J. D. BOWNE.

SAFETY CRANK FOR EXPLOSIVE ENGINES.

APPLICATION FILED AUG. 18, 1910.

996,608. Patented July 4, 1911.

Fig. 1

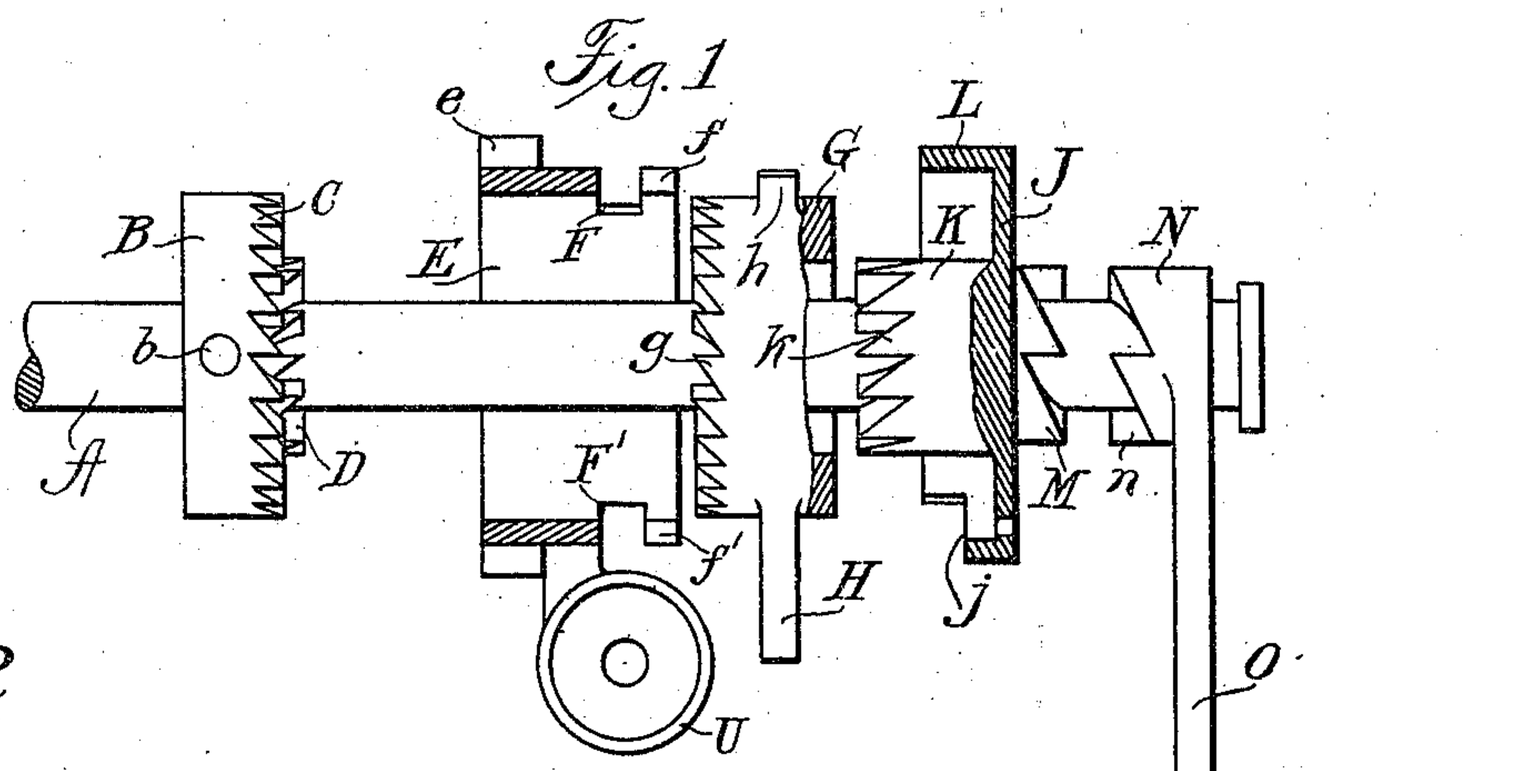


Fig. 2

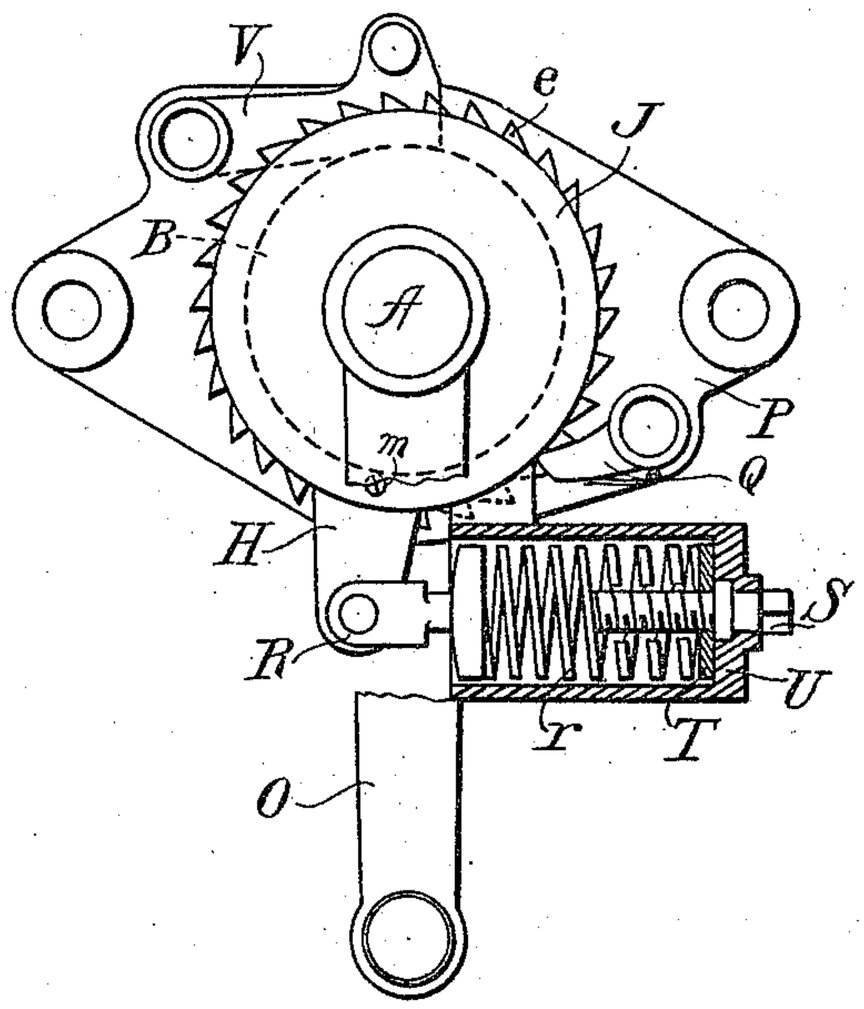
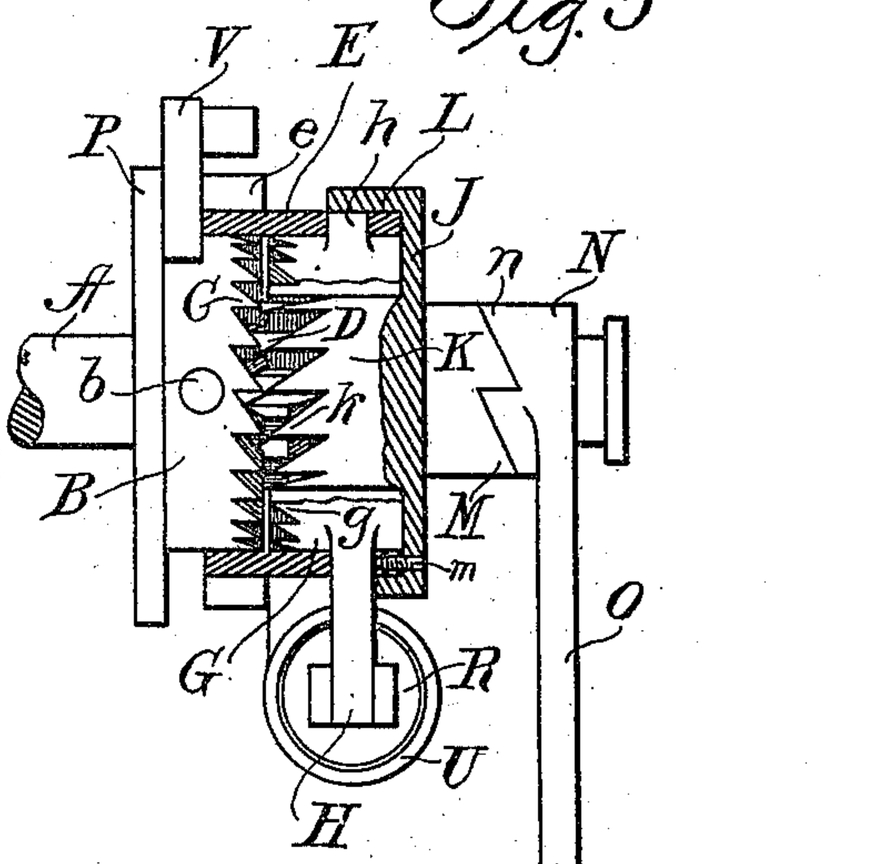


Fig. 3



Witnesses

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UNITED STATES PATENT OFFICE.

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SAFETY-CRANK FOR EXPLOSIVE-ENGINES.

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Application filed August 18, 1910. Serial No. 577,762.

To all whom it may concern:

Be it known that I, JOHN D. BOWNE, citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Safety-Cranks for Explosive-Engines, of which the following is a specification.

This invention relates to safety cranks for explosive engines, particularly to those devices wherein a spring or springs is interposed to cushion the effect upon the person operating the crank of a premature or "back fire" explosion.

The object of this invention is the production of a safety crank having parts of special arrangement and construction, whereby it is believed the disengagement of the crank from the shaft is brought about in the shortest period of time, and the shock of "back fire" of the engine is to a great extent taken up and the hand and arm of the operator correspondingly relieved and practically guarded from injury.

The construction and arrangement of parts comprising this invention appear in the accompanying drawings, of which—

Figure 1 represents a side view of all the parts separated from each other upon the shaft, and about to be assembled. Fig. 2 is a front view of all parts assembled, and Fig. 3 is a side view of the parts assembled, some of them being shown in longitudinal section.

The same letter is employed to refer to the same part throughout the description and drawings.

Upon the shaft A, the ratchet crown B is fixed by means of pin *b*. The outer ring of ratchet teeth are designated by the letter C, and there will be noted, as best shown in Fig. 1, an inner ring of ratchet teeth D, that project beyond the teeth C.

The shell E fits movably upon the fixed crown B. The shell E has a series of ratchet teeth *e* at the rear, and a pair of slots F and F′, the slot F being diametrically opposite the similar slot F′. The shell E is adapted to receive also the ratchet ring G, the teeth of which are referred to by the letter *g*. Projecting from the outside of the ring G, and, formed integrally with the ring, are the arm H and lug *h*, located at opposite points. When the parts are assembled, and the ring G is passed into the shell E, the lug *h* and arm H enter the recesses *f* and *f*′, by way of which the lug and arm reach the slots F and F′ which it is intended they shall traverse.

In Fig. 1 the shell E is illustrated in section lengthwise of the shaft and one side wall only of each of the recesses *f* and *f*′ are shown. Let it be now assumed that the ring G has been passed into the shell E, and that the lug *h* and arm H have passed through the recesses or openings *f* and *f*′ into the slots F and F′. It is thought to be clear that the ring may now be rotated partly and the lug and arm will travel the slots. The ring and shell being now associated, the outer member of cover J is slipped over the recessed end of the shell E, and covers the lug *h* as best shown in Fig. 3. The arm H does not interfere with the placing of the cover member J, because a recess *j* is formed in the edge of the cover J to permit the movement of the arm as stated. The cover or outer member J has an internal cylindrical central portion K, provided with ratchet teeth *k*, and the ratchet teeth D already mentioned as features of the fixed crown B correspond in size and number with the teeth *k*. On the exterior, the cover J is provided with the ratchet-toothed center or hub M, the teeth of which, and of the boss N of the crank O are alike and are arranged to be brought into engagement when the crank is operated. The teeth on the crank boss are designated by the letter *n*.

The supporting plate P, shown in Figs. 2 and 3, lies against the fixed crown B, and the shaft passes movably through the plate which, in practice, is fastened to the vehicle. Upon the plate P, as shown in Fig. 3, is a pivoted pawl Q engaging the ratchet teeth *e* of shell E, and which will be again mentioned. In Figs. 2 and 3 it will be also noted that the arm H of ring G is pivotally connected with the plunger R, and that the head of the plunger bears against the coil spring *r*, which may be compressed by means of the screw S and the adjusting disk T, engaging the screw within the dash-pot U that contains the spring and plunger head.

To explain the operation of this invention, let it be assumed that the crank is engaged as shown in Fig. 3, whereupon all the parts, excepting the fixed crown B and those borne by plate P may be moved together toward the plate until the teeth D and *k* are partly engaged as shown. Now, the associated

parts would be halted were not the latch V raised out of the space between the annular row of ratchet teeth *e* and the surface of the plate P. The latch V being thus raised, the movable assemblage of parts comes to rest with the shell E next to plate P, and the teeth C of the fixed crown B in engagement with the teeth *g* of ring G. The teeth D and *k* are now fully enmeshed. Under those conditions, it is thought to be apparent that the shaft may be turned. Should there be a premature explosion having the effect of starting the engine reversely, the engagement of the pawl Q and ratchet teeth *e* halts the shell E, and the dash-pot U which is attached as shown to the shell. But, the ring G having arm H receives the reverse impulse momentarily, which effect or shock would be transmitted to the hand holding the crank did not the movement of arm H drive the plunger R into the dash-pot against the force of spring *r*, thus interposing a cushioning action and relieving materially the otherwise dangerous jerk upon the hand. As best illustrated in Fig. 3, it will be seen that the cover J is secured to the shell E by the screw *m*. The cover is also held stationary as the result of the engagement of pawl Q and ratchet teeth *e*, and the inclined sides of the inner teeth D and *k* are pressed together with the result that the parts move along the shaft, that is to say, the shell E, ring G, cover J, and crank O, are all forced almost instantly toward the right, thereby disengaging the teeth C and G. In Fig. 3, the operation resulting from "back-fire" has proceeded far enough to release the ratchet teeth C and *g*, but the teeth D still bear against the teeth *k* and the consequent movement to the right of the parts stated will continue until teeth D and *k* are free from each other. But, the movement at the point of the illustration in Fig. 3 has been sufficient to bring the ratchet teeth *e* away from plate P far enough to permit the latch V to fall into the space between the teeth and the plate, and, the inadvertent reëngagement of teeth C and *g* is in that way prevented. The shaft may now continue its backward revolution without affecting the hand of the operator.

It is believed to be clear from the drawings, that when the engine starts up in the proper direction, in this instance with the hands of a watch, the inclined sides of the ratchet teeth M and *n* are pressed together with the resulting disengagement of the crank O in the customary manner.

Having now described this invention, what I claim and desire to secure by Letters Patent is:—

1. In a safety crank, the combination with a stationary plate having a pivoted pawl, of a shaft passing through the plate, a crown fixed to the shaft next to the plate and having an outer and an inner series of ratchet teeth, a shell constructed to fit the crown externally and movably, the said shell having a series of ratchet teeth arranged to be brought into engagement with the pawl of said plate, the said shell having oppositely disposed circumferential slots, a dash-pot connected with said shell and having within it an adjustable spring and a plunger bearing against the said spring, a ring having ratchet teeth constructed to engage the said outer series of ratchet teeth of said crown, the said ring having a lug and an arm arranged to travel the said slots of the shell, the said arm of the ring being connected pivotally with the said plunger of the dash-pot, a cover constructed to be secured externally to the shell and having an internal cylindrical portion constructed to fit the said ring movably and internally, the said cylindrical portion having teeth constructed to engage the inner series of teeth of said crown, the said cover having also an external central portion provided with ratchet teeth, and a crank constructed with ratchet teeth fashioned to engage the teeth of the said external central portion of the cover.

2. In a safety crank, the combination with a stationary plate having a pivotal pawl, of a shaft passing through the plates, a crown fixed to the shaft next to the plate and having an outer and an inner series of ratchet teeth, a shell constructed to fit the crown externally and movably, the said shell having a series of ratchet teeth arranged to be brought into engagement with the pawl of said plate, the said shell having oppositely disposed circumferential slots, means for latching the shell at a distance from the plate, a dash-pot connected with said shell and having within it an adjustable spring and a plunger bearing against the said spring, a ring having ratchet teeth constructed to engage the said outer series of ratchet teeth of said crown, the said ring having a lug and an arm arranged to travel the said slots of the shell, the said arm of the ring being connected pivotally with the said plunger of the dash-pot, a cover constructed to be secured externally to the shell and having an internal cylindrical portion constructed to fit the said ring movably and internally, the said cylindrical portion having teeth constructed to engage the inner series of teeth of said crown, the said cover having also an external central portion provided with ratchet teeth, and a crank constructed with ratchet teeth fashioned to engage the teeth of the said external central portion of the cover.

3. In a safety crank, the combination with a stationary plate having a pivoted pawl, of a shaft passing through the plate, a crown fixed to the shaft next to the plate and hav-

ing an outer and an inner series of ratchet teeth, a shell constructed to fit the crown externally and movably, the said shell having a series of ratchet teeth arranged to be brought into engagement with the pawl of the plate, the said shell having a circumferential slot, a ring having ratchet teeth constructed to engage the said outer series of ratchet teeth of said crown, the said ring having an arm arranged to travel the slot in said shell, means including a spring for cushioning the movement of the ring with respect to the shell and connected with the arm of said ring and with the shell, a cover constructed to be secured externally to the shell and having an internal cylindrical portion constructed to fit the said ring interiorly and movably, the said cylindrical portion having teeth constructed to engage the said inner series of teeth of said crown, the said cover having also an external central portion provided with ratchet teeth, and a crank constructed with ratchet teeth fashioned to engage the teeth of the said external central portion of said cover.

4. In a safety crank, the combination with a stationary plate having a pivoted pawl, of a shaft passing through the plate, a crown fixed to the shaft next to the plate and having an outer and an inner series of ratchet teeth, a shell constructed to fit the crown externally and movably, the said shell having a series of ratchet teeth arranged to be brought into engagement with the pawl of said plate, means for latching the shell at a distance from the plate, the said shell having a circumferential slot, a ring having ratchet teeth constructed to engage the said outer series of ratchet teeth of said crown, the said ring having an arm arranged to travel the slot in said shell, means including a spring for cushioning the movement of the ring with respect to the shell and connected with the arm of said ring and with the shell, a cover constructed to be secured externally to the shell and having an internal cylindrical portion constructed to fit the said ring interiorly and movably, the said cylindrical portion having teeth constructed to engage the said inner series of teeth of said crown, the said cover having also an external central portion provided with ratchet teeth, and a crank constructed with ratchet teeth fashioned to engage the teeth of the said external central portion of said cover.

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

JOHN D. BOWNE.

Witnesses:
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