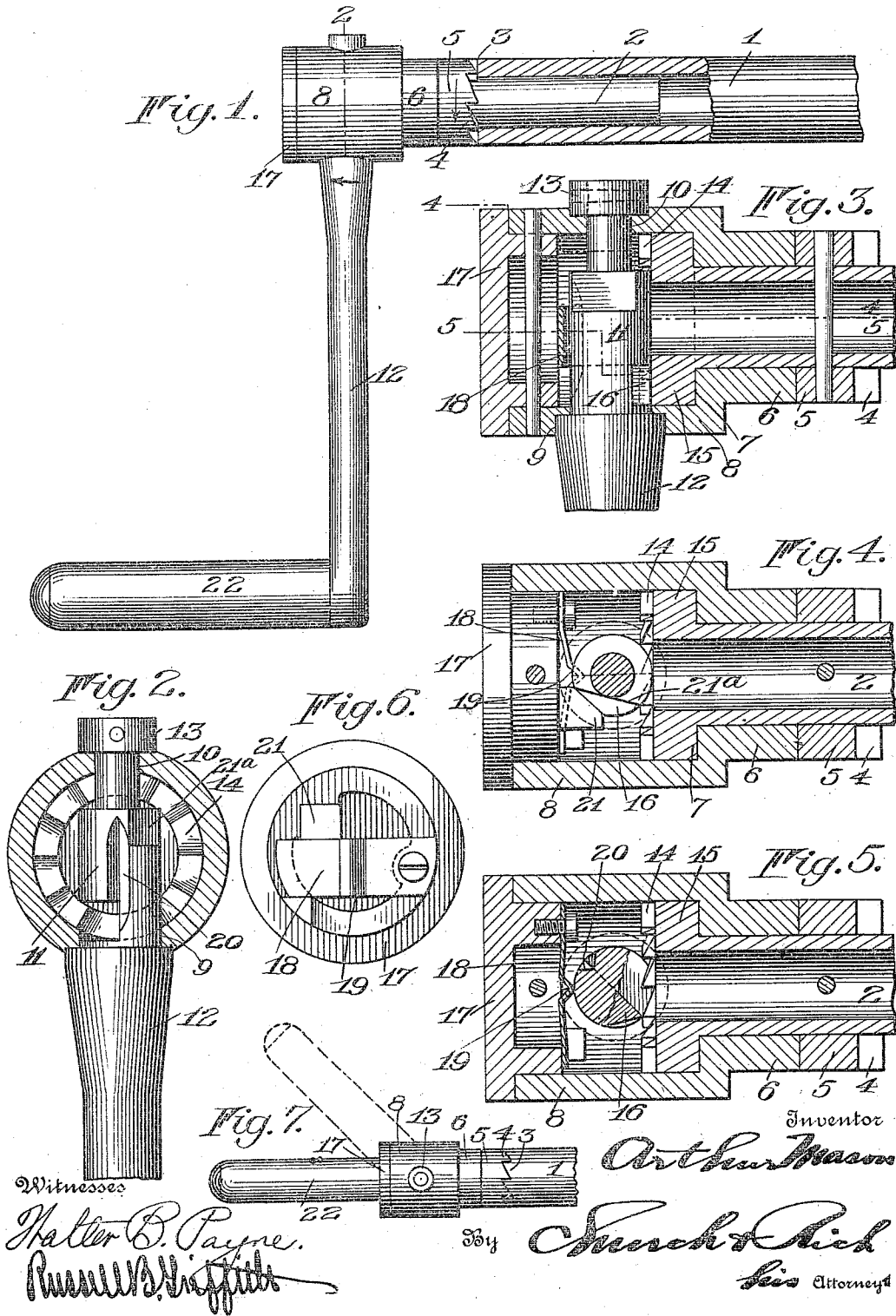


A. MASON.
 STARTING DEVICE FOR EXPLOSIVE ENGINES.
 APPLICATION FILED APR. 27, 1910.

995,547.

Patented June 20, 1911.



UNITED STATES PATENT OFFICE.

ARTHUR MASON, OF PIKE, NEW YORK, ASSIGNOR OF ONE-HALF TO JOHN A. LEVIS AND ONE-EIGHTH TO HOWARD W. SHANNON, BOTH OF ROCHESTER, NEW YORK.

STARTING DEVICE FOR EXPLOSIVE-ENGINES.

995,547.

Specification of Letters Patent. Patented June 20, 1911.

Application filed April 27, 1910. Serial No. 558,038.

To all whom it may concern:

Be it known that I, ARTHUR MASON, of Pike, in the county of Wyoming, in the State of New York, have invented certain new and useful Improvements in Starting Devices for Explosive-Engines; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the reference-numerals marked thereon.

My present invention relates to internal combustion or explosive engines and it has for its object to provide a device for starting the engine manually through the use of which the operator will be protected as far as possible from injury due to back firing in the cylinders as manifested by temporary reversal of the engine due to premature explosion of the charge.

The invention contemplates the use of a starting crank having the usual general characteristics but so constructed that immediately the engine reverses from the above noted causes the crank will be automatically disconnected and prevented from kicking and thereby injuring the operator.

The improvements are further directed toward producing strength and efficiency in the device combined with simplicity in the matter of construction.

To these and other ends the invention consists in certain improvements and combinations of parts, all as will be hereinafter more fully described, the novel features being pointed out in the claims at the end of the specification.

In the drawings: Figure 1 is a side elevation of a starting mechanism constructed in accordance with and illustrating one embodiment of my invention; Fig. 2 is a transverse detail section taken substantially on the line 2—2 of Fig. 1; Fig. 3 is a detail section taken through the axis of movement longitudinally of the crank arm; Fig. 4 is a section taken substantially on the line 4—4 of Fig. 3; Fig. 5 is a section taken substantially on the line 5—5 of Fig. 3; Fig. 6 is an elevation of the inner face of the cap piece carrying the centering means, and Fig. 7 is a top plan view.

Similar reference numerals throughout the several figures indicate the same parts.

Some engines are started by applying the starting device to the projecting end of the

crank shaft itself, while others have intermediate gearing or equivalent mechanism through which the starting motion is communicated. In either instance the result is substantially the same and I will therefore, for convenience herein, refer to this starting shaft merely as the engine shaft. The end portion of such a shaft is indicated in the drawings by the numeral 1 and shown to be of a tubular structure to receive the barrel 2 of the starting mechanism. The tip of the shaft is provided with teeth 3 cooperating with corresponding teeth 4 on a collar 5 fixed to the barrel 2, the teeth having inclined backs so that they lock to turn the shaft in one direction but throw themselves out of engagement when the shaft runs ahead of the starting device in the same direction, as usual, such a coupling as is constituted by the parts 3 and 5 being well known in the art.

Turning loosely on the barrel 2 is a sleeve 6 that is held in place between the fixed collar 5 and a shoulder 7 near the end of the barrel. This sleeve is extended to project beyond the end of the barrel to constitute a casing or housing 8 and journaled transversely therein at the diametrically opposite points 9 and 10 is the preferably reduced end 11 of a radially extending crank arm 12; the said arm being secured in its bearings by a suitable retaining part 13.

On the end face of the barrel 2 is disposed a clutch element formed in the present instance by a series of annular teeth 14 on an enlargement 15 which incidentally provides the shoulder 7, before referred to. The reduced end 11 of the crank arm extends in proximity to this clutch element and carries a second clutch element 16 in the present form of an offset projection or tooth which swings with the rotary movement of the crank arm 12 into and out of cooperation with the teeth forming the clutch element 14 that turns with the engine shaft.

The end of the sleeve 6, or at least the housing 8, is closed by a suitably secured cap 17 and on the inner face thereof is mounted a leaf spring 18 (Fig. 5) having a centering projection 19 that cooperates with the recess 20 on the portion 11 on the crank arm and tends to hold the latter in a position in which its clutch 16 cooperates with the clutch element 14, while an abutment 21,

preferably formed on the cap, has a position in which it coöperates with an abutment 21^a on the crank arm (Fig. 4) to limit the disengaging movement of the clutch element 16 so that it, and the arm on which it is carried, is limited in its rotary movement about the axis of the arm to substantially a quarter revolution.

The crank arm 12 is fitted with a suitable handle portion 22 that normally projects parallel with the engine shaft 1 and barrel 2 in which position the clutch elements 14 and 16 are in coöperative position, but when the handle portion is turned on the axis of the crank arm as a center so that it has an angular relation to the engine shaft and the axis of rotation thereof, the clutch member 16 swings out of engagement with the member 14 against the tension of the spring 18.

With these movements in mind and assuming that the engine turns to the right, in the direction of the arrow in Fig. 1, and that the movement of the crank arm 12 on its own axis is in the direction of the arrow in the same figure, it will be seen that in turning the crank to the right with the handle portion 22 in its normal position, the clutches 14 and 16 will be in engagement and the engine shaft 1 will be turned also.

Of course, the engagement of these clutches under the exertion of the operator will have a tendency to rotate the crank 12 on its own axis, but as the leverage exerted by the clutch 16 is relatively small compared with the leverage in favor of the operator by reason of the length of the handle portion 22 he has no difficulty in holding the clutches in engagement by a rigid grip on the handle assisted somewhat by the spring 18.

However, should the engine kick back and the shaft begin to revolve to the left, or in the opposite direction, the resistance to the operator will be too great to be overcome by him, the clutch 16 will be thrown out of engagement by the advancing tooth of the clutch 14 having the power of the engine behind it, thus rotating the crank arm 12 and the handle portion 22 will be thrown to the left to an angular position, shown in dotted lines in Fig. 7. The operator will unconsciously retain his hold on the handle portion long enough to prevent a possible temporary swing of the crank arm as the clutches are leaving each other and the sleeve 6, carrying the crank arm, will rotate idly on the barrel 2, which is still locked to the engine shaft by the engagement of the teeth 3 and 4. Should the cranking, on the other hand, be successful, the engine shaft 1 will, of course, run ahead of the starting device, including the collar 5, and the teeth 3 and 4 will automatically disengage themselves as usual.

I claim as my invention:

1. In a starting mechanism for explosive

engines, the combination with a clutch member adapted to turn with the engine shaft, of a crank arm adapted to extend radially of the shaft and mounted to swing loosely on the latter, a handle portion on the crank arm having a normal position substantially parallel with the shaft and movable angularly with relation thereto and a second clutch member rotatable with the crank arm about the axis of the shaft, and coöperating normally with the first, the handle portion and one of the clutch members being operatively connected so that the latter moves out of coöperation with the other clutch member when the handle portion is turned angularly with respect to the shaft.

2. In a starting mechanism for explosive engines, the combination with a clutch member adapted to turn with the engine shaft, of a crank arm adapted to extend radially of the shaft and mounted to turn loosely on the latter, a handle portion on the crank arm having a normal position substantially parallel with the shaft and movable angularly with relation thereto, a second clutch member rotatable with the crank arm about the axis of the shaft and normally coöperating with the first, the handle portion and one of the clutch members being operatively connected so that the latter moves out of coöperation with the other clutch member when the handle portion is turned angularly with respect to the shaft, and a spring actuated device for normally holding the handle portion parallel with the shaft.

3. In a starting mechanism for explosive engines, the combination with a clutch member adapted to turn with the engine shaft, of a crank arm adapted to extend radially of the shaft and mounted to turn loosely on the latter, and having a rotary movement on its own axis, a second clutch member rotatable with the crank arm about the axis of the shaft and operatively connected with said arm to move into and out of coöperation with the first when the arm rotates on its own axis and a handle portion on the crank arm arranged to extend substantially parallel with the engine shaft when the clutches are engaged and at an angle thereto when they are free of each other.

4. In a starting mechanism for explosive engines, the combination with a clutch member arranged to turn with the engine shaft, of a crank arm extending radially of the shaft adapted to turn loosely thereon, and having a rotary movement on its own axis, a second rigid clutch element on the arm arranged to swing into and out of coöperation with the first as the arm is rotated on its own axis, and a handle portion on the arm arranged to extend substantially parallel with the engine shaft when the clutches are engaged and at an angle thereto when they are free of each other.

5. In a starting mechanism for explosive engines, the combination with a clutch member arranged to turn with the engine shaft, of a sleeve arranged to turn independently of the shaft about the same axis, a crank arm journaled transversely in the sleeve to rotate on its own axis, a second clutch member within the sleeve adapted to turn therewith and operatively connected with the arm to move into and out of coöperation with the first mentioned clutch member with the rotation of the arm on its own axis, and a handle portion on the crank arm arranged to extend substantially parallel with the engine shaft when the clutches are engaged and at an angle thereto when they are free of each other.

6. In a starting mechanism for explosive engines, the combination with a clutch member arranged to turn with the engine shaft, of a sleeve arranged to turn independently of the shaft about the same axis, a crank arm journaled transversely in the sleeve to rotate on its own axis, and having a second clutch element formed thereon within the sleeve to swing into and out of coöperation with the first mentioned clutch member with the rotation of the arm on its own axis, and a handle portion on the crank arm arranged to extend substantially parallel with the engine shaft when the clutches are engaged and at an angle thereto when they are free of each other.

7. In a starting mechanism for explosive engines, the combination with a clutch member arranged to turn with the engine shaft, of a sleeve arranged to turn independently of the shaft about the same axis, a crank arm journaled transversely in the sleeve to rotate on its own axis, a second clutch member within the sleeve adapted to turn therewith and operatively connected with the arm to turn into and out of coöperation with the first mentioned clutch member with the rotation of the arm on its own axis, a cap

on the outer end of the sleeve, a spring pressed centering device on the cap coöperating with the arm to center it in a position in which the clutch members are in engagement, and a handle portion on the crank arm arranged to extend substantially parallel with the engine shaft when the clutches are engaged and at an angle thereto when they are free of each other.

8. In a starting mechanism for explosive engines, the combination with a clutch member adapted to turn with the engine shaft, of a crank arm adapted to extend radially of the shaft and mounted to turn loosely on the latter and having a rotary movement on its own axis and a second clutch member rotatable with the crank arm about the axis of the shaft and operatively connected with said arm to move into and out of coöperation with the first clutch member with the rotation of the arm on its own axis.

9. In a starting mechanism for explosive engines, the combination with a coupling adapted to be connected with the engine shaft to turn therewith and having a clutch member on its outer end, of a sleeve arranged to freely rotate on the coupling inclosing the clutch member and projecting beyond the same, a crank arm extending transversely through and journaled in the projecting portion of the sleeve to rotate on its own axis, a second clutch element thereon within the sleeve movable into and out of coöperation with the first mentioned clutch element as the arm is rotated on its own axis and a handle portion on the arm arranged to extend substantially parallel with the engine shaft when the clutches are engaged and at an angle thereto when they are free of each other.

ARTHUR MASON.

Witnesses:

LEON J. ARMBRUSTER,
F. H. LYON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

It is hereby certified that in Letters Patent No. 995,547, granted June 20, 1911, upon the application of Arthur Mason, of Pike, New York, for an improvement in "Starting Devices for Explosive-Engines," an error appears requiring correction as follows: In the grant and in the heading to the printed specification it is stated that said Mason assigned one-half of his right to John A. Levis and one-eighth to Howard W. Shannon, whereas it should have been stated that said Mason assigned *one-fourth of his right to John A. Levis and one-eighth to Howard W. Shannon*; as shown by the record of assignments in this office; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 12th day of September, A. D., 1911.

[SEAL.]

E. B. MOORE,
Commissioner of Patents.