G. M. DAVIS.

STARTING DEVICE FOR EXPLOSION ENGINES.

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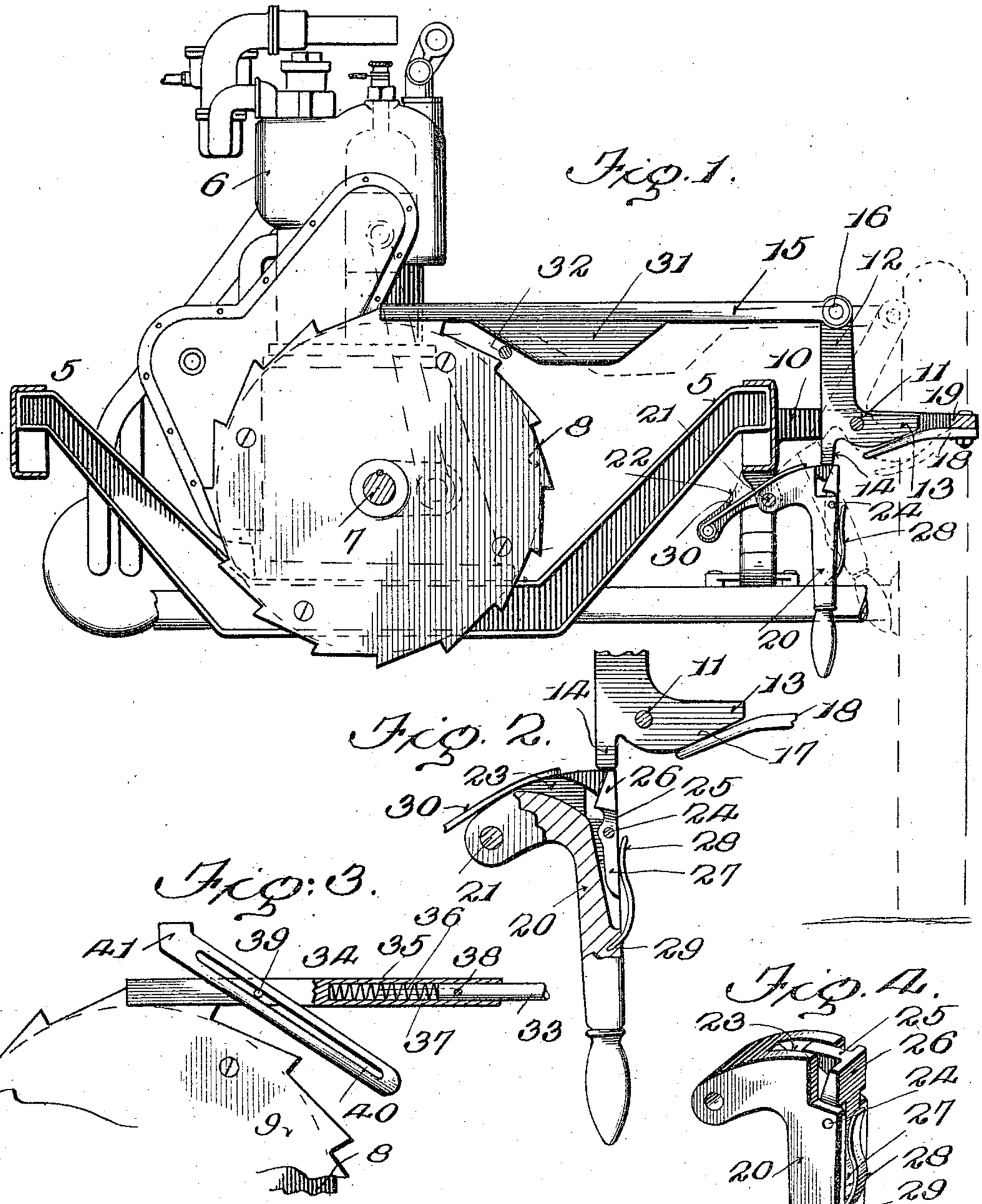

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GEORGE M. DAVIS, OF MANCHESTER, NEW HAMPSHIRE.

STARTING DEVICE FOR EXPLOSION-ENGINES.

952,788. Specification of Letters Patent. Patented Mar. 22, 1910.

Application filed September 24, 1909. Serial No. 519,378.

To all whom it may concern:

Be it known that I, GEORGE M. DAVIS, a citizen of the United States, residing at Manchester, in the county of Hillsboro and State of New Hampshire, have invented certain new and useful Improvements in Starting Devices for Explosion-Engines, of which the following is a specification.

One object of my invention is to provide a device which will enable a person to start an explosion engine with the expenditure of but little physical exertion to give it the partial revolution necessary to cause it to start.

A further object of my invention is to provide a device of this character that shall be relatively simple and uncomplicated as well as conveniently located for operation.

With these and other objects in view my invention consists in certain constructions, combinations and arrangements of parts the preferred form of which will be first described in connection with the accompanying drawings and then the invention particularly pointed out in the appended claims.

Figure 1 is a front elevation showing my invention as applied to an explosion engine of an automobile; Fig. 2 is a detail view partly in section of a portion of the starting device; Fig. 3 is a detail view partly in section of a modified form of starting device and Fig. 4 is a perspective view of the upper portion of the operating lever.

5 indicates a portion of the frame of an automobile and 6 the explosion engine of which 7 is the power shaft and 8 the fly wheel. These parts are shown as merely for the purpose of illustrating one application of my invention, it being understood that the type of explosion engine is entirely immaterial, and it is also immaterial for what purpose the explosion is to be used, as my invention is capable of use in connection with any explosion engine which may be used for any purpose.

9 is a ratchet wheel which, as shown, is fast to one face of the fly wheel, it only being material however that the same should be fast to or should rotate in unison with the drive-shaft. In order to start the engine I have provided a pawl arm which is adapted to engage the teeth of the ratchet wheel to move the same in the direction to start the engine, the pawl arm being operated by a spring put under tension by suitable operative means, and which when moved a certain distance is automatically released to drive the pawl arm against the ratchet teeth and give the engine a partial revolution sufficient to cause the starting thereof.

In the particular form in which I have illustrated my invention 10 designates a bracket arm conveniently located on the side of the frame of the automobile, and 11 is a stud extending out from the side of the bracket and carrying a stud on which is mounted a bell crank lever having three arms 12, 13 and 14. To the end of the arm 12 is pivoted one end of the pawl arm 15 on the pivot 16. The arm 13 is provided with an inclined face 17 against which bears one end of a heavy leaf spring 18, the other end of the spring being shown as secured at 19 to the end of the bracket 10. The third arm 14 of the bell crank is adapted to be engaged by the nose of the operating lever 20, one form of which will now be described.

The operating lever 20 as shown is of a general L shape and is pivoted at the end of the short arm of the L on a stud 21 shown as projecting from the frame of the automobile. In one side of this operating lever I preferably cut a channel 23 in which is pivoted on the pin 24 a dog 25 having an engaging head 26 on one side of the pivot and a portion 27 on the other side of the pivot, which latter portion is engaged by the free end of the leaf spring 28, which has its other end secured to the operating lever in any suitable way as being inserted in the slot 29 formed in the face of the lever. 30 is a leaf spring secured at one end to the bracket 22 and having its other end bearing on the actuating lever between its pivot 21 and the dog 25, whereby the lever will be normally held in the full line position shown in Figs. 1 and 2. In the operation of this portion of the device when the operating lever is moved from the full line position shown in Fig. 1 down to dotted line position, the head of the dog will engage the arm 14 of the bell crank lever and move the lever from position slightly in front of that shown in Fig. 1, in dotted lines, back toward the position shown in dotted lines. This will cause the free end of the ratchet lever to move back over one or more of the teeth of the ratchet wheel 9, the number of the teeth and the amount of such movement being dependent upon the size of the teeth of the ratchet wheel and the relative sizes of the arms of the bell crank lever, and also

the length of the shorter arm of the actuating lever. The actuating lever is drawn back toward the dotted line position which places the springs 18 and 30 under tension until, when the parts have reached the dotted line position shown in Fig. 1, the arm 14 will slip over the end of the dog and the spring 18 will then drive the bell crank lever toward the full line position, moving the pawl arm forward, rotating the ratchet wheel, and through it giving sufficient movement to the engine shaft to start the latter.

In order to prevent the pawl arm from resting on the ratchet wheel when the engine is running I provide means for raising the pawl arm when it has nearly reached the end of its forward stroke. In the form of construction shown in Fig. 1 this mechanism consists of a cam 31 formed on the under side of the arm 15, the front face of the cam being adapted to engage a pin 32 suitably mounted in the path of the cam and cause the cam to ride up on the pin during the last end of the forward movement of the pawl arm and consequently raising the pawl arm out of contact with the ratchet wheel. In the form of construction shown in Fig. 3 this raising of the end of the pawl arm is effected by forming the pawl arm in two sections, 33 and 34, the rear end of the section 33 being pivoted on the pivot 15 of the bell crank arm. The section 34 is drilled at one end, as shown at 35, which is adapted to telescope over the free end of the section 33, and 36 is a spring placed in the bore 35 and bearing at one end against the end of the bore and at the other end against the section 33. The telescoping movement of the parts 33 and 34 is limited by forming a slot 37 in the part 34 and providing a pin 38 which passes through the part 33 into the slot 37. 39 is a pin projecting out from the side of the portion 34 and entering into an inclined cam slot 40 formed in a bar 41 which is suitably supported along side the ratchet wheel. The spring 36 is sufficiently weak so that it will be compressed by the resistance of the engine to the turning movement. In the operation of this modified construction when the bell crank lever is drawn back as previously described, the sections 33 and 34 are drawn back and the pin 39 moves down the slot 40. As soon as the bell crank lever is raised the spring 18 operates to drive the ratchet arm forward which causes, because of the resistance of the engine, the compression of the spring 37. After the spring is compressed the continued forward movement of the pawl arm causes the starting of the engine, due to the movement given the ratchet wheel in the manner previously described. When the bell crank arm has turned to its normal position and the engine started the rotation of the ratchet cam will permit the section 34 to continue its forward movement under the influence of the spring 36. This will cause the pin 39 to move upward in the slot 40 and raise the pawl arm until it is clear of the ratchet teeth, and the parts will remain in this position until the bell crank lever is again drawn back by operating the actuating lever 20.

It is to be understood that the particular location of the parts of my actuating device in relation to the engine as illustrated in the drawings is not essential to my invention, and that their form, location and arrangement may be varied as desired. With some arrangements within the scope of my invention the actuating lever 20 can be foot operated instead of hand operated as shown, which hand operated construction is only shown for the purpose of illustrating my invention.

I realize that considerable variation is possible in the details of construction and arrangement of parts without departing from the spirit of my invention, and I therefore do not intend to limit myself to the specific form shown and described.

What I claim as new and desire to secure by Letters Patent is—

1. The combination with an explosion engine, of a ratchet wheel connected to the power shaft of said engine, a pawl arm for said ratchet wheel, a spring adapted to move the pawl arm in a direction to actuate the ratchet wheel, means for placing said spring under stress and releasing said spring after it has reached a predetermined point, and means for raising said pawl near the end of its actuating stroke.

2. The combination with an explosion engine, of a ratchet wheel connected to the power shaft of said engine, a pawl arm for said ratchet wheel, a bell crank lever to one arm of which the pawl arm is connected, a spring adapted to move the bell crank in a direction to cause the pawl to actuate the ratchet wheel, and means for moving the bell crank to put the spring under stress and releasing said bell crank after it has reached a predetermined point.

3. The combination with an explosion engine, of a ratchet wheel connected to the power shaft of said engine, a pawl arm for said ratchet wheel, a bell crank lever to one arm of which the pawl arm is connected, a spring adapted to move the bell crank in a direction to cause the pawl to actuate the ratchet wheel, and a pivoted arm provided with a part adapted to engage the bell crank to put the spring under stress and releasing said bell-crank after it has reached a predetermined point.

4. The combination with an explosion engine, of a ratchet wheel connected to the power shaft of said engine a pawl arm for said ratchet wheel, means for raising said

pawl near the end of its actuating stroke, a spring adapted to move the pawl arm in a direction to actuate the ratchet wheel, and means for placing said spring under stress and releasing said spring after it has reached a predetermined point.

5. The combination with an explosion engine, of a ratchet wheel connected to the power shaft of said engine, a pawl arm for said ratchet wheel, a bell crank lever to one arm of which the pawl arm is connected, a spring adapted to move the bell crank in a direction to cause the pawl to actuate the ratchet wheel, and a pivoted arm, a dog pivoted on the arm between the ends thereof, said dog being adapted to engage the bell-crank to put the spring under stress and releasing said bell crank after it [illegible] reached a predetermined point.

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

GEORGE M. DAVIS.

Witnesses:
GEO. S. LIVINGSTON,
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