April 10, 1951 S. L. GROVE 2,548,666

SAFETY CRANK DEVICE

Filed April 22, 1949

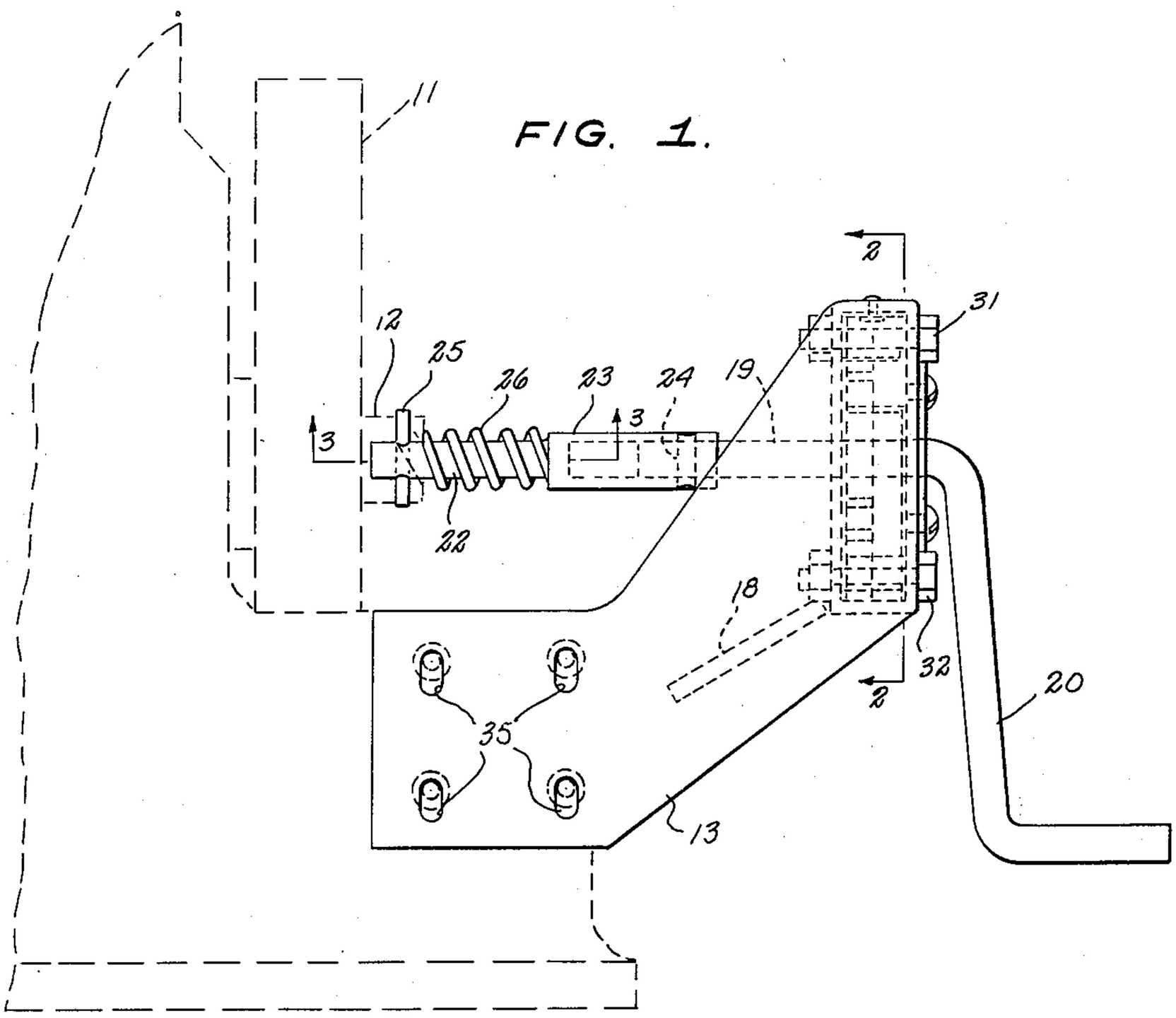

FIG. 1.

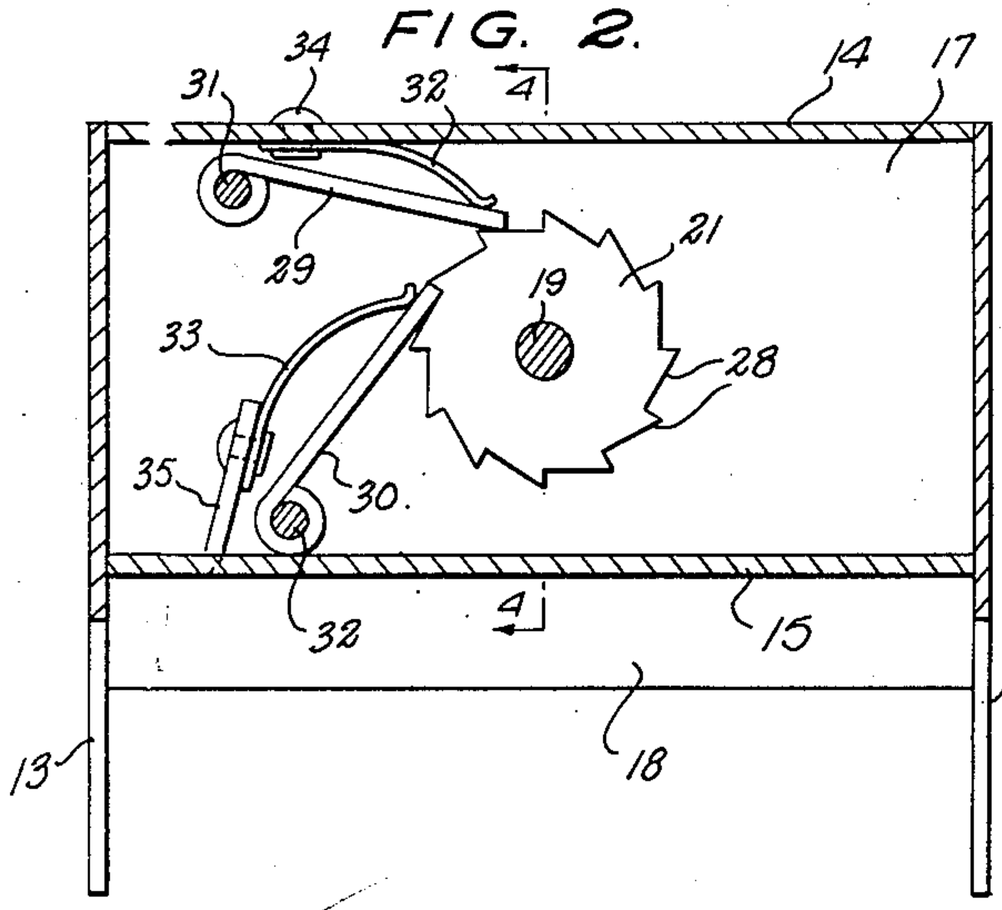

FIG. 2.

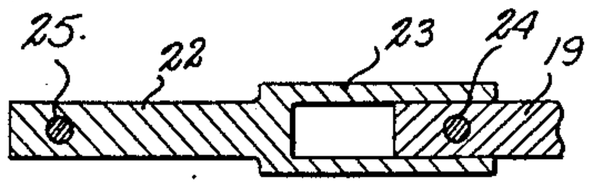

FIG. 3.

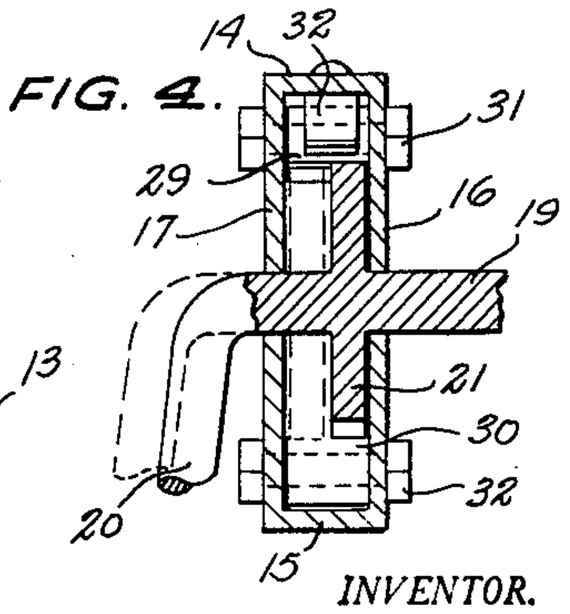

FIG. 4.

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SAFETY CRANK DEVICE

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3 Claims. (Cl. 123—185)

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This invention relates to motor-cranking devices, and more particularly to a safety hand-crank device for starting an industrial motor of the internal combustion type.

The main object of the invention is to provide a novel and improved hand-crank device for starting an industrial motor, which is simple in construction, easy to use, and which protects the operator against accidental injury in case of backfiring of the motor.

A further object of the invention is to provide an improved safety hand-crank device for use with industrial internal combustion engines and the like, which embodies positive check means for checking the backfire action of the motor, and also embodies means for releasing the hand-crank device from the crankshaft of the motor in the event such backfiring occurs.

Further objects and advantages of the invention will become apparent from the following description and claims, and from the accompanying drawings, wherein:

Figure 1 is a side elevational view of an improved safety hand-crank device constructed in accordance with the present invention, shown mounted on the frame of an internal combustion engine in operating position;

Figure 2 is a cross-sectional view taken on line 2—2 of Figure 1;

Figure 3 is an enlarged cross-sectional detail view taken on line 3—3 of Figure 1;

Figure 4 is a cross-sectional detail view taken on line 4—4 of Figure 2.

Referring to the drawings, 11 designates the end portion of an industrial motor of the internal combustion type, the crankshaft of the motor being designated at 12. Secured to the frame of the motor 11 parallel to the crankshaft 12 are a pair of brackets shown at 13, 13, which extend upwardly and have secured between their end portions respective top and bottom horizontal support plates 14 and 15. These horizontal plates have integrally secured to their front and rear portions vertical transverse plates 16 and 17, whereby a transverse vertical housing is defined which is located at right angles to the axis of the crankshaft 12. Connecting the side plates 13, 13 is an inclined transverse brace plate 18. Journaled in the aforementioned transverse housing is a crank 19, said crank having an offset handle portion shown at 20. Inside the aforesaid housing, the crank 19 is formed with a ratchet wheel shown at 21. The crank 19 is axially aligned with the crankshaft 12. Referring now to Figure 3, it will be seen that the end of the crank 19 has

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secured thereto an extension 22, said extension being formed with a sleeve portion 23 which receives said end of crank 19. The end of crank 19 is locked within the sleeve portion 23 by a transverse shearable pin member shown at 24. Secured to the end portion of member 23 and projecting laterally therefrom on both sides is a transverse pin member 25. Said pin member 25 is adapted to be interlocked in the usual helical end slot in the end of the crankshaft 12. Encircling the end of shaft extension 22 is a heavy coil spring 26 which bears between the shoulder defined by sleeve portion 23 and the end of the crankshaft 12. The crank 19, while being rotatably mounted in the transverse housing defined by the wall elements 16 and 17, is also longitudinally slidable therein, as indicated in dotted view in Figure 4. This enables the crank to be advanced while pin 25 is entering the helical slot in the crankshaft during the starting of the motor, and allows the spring 26 to withdraw the crank extension 22 from the crankshaft after the motor has been started.

As shown in Figure 2, the ratchet 21 has teeth 28, which are engaged by the respective dogs 29 and 30, said dogs being pivoted on the respective bolts 31 and 32 secured to the vertical transverse wall elements 16 and 17 in the upper and lower portions of the aforementioned transverse housing. The said dogs 29 and 30 are biased into engagement with the teeth of the ratchet wheel by the respective leaf springs 32 and 33. As shown in Figure 2, the upper leaf spring 32 is secured to the top wall of the aforesaid transverse housing by a rivet 34. The leaf spring 33 is secured to an upstanding lug 35 projecting from the bottom wall element 15 of said housing. The dogs 29 and 30 positively limit counterclockwise rotation of the ratchet wheel, such as would occur when the motor backfires during the starting period. Since the shaft 19 is rotated clockwise, as viewed in Figure 2, during the starting of the motor, this prevents injury to the operator when such backfire occurs, whereas reverse rotation of the shaft 19 is checked by the engagement of the dogs 29 and 30 with the ratchet wheel, the reverse torque produced by such backfire causes the shearable pin 24 to rupture, thereby disconnecting the shaft 19 from forward extension 22. The rupture of pin 24 prevents damage to the slotted end of the crankshaft 12, as well as possible damage to the other portions of the safety crank device.

As shown in Figure 1, the side plates 13, 13 are formed with the slots shown at 35' through which

pass the bolts securing said plates to the frame of the motor, whereby the plates 13, 13 may be adjusted vertically in order to properly align the shaft 19 with the crankshaft of the motor.

The broken portions of the shear pin 24 are easily removable, whereby very little effort is involved in replacing said shearable pin.

While a specific embodiment of a safety hand-crank device for starting an internal combustion engine has been described in the preceding disclosure, it will be apparent that various modifications within the spirit of the invention may occur to those skilled in the art. Therefore, it is intended that no limitations be placed on the invention except as defined by the scope of the appended claims.

What is claimed is:

1. In an internal combustion engine, a crankshaft, bracket means adjacent said crankshaft, a housing carried by said bracket means transverse to the axis of the crankshaft, a crank rotatably and slidably mounted in said housing in axial alignment with the end of the crankshaft, said crank being axially movable in said housing, a ratchet wheel carried by said crank and being axially movable therewith through the width of the housing, dog means secured within and being substantially coextensive in internal width with the housing and engaging the periphery of the ratchet wheel in all positions of said ratchet wheel in the housing, preventing reverse rotation of said crank, said crank having a forward extension interlocked with the end of the crankshaft, and frangible means connecting said forward extension to the crank.

2. In an internal combustion engine, a crankshaft, bracket means adjacent said crankshaft, a housing carried by said bracket means transverse to the axis of the crankshaft, a crank rotatably and slidably mounted in said housing in axial alignment with the end of the crankshaft, said crank being movable axially in said housing, a ratchet wheel carried by said crank and being axially movable therewith through the width of the housing, dog means secured within and being substantially coextensive in internal width with

the housing and engaging the periphery of the ratchet wheel in all positions of said ratchet wheel in the housing, preventing reverse rotation of said crank, a sleeved extension receiving the end of the crank, said sleeved extension being interlockingly engageable with the end of the crankshaft, a shearable pin extending transversely through said sleeved extension and the portion of the crank received therein, said sleeved extension being formed with a shoulder, and a coil spring on said extension bearing between the shoulder and the end of the crankshaft.

3. In an engine, a crankshaft, bracket means adjacent said crankshaft, a housing carried by said bracket means transverse to the axis of said crankshaft, a crank rotatably and slidably mounted in said housing in axial alignment with the end of the crankshaft, said crank being movable axially in said housing, a ratchet wheel carried by said crank and being axially movable therewith through the width of the housing, dog means secured within and being substantially coextensive in internal width with the housing and engaging the periphery of the ratchet wheel in all axially moved positions of said ratchet wheel in the housing, preventing reverse rotation of said crank, a sleeved extension receiving the end of said crank, said sleeved extension being interlockingly engageable with the end of the crankshaft, and a shearable pin extending transversely through said sleeved extension and the portion of the crank received therein.

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