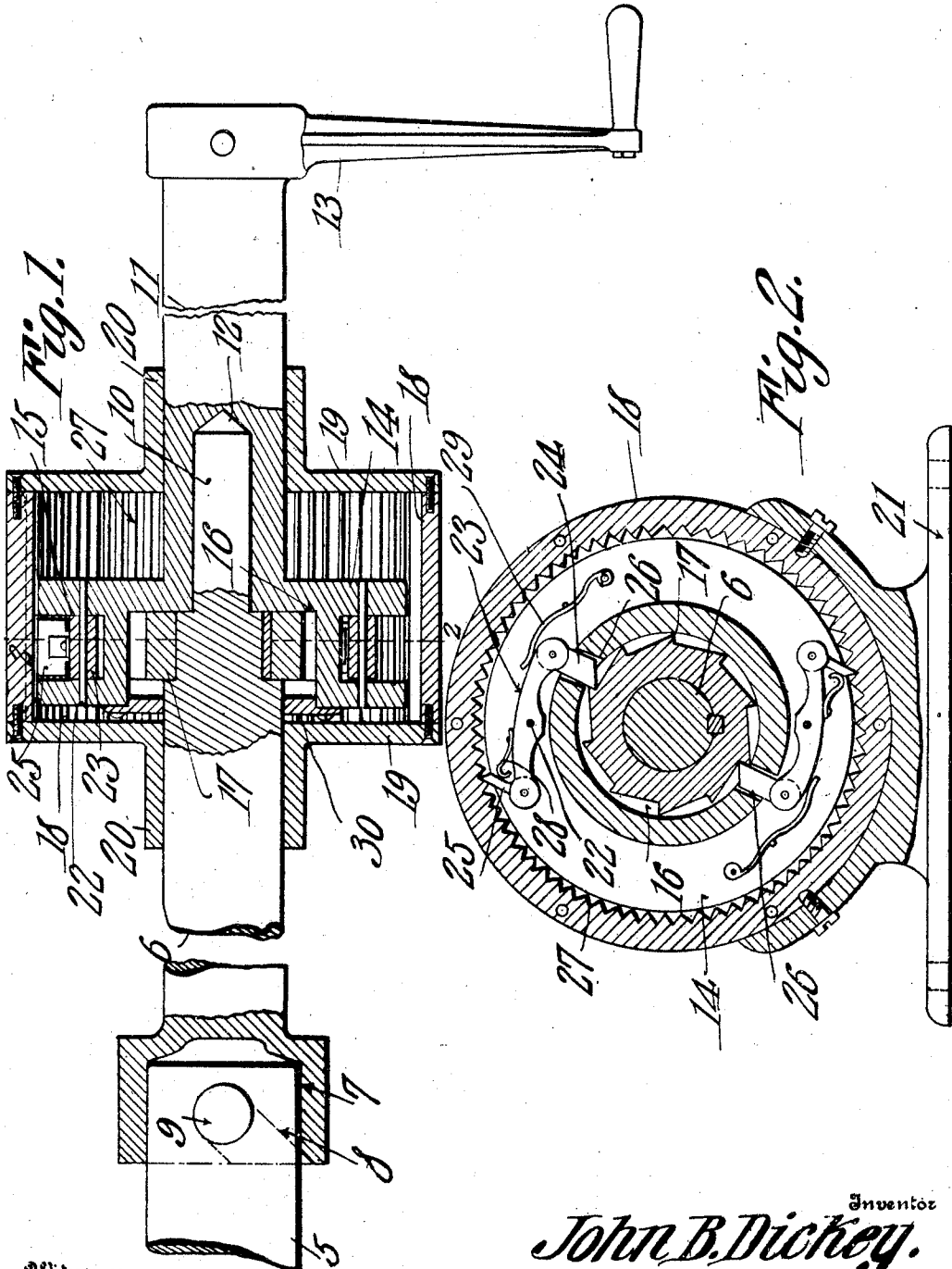


J. B. DICKEY.
 STARTING DEVICE FOR INTERNAL COMBUSTION ENGINES.
 APPLICATION FILED DEC. 9, 1909.

958,909.

Patented May 24, 1910.



Witnesses
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UNITED STATES PATENT OFFICE.

JOHN B. DICKEY, OF COLUMBUS, INDIANA, ASSIGNOR OF ONE-EIGHTH TO WILLIAM W. DENISON AND ONE-EIGHTH TO WALLACE B. DENISON, BOTH OF COLUMBUS, INDIANA.

STARTING DEVICE FOR INTERNAL-COMBUSTION ENGINES.

958,909.

Specification of Letters Patent.

Patented May 24, 1910.

Application filed December 9, 1909. Serial No. 532,218.

To all whom it may concern:

Be it known that I, JOHN B. DICKEY, a citizen of the United States, residing at Columbus, in the county of Bartholomew and State of Indiana, have invented a new and useful Starting Device for Internal-Combustion Engines, of which the following is a specification.

This invention relates to that class of starting devices for internal combustion engines which are manually operated, and it is the object of the invention to provide an improved device of this kind which will be automatically disengaged from the engine crank shaft in case the engine should start backward, or "kick back" as it is commonly termed, and with this object in view, the invention consists in a novel construction and arrangement of parts to be hereinafter described and claimed, reference being had to the accompanying drawing forming a part of this specification, in which drawing,

Figure 1 is a longitudinal section of the device. Fig. 2 is a transverse section on the line 2-2 of Fig. 1.

In the drawing, 5 denotes the crank shaft of the engine, and 6 is an axially aligned starting shaft, which is manually operable by a mechanism to be presently described. One end of the starting shaft 6 has a socket head 7 adapted to be placed over the adjacent end of the crank shaft 5, the two shafts being coupled together by providing the wall of the socket head with a slot 8 extending obliquely to the axis of the starting shaft, and entered by a laterally projecting pin 9 carried by the crank shaft. The starting shaft is movable in the direction of its length, so that it will be automatically disconnected from the crank shaft when the engine starts, the engagement of the pin 9 with one of the inclined walls of the slot causing the starting shaft to back away from the crank shaft until said shafts are disconnected by the pin leaving the slot. The opposite end of the starting shaft 6 is reduced as indicated at 10, and on this portion of the shaft is loosely mounted a shaft 11 having in one of its ends an axial opening 12 to receive said reduced end of the starting shaft. The opposite end of the shaft 11 is fitted with a hand crank 13. These two shafts are in axial alignment.

The end of the shaft 11 into which the re-

duced portion 10 of the starting shaft extends, is formed with a circular enlargement or head 14 having a peripheral groove 15. The head is also bored out to form a circular recess 16 sufficiently large to receive a ratchet disk 17 which is keyed or otherwise made fast to the starting shaft. The enlargement 14 of the shaft 11 is inclosed in a casing comprising a cylindrical portion 18, and heads 19 are fastened to the ends thereof. The heads are formed with hub extensions 20 one of which supports the starting shaft, and the other one the shaft 11. This casing is mounted on a suitable base 21 the latter being secured to the frame of the machine in any suitable manner, either at the front or side.

In the groove 15 at diametrically opposite points, are pivoted by means of pins 22 extending across the groove, levers 23, said levers being pivotally mounted intermediate their ends. Each lever carries at its ends pivoted dogs 24 and 25 respectively, extending in opposite direction. The dogs 24 pass loosely through openings 26 in the head 14 so as to extend into the recess 16, into engagement with the teeth of the ratchet disk 17. The dogs 25 extend in a direction to engage ratchet teeth 27 formed on the inner surface of the cylindrical portion 18 of the casing, they being held normally in engagement with said teeth by means of a spring 28 secured to the lever 23 and pressing against the back of the dogs. The ends of the levers 23 which carry the dogs 24 are engaged by a spring 29, which swings the levers in a direction to hold said dog in engagement with the teeth of the ratchet disk 17.

The shaft 11 moves in the direction of its length with the starting shaft 6 when the latter is disconnected from the crank shaft 5 as already described. This lengthwise movement is given the shaft 11 by the engagement of the ratchet disk 17 with the inner end of the recess 16. The starting shaft is moved in a direction to engage the crank shaft by means of the shaft 11. The outer end of the recess 16 is closed by a ring 30 which keeps the starting shaft and the shaft 11 together in the longitudinal sliding movement referred to. Inasmuch as the enlargement 14 slides back and forth in the casing when the starting shaft is

coupled to or disconnected from the crank shaft, the ratchet teeth 27 extend throughout the entire width of the cylindrical portion of the casing, in order that the dogs 25 may remain in engagement therewith.

In operation, the starting shaft 6 is coupled to the crank shaft by pushing forwardly on the shaft 11 by means of the hand crank 13. After the shafts are coupled, the hand crank is turned in a direction to rotate the crank shaft to start the engine. The motion of the hand crank is transmitted to the shaft 11, and through the levers 23 and the dogs 24 to the ratchet disk 17. Inasmuch as the ratchet disk is fast to the starting shaft, and the latter is coupled to the crank shaft, it will be evident that the latter is rotated upon turning the hand crank in the proper direction. During this movement of the parts, the dogs 25 slip over the ratchet teeth 27. Inasmuch as the part on which the ratchet teeth 27 are located is stationary, it will be seen that at the least backward movement of the crank shaft, the teeth 27 will press against the dogs 25, and by reason of the connection of the latter with the lever 23, the latter will be swung on its pivot in a direction to disengage the dogs 24 from the teeth of the ratchet disk 17, thus at once disconnecting the shaft 11 of the hand crank from the starting shaft 6. The ratchet teeth 27 are set close together, so that the release will take place practically instantaneously, and danger of injury to the operator when the engine "kicks back" is thus entirely eliminated.

The device is reliable in operation, simple in construction, and devoid of complicated parts to get out of order, and it is capable of use in connection with either stationary, marine, or automobile engines. If applied to an automobile it may be mounted at the front or on the side of the machine according to the position of the crank shaft. By providing the bearing hubs 20, and supporting the reduced end of the starting shaft 6 in the shaft 11, a rigid support for the several parts is had. The levers and dogs carried thereby are entirely inclosed, and are therefore protected from dust and dirt.

What is claimed is:

1. In a starting device for internal combustion engines, a starting shaft, means for coupling the same to the engine crank shaft, a ratchet disk carried by the starting shaft, a hand crank carrying a head having a recess to receive the ratchet disk, a lever carried by the head, a stationary cylindrical member encircling the head and having its inner surface formed with ratchet teeth, and dogs carried by the aforesaid lever, one of said dogs engaging the teeth of the ratchet disk, and the other dog the teeth of the stationary member.

2. In a starting device for internal com-

bustion engines, the combination with a starting shaft, means for coupling the same to the engine crank shaft, a ratchet disk carried by the starting shaft, a hand crank carrying a head having a recess and a peripheral groove, and an opening from the groove into the recess, a lever pivotally mounted in the groove, a dog carried at one end of said lever and passing through the opening into the recess into engagement with the teeth of the ratchet disk, a stationary cylindrical member encircling the head and having its interior surface formed with ratchet teeth, and a dog carried by the other end of the lever, and engaging the last-mentioned ratchet teeth.

3. In a starting device for internal combustion engines, a starting shaft, means for coupling the same to the engine crank shaft, a ratchet disk carried by the starting shaft, a hand crank, a shaft to which said hand crank is connected, the last-mentioned shaft having an axial opening in which one end of the starting shaft is mounted, a head on the shaft of the hand crank, said head having a recess to receive the ratchet disk, means for coupling the head to the ratchet disk, and means for automatically releasing said parts when the motion of the starting shaft is reversed.

4. In a starting device for internal combustion engines, a starting shaft, means for coupling the same to the engine crank shaft, a ratchet disk carried by the starting shaft, a shaft having an axial opening in which one end of the starting shaft is supported, and carrying a hand crank, and provided with a head having a recess to receive the aforesaid ratchet disk, a stationary cylindrical member having internal ratchet teeth, heads secured to the ends of said member, said heads having hub extensions supporting the starting shaft and the shaft of the hand crank, means for coupling the aforesaid head to the ratchet disk, and means engageable with the aforesaid internal ratchet teeth for releasing the head from the ratchet disk when the motion of the starting shaft is reversed.

5. In a starting device for internal combustion engines, a starting shaft, means for coupling the shaft to the engine crank shaft, a ratchet disk carried by the starting shaft, a hand crank, a shaft to which the hand crank is connected, the last-mentioned shaft having an axial opening in which one end of the starting shaft is mounted, a head on the shaft of the hand crank, and having a recess to receive the ratchet disk, said head having a peripheral groove, and an opening extending from said groove into the recess, a stationary cylindrical member encircling the head, and having internal ratchet teeth, a lever pivotally mounted intermediate its ends in the aforesaid groove,

a dog carried by one end of said lever, and extending through the opening into engagement with the ratchet disk, and a dog carried by the other end of the lever, and engaging the aforesaid internal ratchet teeth.

5 6. In a starting device for internal combustion engines, a starting shaft, means for coupling the same to the engine crank shaft, a hand crank, a shaft carrying the hand
10 crank, and having an axial opening in which the starting shaft is supported, a support having hubs in which the starting and hand

crank shafts are supported, and means for coupling the starting and crank shafts, and means for automatically releasing said shafts when the motion of the starting shaft is reversed. 15

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

JOHN B. DICKEY.

Witnesses:

ROY V. ROSS,
ETHEL SHIER.