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STARTING DEVICE FOR INTERNAL COMBUSTION ENGINES.

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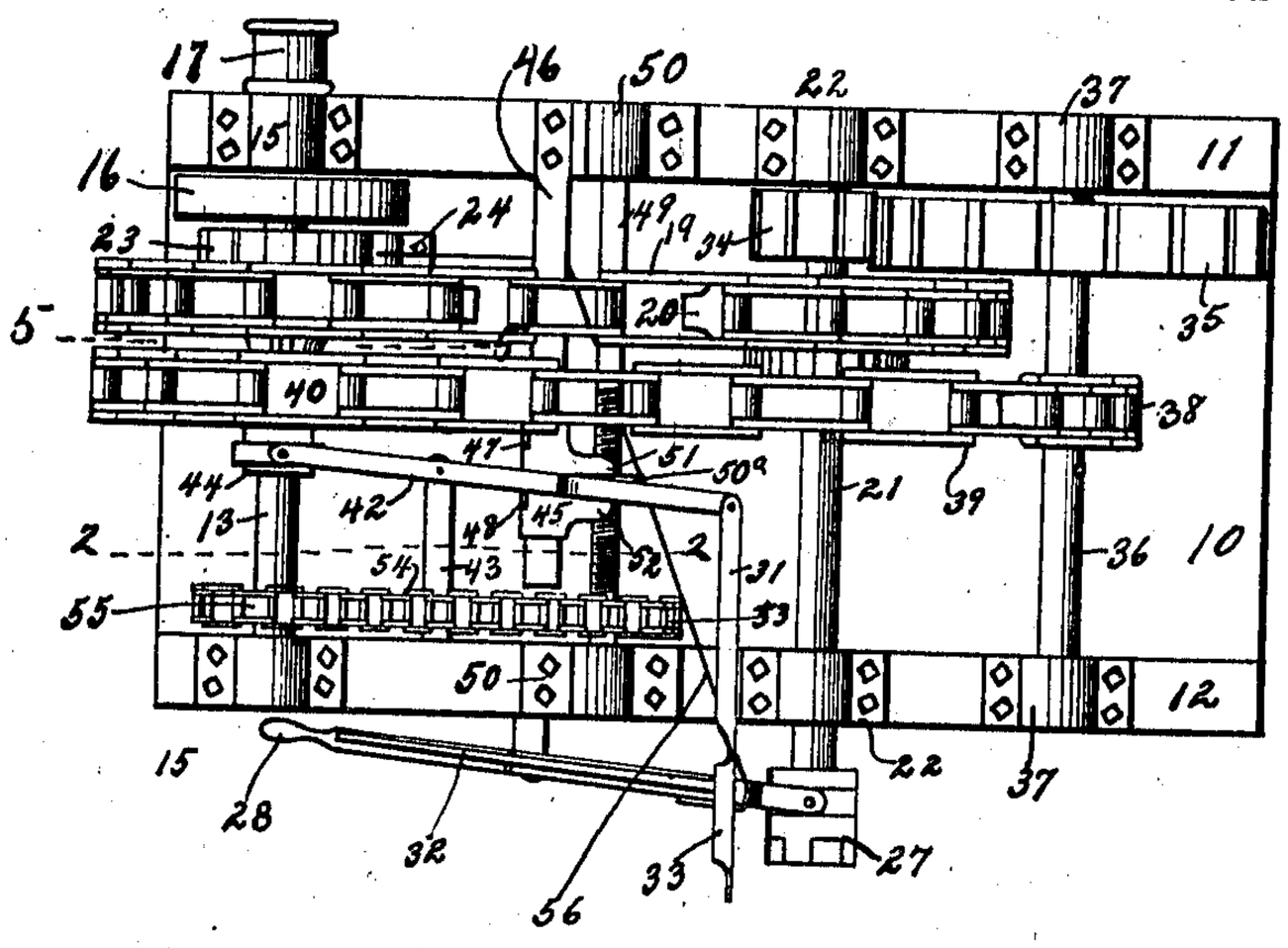

Fig. 1.

Fig. 2.

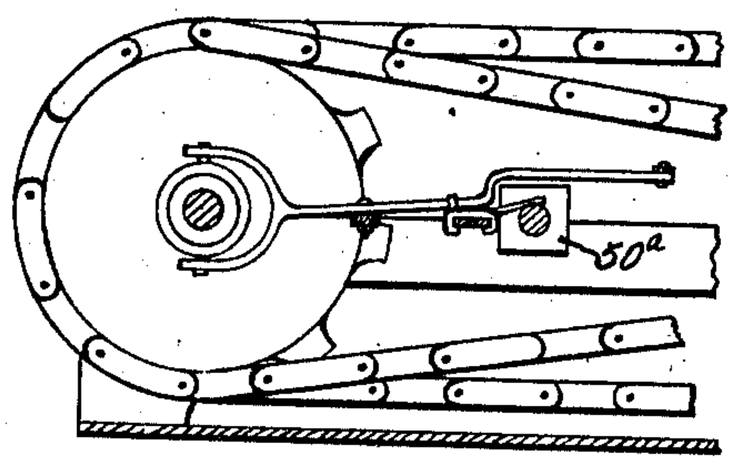

Fig. 3.

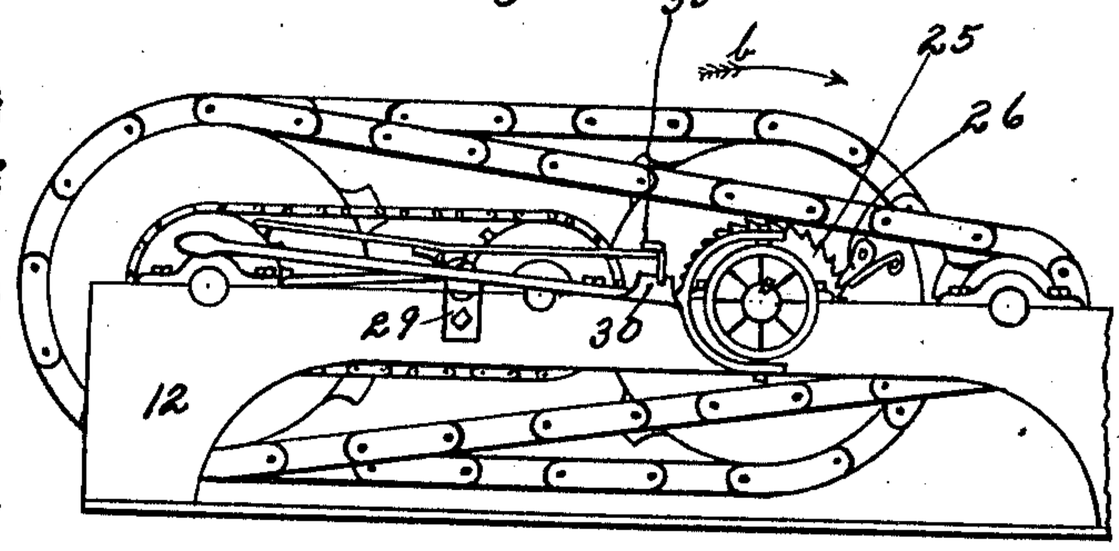

Fig. 4.

Fig. 5.

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STARTING DEVICE FOR INTERNAL-COMBUSTION ENGINES.

953,223. Specification of Letters Patent. **Patented Mar. 29, 1910.**

Application filed August 7, 1909. Serial No. 511,824.

To all whom it may concern:

Be it known that I, WILLIAM OBERG, a citizen of the United States of America, and resident of Oakland, Burt county, Nebraska, have invented a new and useful Starting Device for Internal-Combustion Engines, of which the following is a specification.

The object of this invention is to provide improved means for "cranking" or starting an explosive engine.

A further object of this invention is to provide improved means for "cranking" or starting an explosive engine without risking life or limb of the operator in relation to such engine.

My invention consists in the construction, arrangement and combination of elements hereinafter set forth, pointed out in my claims and illustrated by the accompanying drawing, in which—

Figure 1 is a plan of the complete device without any jacket or casing. Fig. 2 is a vertical section on the indicated line 2—2 of Fig. 1. Fig. 3 is a side elevation of a portion of the device shown in Fig. 1. Fig. 4 is an end elevation of the device. Fig. 5 is a cross-section on the indicated line 5—5 of Fig. 1.

In the construction of the machine as shown the numeral 10 designates a base and 11, 12 designate beams, standards or bearing heads arranged parallel with each other and rising from the base 10. A shaft 13 is mounted for rotation in bearings 15 on the heads 11, 12 and a spring 16 may be fixed at one end to said shaft and at the other end to the head 11 in such manner that the resilience of said spring when released from wound position will rotate the shaft 13 in the direction of the arrow *a* in Fig. 5. The spring may be substituted by a drum 17 on the shaft 13 adapted to carry a weighted rope arranged to rotate said shaft in the direction of the arrow *a* in Fig. 5. A sprocket wheel 18 is fixed to the shaft 13 and is connected by a chain 19 to a sprocket wheel 20 loosely mounted on a counter shaft 21 journaled in bearings 22 on the heads 11, 12 parallel with the shaft 13. A ratchet wheel 23 is mounted on the sprocket wheel 18 and normally is engaged by a spring-pressed pawl 24 fixed to the base 10. It is the function of the pawl 24 and ratchet wheel 23 to retain the sprocket wheel 18 and shaft 13 against rotation by the spring 16 or weight-operated drum 17. A ratchet wheel 25 is fixed to the counter shaft 21 adjacent the sprocket wheel 20 and is connected to said sprocket wheel by a spring-actuated pawl 26. It is the function of the pawl 26 and ratchet wheel 25 to rotate the counter shaft 21 when the sprocket wheel 20 is driven by the chain 19 in the direction of the arrow *b* in Fig. 3 and permit said counter shaft to revolve in the same direction (under power of the started engine) without rotating said sprocket wheel.

A clutch member 27 is feathered to and adjustable longitudinally of one end portion of the counter shaft 21 and is adapted to engage at times with a clutch member on an engine shaft not shown. A hand lever 28 is fulcrumed on a bracket 29 fixed to the head 12 and is provided with a yoke at its forward end embracing the clutch member 27. The lever 28 is provided with a lip or lug 30 adapted to be engaged at times by a ratchet-toothed lower margin of a rod 31 and a lever 32 fulcrumed on the lever 28 is shaped at its forward end for engagement beneath a flange 33 on the upper margin of the rod 31. It is the function of the lever 32 to lift the rod 31 free from the lip 30 of the lever 28 at times and under manual actuation. A pinion 34 is mounted rigidly on the counter shaft 21 adjacent the sprocket wheel 20 and meshes with a pinion 35 fixed to a shaft 36 journaled in bearings 37 on the heads 11, 12 and arranged parallel with the first shaft. A sprocket wheel 38 is fixed to the shaft 36 and is connected by a chain 39 to a sprocket wheel 40 loosely mounted on the shaft 13. The sprocket wheel 40 is provided with clutch lugs adapted to engage at times with clutch lugs 41 on the wheel 18 and revolve the latter wheel in the direction opposite to that indicated by the arrow *a* in Fig. 5. Normally the sprocket wheel 40 is unclutched or disconnected from the wheel 18. A lever 42 is fulcrumed on a bracket 43 extending inward from the head 12 and is formed with a yoke on one end engaging

a hub 44 on the wheel 40 and adapted to move said wheel longitudinally of the shaft 13. The opposite end portion of the lever 42 is pivotally connected to the inner end of the rod 31. The lever 42 is offset downwardly intermediate of its ends into a sliding plate 45 slidingly mounted on a bar 46 fixed at one end to the head 11 and at the other end to the base 10. The sliding plate 45 is formed with studs 47, 48 upstanding from the plate on opposite sides of and spaced from the lever 42 in front of the fulcrum of said lever. Thus any lateral movement of the sliding plate 45 will be communicated through one or the other stud 47, 48 and oscillate the lever 42, and any oscillation of said lever will shift the hub 44 and sprocket wheel 40 relative to the sprocket wheel 18. A screw 49 is mounted for rotation in bearings 50 on the heads 11, 12 and is arranged parallel with and between the shaft 13 and counter shaft 21. The screw 49 extends through a nut 50ª and said nut is embraced by studs 51, 52 extending forwardly and upwardly from the sliding plate 45. A sprocket wheel 53 is feathered to the screw 49 adjacent the head 12 and is connected by a chain 54 to a sprocket wheel 55 rigidly mounted on the shaft 13. A draft wire 56 is fixed at one end to the spring-pressed pawl 24, extends through a guide on the bar 46 and is fixed at its opposite end to the forward end of the lever 28.

In the practical use of this device to start an engine the lever 32 is manually actuated to lift the rod 31 from engagement with the lever 28; the lever 28 is manipulated to shift the clutch 27 into engagement with the clutch member on the engine shaft and at the same time apply a draft through the wire 56 to release the spring-pressed pawl 24 from the ratchet wheel 23, thus releasing the spring 16 or weight-operated drum 17; the spring 16 or weight-operated drum 17 rotates the shaft 13 and wheel 18 in the direction of the arrow *a* in Fig. 5 and also drives the clutch member 27, shaft 21 and wheel 20 in the same direction through the chain 19; the shaft 21, acting through the gears 34, 35, drives the shaft 36, wheel 38, chain 39, wheel 40 in the opposite direction idly because of detached relations existing at this time between the wheels 40 and 18; the clutch member 27 drives the engine shaft forwardly to and beyond an explosion therein, after which the explosive properties of the engine propel it and its power reacts through the clutch member 27 to further rotation of the shaft 21, gears 34, 35, shaft 36, sprocket wheel 38, chain 39 and sprocket wheel 40.

Advance movement of the shaft 13 under impulse of the spring or weighted drum rotates the sprocket wheel 55, chain 54, wheel 53 and screw 52 to the end of moving the nut 50ª in such manner that said nut, acting through the sliding plate 45, will oscillate the lever 42 and move the sprocket wheel 40 into engagement with the sprocket wheel 18. Such movement is so timed that when or shortly after the power of the engine is established the sprocket wheel will be brought into engagement with the sprocket wheel 18, whereupon the chain 39 will act on the wheel 40 and cause it to drive the wheel 18, shaft 13, wheel 55, chain 54, wheel 53 and screw 52 in the reverse direction. The result of this latter movement is three-fold: namely, to wind the spring or weighted drum; second, to reverse the travel of the nut 50ª through the screw 49, reverse the travel of the sliding plate 45, oscillate the lever 42 in the opposite direction and disengage the wheel 40 from the wheel 18; and third, to cause the lever 42 to act through the rod 31 on the lip 30 and move the lever 28 to its initial position and in so doing disengage the clutch member 27 from the engine shaft. Thereupon the starting device comes to rest until again manipulated.

I claim as my invention—

1. A starting device for explosive engines, comprising a power shaft, a driving shaft ratchet-geared to the power shaft, clutch connections between the driving shaft and an engine shaft, back gearing from the driving shaft to the power shaft, clutch connections between the back gearing and power shaft, and a screw timing device controlling the latter clutch connections and also controlling the clutch connections with the engine shaft.

2. A starting device for explosive engines, comprising a power shaft, detent devices acting on said power shaft, a driving shaft ratchet-geared to the power shaft, clutch connections between the driving shaft and an engine shaft, manually operated lever mechanism for actuating said clutch connections in one direction, back gearing from the driving shaft to the power shaft, clutch connections between the back gearing and power shaft, a screw timing device controlling the latter clutch connections, and draft devices between the lever mechanism and detent devices, the timing devices also controlling said draft devices.

3. A starting device for explosive engines, comprising a power shaft, detent devices acting on said power shaft, a driving shaft ratchet-geared to the power shaft, clutch connections between the driving shaft and an engine shaft, manually operated lever mechanism adapted to move said clutch connections in one direction, back gearing from the driving shaft to the power shaft, clutch

connections between the back gearing and power shaft, a screw timing device controlling the latter clutch connections, a rod carried by said timing device, ratchet connections between said rod and the lever mechanism, and a lever adapted to disengage said ratchet connections at times.

Signed by me at Oakland, Nebraska, this second day of August, 1909.

WILLIAM OBERG.

Witnesses:
C. C. NEUMANN,
G. A. KULD