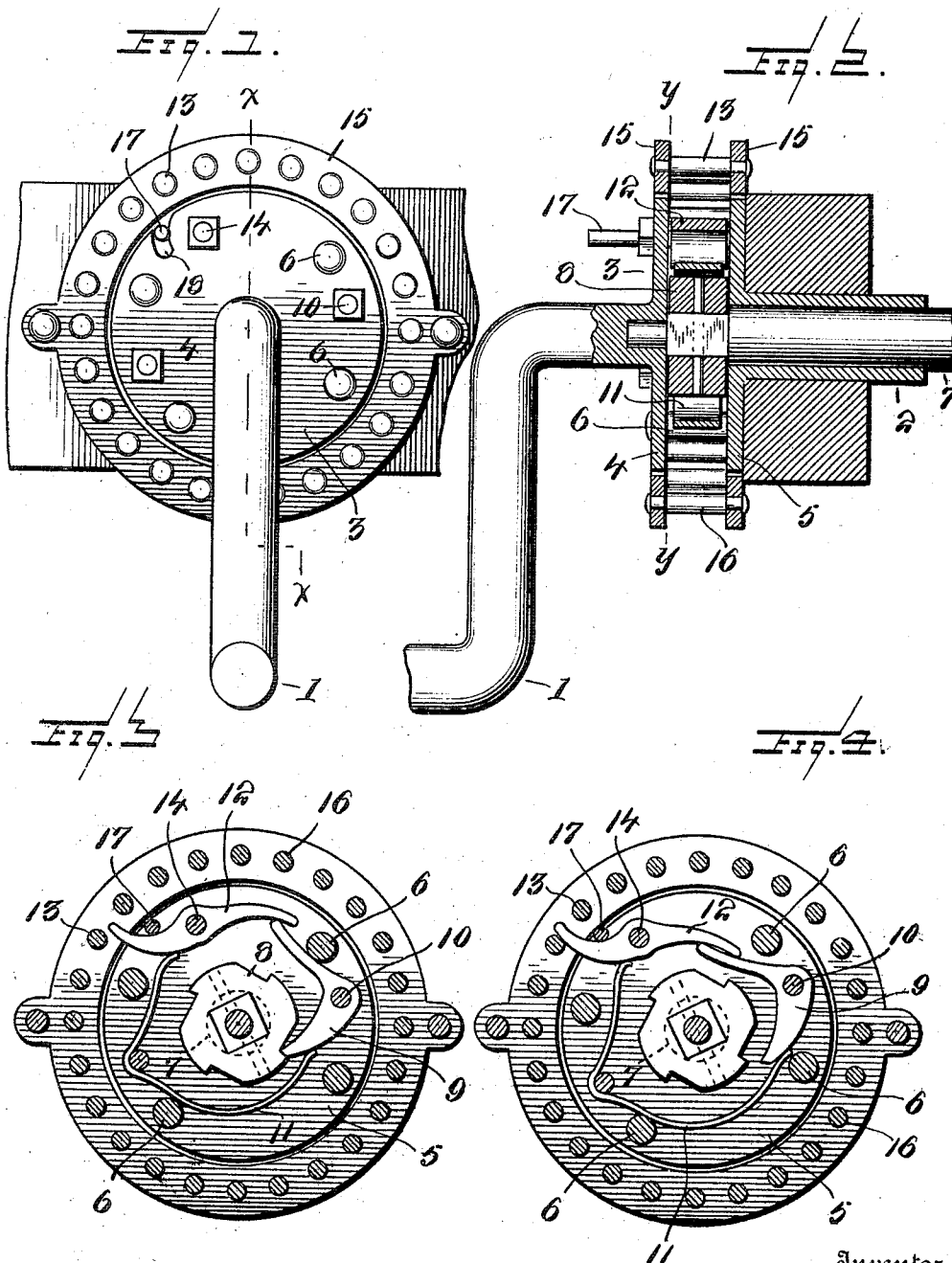


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ENGINE STARTING MECHANISM.
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Patented Mar. 7, 1911.



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ENGINE-STARTING MECHANISM.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that we, HERMAN W. SAEGER, a citizen of the United States, residing at Battle Creek, in the county of Ida and State of Iowa, and WILLIAM BUROW, a citizen of the United States, residing at Frederick, in the county of Brown and State of South Dakota, have invented new and useful Improvements in Engine-Starting Mechanism, of which the following is a specification.

Engines of the internal combustion or explosive type are required to be started by means of a crank and it not unfrequently happens that a premature explosion causes the engine to start backward with serious results to the person starting the engine.

The present invention provides a safety mechanism as an adjunctive part of the engine starting or crank mechanism, so that in the event of the engine starting backward by reason of a premature explosion or from other cause the starting crank is positively and instantly disengaged from the crank shaft of the engine, thereby permitting the engine to back-fire or start in an opposite direction from that designed without producing any ill effect or causing injury or shock to the operator.

The invention consists of the novel features, details of construction and combination of parts, which hereinafter will be more particularly set forth, illustrated in the accompanying drawing, and pointed out in the appended claims.

Referring to the drawing, forming a part of the application, Figure 1 is a front view of a starting mechanism for explosive engines embodying the invention. Fig. 2 is a vertical section thereof on the line $x-x$ of Fig. 1. Fig. 3 is a transverse section on the line $y-y$ of Fig. 2, showing the relation of the parts when cranking the engine. Fig. 4 is a view similar to Fig. 3, showing the relation of the parts when the starting crank is automatically disengaged from the crank

shaft by the releasing mechanism in the event of the engine back-firing.

Corresponding and like parts are referred to in the following description, and indicated in all the views of the drawing, by the same reference characters.

The numeral 1 designates the starting crank, 2 the extension thereof and 3 a cage coupling between the starting crank 1 and its extension 2; said coupling consisting of a disk 4 rigid with the inner end of the starting crank, a disk 5 rigid with the crank extension 2 and pins 6 connecting the disks 4 and 5. The disks 4 and 5 are spaced apart and receive between them the ratchet mechanism. The starting crank extension 2 is tubular and receives the outer end of the engine or crank shaft 7. A ratchet wheel 8 is fastened to the outer end of the crank shaft 7 so as to turn therewith. A pawl 9 is pivotally connected with the cage coupling and coöperates with the teeth of the ratchet wheel 8 and is mounted midway of its ends upon a pin 10, which is supported at its ends in the disks 4 and 5. A spring 11 coöperates with the pawl 9 and normally exerts a pressure thereon to hold the same in engagement with the ratchet wheel. The ratchet wheel 8 and the pawl 9 constitute the essential parts of the starting ratchet mechanism. When the crank 1 is turned in the proper direction, namely to the right, the starting pawl 9 engages with the teeth of the starting ratchet wheel 8 and causes a corresponding turning of the crank shaft 7. When the engine starts the pawl 9 rides upon the teeth of the ratchet wheel 8.

The releasing mechanism for automatically and instantly disengaging the starting pawl 9 from the starting ratchet wheel 8 in the event of the engine back-firing comprises a pawl 12 and a ratchet 13. The releasing pawl 12 is mounted upon a pin 14, which is supported at its ends in the disks 90

4 and 5. One end of the releasing pawl 12 overlaps an end portion of the starting pawl 9, whereas the opposite end of the releasing pawl is arranged to engage elements of the ratchet 13, whereby said releasing pawl is moved to effect a corresponding movement of the starting pawl so as to depress the end thereof in engagement with the pawl 12, with the result that the opposite end of the starting pawl is disengaged from the teeth of the ratchet wheel 8 so that the crank shaft 7 may turn backward without causing a corresponding backward movement of the starting crank. The releasing ratchet 13 may be of any construction and is firmly secured to the framework of the machine and encircles the cage coupling 3 and in its specific construction comprises a pair of rings 15 and connecting pins 16. The outer end of the releasing pawl 12 is curved so as to engage the pins 16 and to ride thereon in the forward rotation of the crank so as to relieve the pressure of its inner end upon the starting pawl 9. In the event of the engine back-firing the outer end of the releasing pawl 12 engages one of the pins 16 and rides thereof, thereby depressing the inner end of the pawl 12 and causing disengagement of the pawl 9 from the teeth of the starting ratchet 8. The spring 11 also serves to exert an outward pressure upon the outer end of the releasing pawl 12. A finger piece 17 projects laterally from the outer or rear end of the pawl 12 and is adapted to be pressed upon so as to relieve pressure of the pawl 12 upon the pawl 9. A notch 18 is formed in the edge of the disk 4 to receive the finger piece 17 when the same is pressed inward. By having the starting and the releasing ratchet mechanisms located in the same plane a compact arrangement results and a cumbersome appearance is avoided.

From the foregoing description, taken in connection with the accompanying drawing, the advantages of the construction and of the method of operation will be readily apparent to those skilled in the art to which the invention appertains, and while we have described the principle of operation of the invention, together with the device which we now consider to be the embodiment thereof, we desire to have it understood that the device shown is merely illustrative, and that such changes may be made when desired as are within the scope of the claims appended hereto.

Having thus described the invention what is claimed as new, is:—

1. In starting mechanism for explosive engines comprising a crank shaft, a starting crank and a starting ratchet mechanism, the latter comprising a ratchet wheel connected with the crank shaft and a pawl mounted

upon the starting crank, a releasing ratchet mechanism, the same comprising a ratchet encircling the starting ratchet mechanism, and a pawl pivotally mounted between its ends and having its inner end overlapping the starting pawl and having its outer end outwardly curved to ride upon the elements of the releasing ratchet in the forward rotation of the starting crank and to engage with an element of the releasing ratchet to move the releasing pawl so as to effect disengagement of the starting pawl from the starting ratchet, the releasing pawl being provided with a finger piece to admit of manual operation thereof.

2. In engine starting mechanism of the character described, the combination of a crank shaft, a starting crank, a starting crank extension, a cage coupling connecting the starting crank and the starting crank extension, a starting ratchet fastened to the crank shaft, a starting pawl pivotally connected with said cage coupling, a releasing pawl having an end portion overlapping the starting pawl, said releasing pawl being carried by said cage coupling, and a releasing ratchet secured to the framework of the engine and encircling the cage coupling and adapted to cooperate with the releasing pawl to effect disengagement of the starting pawl from the starting ratchet in the event of back-firing of the crank shaft.

3. In engine starting mechanism of the character described, the combination of a starting crank, a starting crank extension of tubular form, disks at the inner ends of the starting crank and starting crank extension, pins connecting said disks, a crank shaft having a portion passing through the starting crank extension, a ratchet wheel fastened to the crank shaft and arranged between the said disks, a pawl mounted between the disks and adapted to cooperate with the teeth of said ratchet wheel, a releasing pawl mounted between its ends between the said disks and adapted to engage the first mentioned pawl to effect disengagement thereof from the ratchet wheel, and a releasing ratchet encircling the said disks and fixedly mounted and adapted to cooperate with the releasing pawl to effect movement thereof to cause automatic disengagement of the starting ratchet mechanism in the event of the engine back-firing.

4. The herein described starting mechanism for explosive engines, the same comprising a starting crank, a tubular starting crank extension, disks at the inner ends of the starting crank and starting crank extension, pins connecting said disks, a crank shaft passing through the starting crank extension, a starting ratchet secured to the crank shaft, a starting pawl mounted intermediate of its ends between said disks, a

releasing pawl mounted intermediate of its
ends between said disks and having its inner
end overlapping the starting pawl and hav-
ing its outer end curved outwardly, a finger
5 piece projected laterally from the outer end
of the releasing pawl, a spring arranged be-
tween the disks and normally exerting a
pressure upon both the starting and the re-
leasing pawls, and a fixedly mounted releas-
10 ing ratchet encircling the beforementioned
disks and comprising spaced rings and con-
necting pins, the latter forming elements to
engage the outer end of said releasing pawl.

In testimony whereof we affix our signa-
tures in the presence of witnesses.

HERMAN W. SAEGER.
WILLIAM BUROW.

Witnesses as to the signature of Herman
W. Saeger:

HENRY R. ALBERS,
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C. B. AINSWORTH,
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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
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