(No Model.) 2 Sheets—Sheet 1.

J. SANDAGE.

DROP HAMMER.

No. 376,111. Patented Jan. 10, 1888.

Fig. 1.

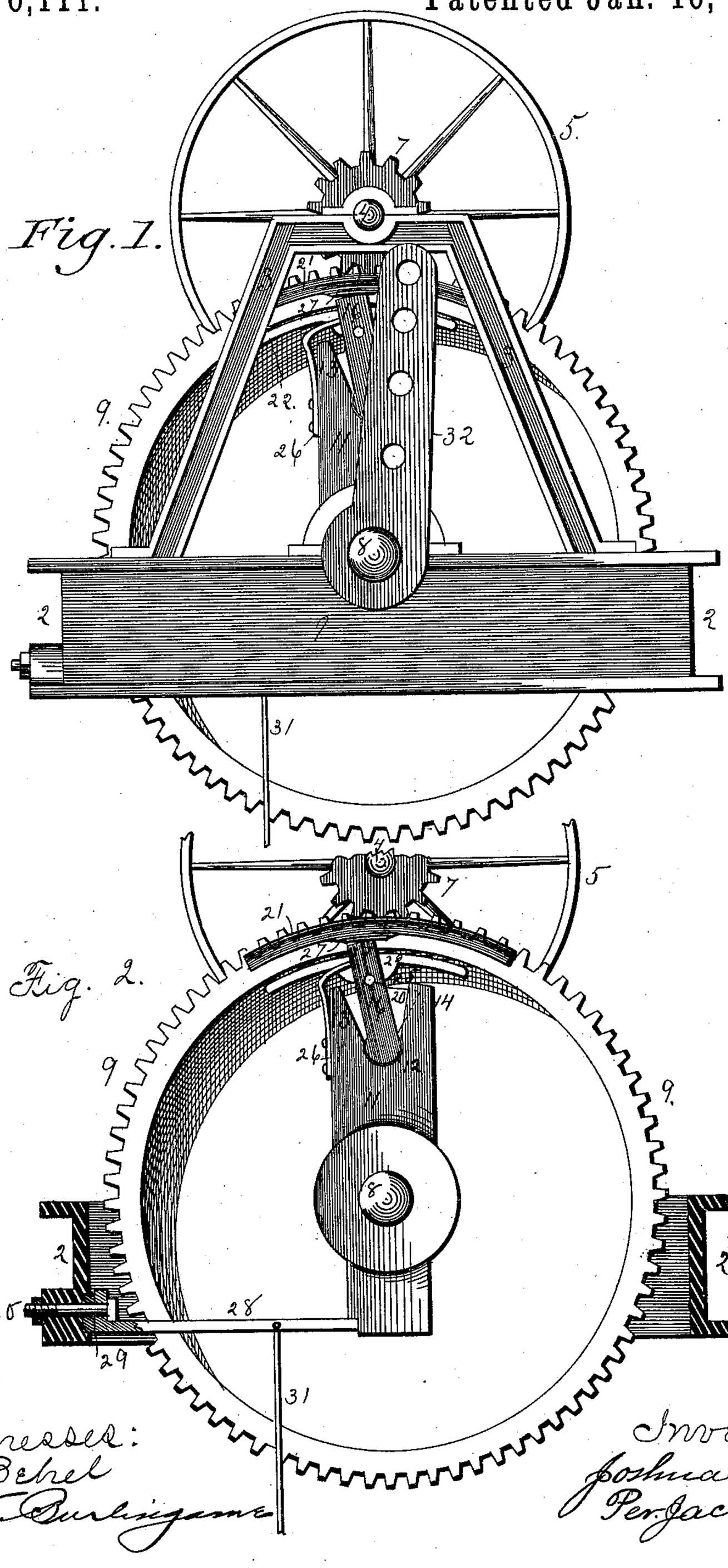

Fig. 2.

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

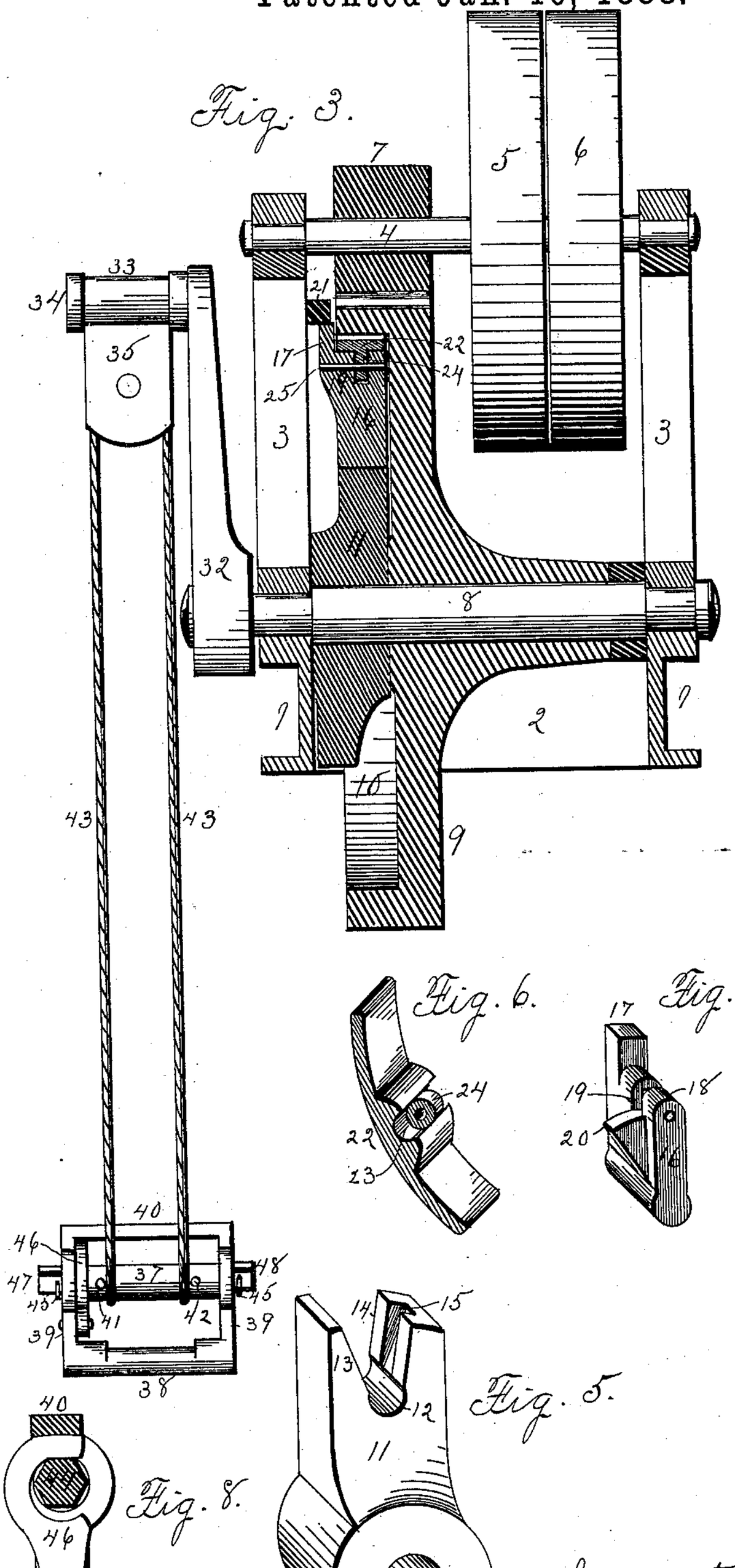

Fig. 4.

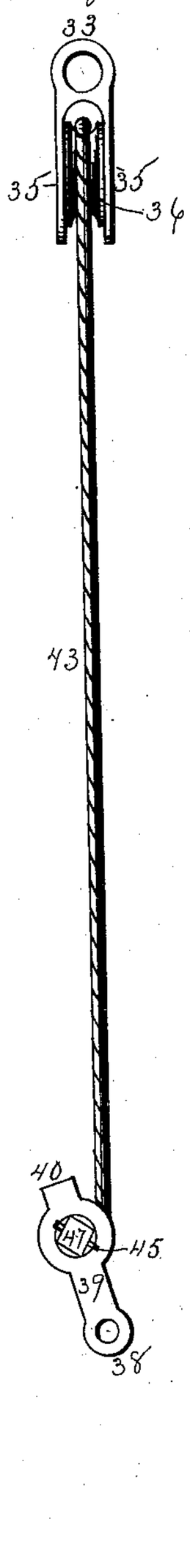

Fig. 6.

Fig. 7.

Fig. 8.

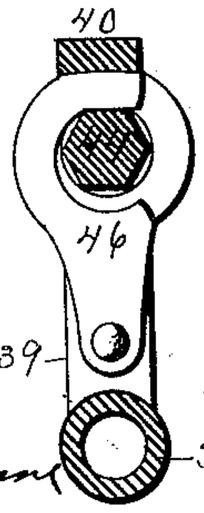

Fig. 5.

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UNITED STATES PATENT OFFICE.

JOSHUA SANDAGE, OF SOUTH BEND, INDIANA.

DROP-HAMMER.

SPECIFICATION forming part of Letters Patent No. 376,111, dated January 10, 1888.

Application filed November 8, 1887. Serial No. 254,641. (No model.)

To all whom it may concern:

Be it known that I, JOSHUA SANDAGE, a citizen of the United States, residing in the city of South Bend, county of St. Joseph, and State of Indiana, have invented certain new and useful Improvements in Drop-Hammers, of which the following is a specification.

This invention relates to a class of machines known as the "drop-hammer," but more especially to the parts immediately employed to operate the hammer.

It consists in devices by which the hammer is raised by friction, and its object is to increase the velocity or rapidity of the strokes.

In the accompanying drawings, Figure 1 is a side elevation of my improved drop-hammer. Fig. 2 is also a side elevation of the same, with portions removed or broken away to more clearly show the friction-shoe and stop. Fig. 3 is an end elevation, partly in section, and showing my improved rope-connection of the crank with the hammer. Fig. 4 is a side elevation of the rope-connection. Fig. 5 is an isometrical representation of a portion of the lock-arm carrying the link connecting the arm and friction-shoe. Fig. 6 is an isometrical representation of the friction-shoe. Fig. 7 is an isometrical representation of the link employed to connect the lock-arm and friction-shoe. Fig. 8 is a section of the connection of the rope, showing the pawl engaging the roller upon which the rope is wound.

The base portion of my improved hammer is composed of sides 1 and ends 2, of channel-iron form in section, suitably joined together, forming a base-frame rectangular in plan. The upper face of the side beams, about midway of their length, are formed in semi-box bearing form. Brackets 3 are secured to the upper face of the base-frame by means of bolts passing through their feet. The upper face of these brackets are made in semi-box bearing form.

In the bearings formed in the brackets 3 is supported a shaft, 4, upon which is mounted a driving-pulley, 5, loose pulley 6, Fig. 3, and gear-toothed pinion 7. A second shaft, 8, extending across the base-frame below and parallel with shaft 4, is carried in the box-bearings formed in the base-frame, as shown in Figs. 1, 2, and 3. A gear-wheel is loosely mounted on the shaft 8, to revolve freely thereon when motion is imparted to it through pinion 7 and pulley 5. The wheel 9 is recessed on its face side a sufficient depth to present a suitable friction-surface, as shown in the drawings at 10.

A lock-arm, 11, is fixed upon shaft 8, to revolve therewith, and is so placed on said shaft as to revolve within the recessed portion of the wheel 9. This arm is bored transversely at 12, and has a V-shaped opening formed in its free end within the walls 13 and 14. The wall 14 is grooved, as shown in the drawings at 15, Fig. 5. A link, 16, having one end fitted to enter the opening 12, and a projection, 17, to enter the groove 15, Fig. 5, is placed within the V-formed opening in the lock-arm, and is capable of an oscillatory movement therein, and the projection 17 and groove 15 serve to hold it in place. The upper end of this link is rounded, as shown at 18, Fig. 7, and the rounded portion is slotted about midway of its width, as at 19, and an arm, 20, projects beyond its rounded portion to engage a tappet, 27.

A segmental friction-shoe, 22, of a conformation to engage the inner face of the rim of the gear-wheel 9, is provided with a semicircular groove, 23, Fig. 6, at or near the center of its length, to receive the upper curved end of the link, and a projection, 24, is formed in the groove in the shoe to enter the slot 19, formed in the link, and by means of a bolt or rivet, 25, passed through the parts serves to hold them in place, but it permits the link to oscillate in its connection with the shoe. A plate-spring, 26, Figs. 1, 2, is secured to the lock-arm 11, and its free end is bent at nearly right angles and rests against the link 16, and serves to hold the friction-shoe in contact with the friction-rim of the toothed wheel when the hammer is being lifted.

A tappet-plate, 21, Fig. 1, is secured to the bracket 3, and about midway of its length is provided with a tappet, 27, projecting from its inner edge. The object of the tappet 27 is to receive the projecting end 17 of the link 16, to counteract the force of the spring 26 and release the friction-segment from engagement with the gear-wheel, and in connection with the stop 28, to be hereinafter described, to sup-

port the hammer elevated. The lock-arm 11, Fig. 2, extends beyond its axial center a sufficient distance to engage the free end of a stop, 28. This stop 28 is of bar form, bent at one end at right angles to its main portion. A rubber cushion, 29, is placed between the upturned end of the stop and the end portion of the base-frame, and a bolt, 30, passed through the parts holds them in position to engage the projecting end of the lock-arm as it revolves.

A rod or chain, 31, depends from the stop 28, and a downward pull thereon will disengage the stop, release the lock-arm, and the stop will again assume its normal position to again engage the lock-arm.

A crank-arm, 32, Fig. 1, is secured to the shaft 8, to revolve therewith, and its position on the shaft with relation to the lock-arm is such that when the lock-arm is perpendicular the crank-arm will be past the vertical center in the direction in which it revolves to such an extent that when the lock-arm is released the hammer will be sure to drop. This crank-arm is provided with holes, to adjust the crank-pin nearer to or farther from its center, to give greater or less movement to the hammer connected therewith.

A rope-pulley support is composed of a sleeve, 33, fitted to the wrist-pin 34, supported on the crank-arm, and arms 35, depending therefrom, between which a sheave, 36, is supported on an axial bolt passing through the parts.

A rectangular windlass-frame consisting of a horizontal end bar, 40, a horizontal cylindrical end bar, 38, and vertical side bars, 39, connects the ends of horizontal bars 38 and 40. A cylindrical windlass, 37, is supported to be rotated in the side bars, 39, of the frame, and this windlass 37 is bored transversely at 41 and 42, to receive the ends of a rope, 43, passed over the sheave 36.

One end portion, 47, of the windlass 37, immediately inside of its frame-support, is made in hexagon form, as at 44, and a latch-detent, 46, with a jaw, to enter between the hexagonal portion 44 of the windlass, and the upper horizontal bar of the frame is pivoted to the inner face of one of the vertical side bars, 39, of the frame, and serves to hold the windlass from turning. The projecting ends 47 and 48 of the windlass are squared to receive a wrench, by means of which the windlass may be turned to wind or unwind the rope to the required adjustment, and when adjusted the replacement of the latch-formed pawl will hold the windlass in its adjusted position.

The hammer (not shown, and which may be any of the known forms,) is intended to connect with the cylindrical bar 38 of the windlass-frame in any known manner. When the hammer is at rest, the parts will be in the position shown in Fig. 1. Motion imparted to the driving-pulley 5 will be transmitted, through the gear-pinion 7, to the gear-wheel 9, and when the stop 28 is disengaged from the lock-arm the hammer will drop, and the action of the spring will cause the friction-shoe to engage the inner surface of the rim of the gear-wheel, which will lift the hammer to its position of rest, and the stop 28 will hold it in position to produce another stroke when released by disengaging the stop by means of the rod or chain 31. In this operation the engagement of the projection 17 with the tappet 27 will release the friction-shoe from its frictional contact with the inner face of the rim of the gear-wheel, and the engagement of the lock-arm with the stop will hold the hammer elevated and permit the free rotation of the gear-wheel.

In the employment of the friction mechanism to operate the hammer I obviate the jar and concussion common to this class of hammers employing the usual pawl-and-ratchet mechanism, and it also enables me to run my improved hammer at a greater velocity, and consequently increase its efficiency.

From the foregoing it will be seen that if the stop 28 is held from engaging the lock-arm continuous blows will be struck by the drop at equal intervals in rapid succession, and the velocity of the movement within the action of gravity cannot in any manner operate to injury of the hammer.

In the foregoing I have shown and described a sheave-support to the rope journaled between the depending arms 35; but instead thereof a semi-sheave or other equivalent device may be fixed in place, the object being to furnish a grooved support to the rope of such conformation to permit the rope to center itself thereon and prevent chafing or cutting.

In the drawings I have only represented such parts of a hammer necessary to a complete understanding of my improvements, and have confined my description to the parts shown, and the parts necessary to a complete hammer (not shown, nor herein described) may be any of the known parts of like machines capable of use in connection with my improvements.

I claim as my invention—

1. In a drop-hammer, the combination of a wheel having an annular friction-surface, a lock-arm carrying a friction-shoe, and a crank-arm adapted to support a hammer, said lock-arm and crank-arm supported to move in unison, substantially as set forth.

2. In a drop-hammer, the combination of a wheel having an annular friction-surface, a lock-arm carrying a friction-shoe, a spring to hold the shoe in contact with the friction-surface of the wheel, and a crank-arm to support the hammer, said lock-arm and crank-arm supported to move in unison, substantially as set forth.

3. In a drop-hammer, the combination of a wheel having an annular friction-surface, a lock-arm carrying a friction-shoe, a tappet to release the friction-shoe from engagement with the friction-surface of the wheel, and a crank-arm to support a hammer, said lock-arm and crank-arm supported to move in unison, substantially as set forth.

4. In a drop-hammer, the combination of a wheel having an annular friction-surface, a lock-arm carrying a friction-shoe, a crank-arm to support a hammer, said lock-arm and crank-arm supported to move in unison, and devices to arrest the movement of the hammer and release the same, substantially as set forth.

5. In a drop-hammer, the combination of a wheel having an annular friction-surface, a lock-arm, a friction-shoe, a link connecting the friction-shoe and lock-arm, and a crank-arm to support a hammer, said lock-arm and crank-arm supported to move in unison, substantially as set forth.

6. In a drop-hammer, the combination of a crank-arm carrying a rope-support, a windlass, a rope connecting its support and windlass, and a detent for holding the windlass when adjusted, substantially as set forth.

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