINS, MINNESOTA.

TRIP-LOCK FOR USE IN STARTING EXPLOSIVE-ENGINES.

SPECIFICATION forming part of Letters Patent No. 662,507, dated November 27, 1900.

Application filed September 21, 1899. Serial No. 731,157. (No model.)

To all whom it may concern:

Be it known that I, PAUL SWENSON, a citizen of the United States, residing at Hopkins, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Trip-Locks; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to explosive-engines, and has for its object to provide a simple and efficient lock or catch for holding the engine with its crank in proper position to receive the force of the explosion while the cylinder of the engine is being given its initial charge of gas or commingled air and gas.

It is, as is well known, the common practice in the operation of explosive-engines of modern construction to pump an initial charge of gas or commingled air and gas into the engine-cylinder in order to make possible the first explosion or starting stroke of the engine. It is customary to prevent movement of the engine while giving the cylinder this initial charge by taking hold of the fly-wheel with the hands or by holding the same in a similar manner. Such manipulations are of course objectionable for several obvious reasons. For instance, the personal attention required is a serious objection, and, furthermore, it is desirable that at the instant of the first explosion the crank should stand at a predetermined point—to wit, slightly beyond the inner dead-center. That the fly-wheel will be thus correctly positioned is by no means certain when the fly-wheel is set and held by hand.

By my invention I provide a lock or latch, which as one function serves to determine the proper position of the crank to receive the initial explosion and as another function serves to lock or hold the engine in its properly-set position under such pressure as will be exerted on the engine-piston by the unexploded initial charge of gas into the cylinder.

The lock or catch in its most desirable form is arranged to be automatically tripped out of action by the initial explosion, so that the engine is thereby released and permitted to run. This automatic action is extremely desirable for the reason that the exact time when the first effective explosion is to take place is extremely difficult or probably impossible to determine in advance, inasmuch as several sparks are likely to be produced in the cylinder before the explosion of the initial charge will take place. Preferably, but not necessarily, my improved lock or catch is applied to act directly upon the periphery or rim of the fly-wheel of the engine.

My invention is illustrated in the accompanying drawings, wherein like characters indicate like parts throughout the several views.

Figure 1 is a view in side elevation, partly in diagram, illustrating my improved lock or catch in what I at present consider its preferred form applied in working position to the fly-wheel of an explosive-engine. Fig. 2 is a detail, partly in side elevation and partly in vertical section, showing, on an enlarged scale, my improved lock or catch, the same being shown by full lines in a partially-tripped position and by dotted lines in a completely-tripped position; and Fig. 3 is a detail view in plan showing the lock or catch on the same scale as illustrated in Fig. 2.

The numeral 1 indicates the fly-wheel of the engine, a portion only of which is shown in the drawings, the same being secured to the crank-shaft 2, having the crank 3.

The dotted line marked *z* on Fig. 1 indicates the line of the axis of the cylinder, which line intersects the axis of the crank-shaft 2. The dotted line marked *z'* on said Fig. 1 indicates the line of the connecting-rod. The arrow marked on said Fig. 1 indicates the direction in which the fly-wheel will be driven when the engine is started.

In its periphery the fly-wheel 1 is provided with a small recess 4 or other part affording a stop-shoulder, at one edge of which preferably a hardened wearing-plate 5 is embedded and rigidly secured.

The lock or catch illustrated in the drawings is in the form of a toggle made up of arms 6 and 7, pivotally connected at 8, and the said arm 6 being pivotally mounted on a strong stud 9, which projects from and is rigidly supported by a portion of the engine-frame, which latter is not shown in the drawings. The arm 6 is provided with a cylindrical spring pocket or projection 10, and it is bifurcated or re-

cessed to receive the tail portion 11 of the arm 7. The outward movement of this tail portion 11 with respect to the arm 6 is limited by a stop flange or lug 12 on the said arm 6. The free end of said tail portion 11 is normally yieldingly held against the stop 12 by a spring 13, which is compressed within the spring-pocket 10, between the free end of said tail-section 11 and a collar 14 of a set-screw 15, which latter works through the outer end of the spring-pocket 10 and, as shown, is adapted to be held where set by jam-nut 16. The collar 14 may be secured on the inner end of the set-screw 15 either by being sprung into a groove or simply by being slipped onto the end of the same, or, in fact, it may be in the form of a disk against which the inner end of the set-screw simply impinges. Obviously by adjusting the set-screw 15 the tension of the spring 13 may be varied. At its free end the toggle-arm 7 is provided with a heel or point 17 and with a toe or projection 18. When the lock or catch is set, the heel portion 17 will engage into the recess or notch 4 of the fly-wheel and will press against the forward edge of the wearing-plate 5, (if, in fact, the said wearing-plate 5 be employed,) while the toe 18 will bear against the outer face of the said wearing-plate 5. When by the force of the initial explosion the toggle 6 and 7 is buckled, as shown in Fig. 2, the toe portion 18 of the arm 6 will carry the heel 17 out of the notch 4, and thus the fly-wheel is released. When thus set, it is evident that the lock or catch will prevent the forward movement of the fly-wheel until the toggle-lever has been buckled against the tension of the spring 13. By reference to Fig. 1, wherein the dotted line z^2 indicates the line of the dead-center of the toggle-lever, it will be noted that the axis of the pivot 8 stands below the dead-center of the said toggle-lever, and hence it is obvious that if sufficient force be applied to the fly-wheel it will buckle the said toggle-lever 6 7 against the tension of the spring 13. In practice the tension of the said spring 13 is so adjusted that it will resist the force exerted by the pressure of the initial unexploded charge, but will be overcome by the pressure or force exerted by the initial explosion of the said charge. From the foregoing statements the operation of the above-described device must be well understood.

It will of course be understood that my improved lock or catch is capable of a very wide range of modification within the scope of my invention.

What I claim, and desire to secure by Letters Patent of the United States, is as follows:

1. The combination with a fly-wheel or other moving part of an explosive-engine, having a lock-notch or part affording a stop-shoulder, of an arm pivoted to a fixed support, a second arm pivoted to the first, and constituting therewith a toggle and formed at its free end to engage the said notch or stop-shoulder of said fly-wheel or running part, the pivot of the first toggle-arm being above the point of engagement with the free end of the toggle, a spring forcing said toggle toward a dead-center, and a stop holding said toggle from a dead-center, which toggle when released falls by gravity into an inoperative position.

2. The combination with the fly-wheel or other moving part of an explosive-engine, having a notch or other part affording a stop-shoulder, of an arm 6 pivoted to a fixed support, the arm 7 pivoted to said arm 6 and formed at its free end with the heel or projection 17 and releasing-toe 18, said parts 17 and 18 coöperating with the notch or stop-shoulder of said fly-wheel, substantially as described, said arms 6 and 7 affording a toggle, a spring applied to said toggle to force the same toward a dead-center, and a stop applied to said toggle to hold the same from its dead-center, which toggle, when released, is yieldingly thrown into an inoperative position.

3. The combination with the fly-wheel or other moving part of an explosive-engine, having the notch or other part 4 affording a stop-shoulder, of the arm 11 pivoted to the fixed support 9 and provided with the spring-pocket 10 and stop 12, the arm 7 pivoted to said arm 6 at 8 and having at its free end the heel 17 and toe 18 and at its inner end the tail extension 11 engageable with said stop 12 to hold the toggle formed by the arms 6 and 7 from a dead-center, and the spring 13 within said pocket 10 operating upon said tail extension 11, substantially as described.

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

PAUL SWENSON.

Witnesses:
MABEL M. MCGRARY,
JAS. F. WILLIAMSON.