(No Model.)

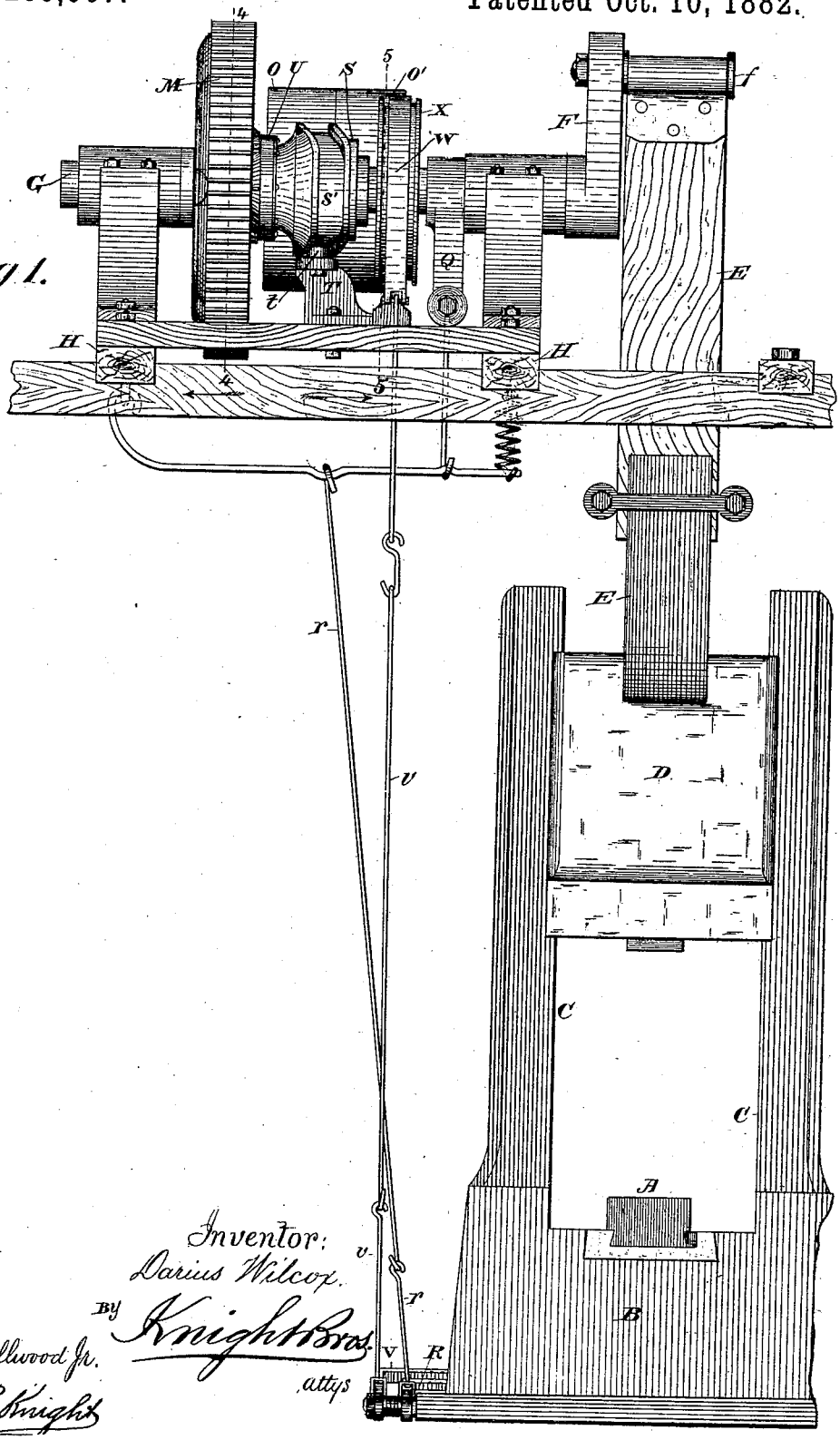
3 Sheets—Sheet 1.

D. WILCOX.

DEVICE FOR OPERATING DROP HAMMERS.

No. 265,907. Patented Oct. 10, 1882.

Fig 1.



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Harry E. Knight

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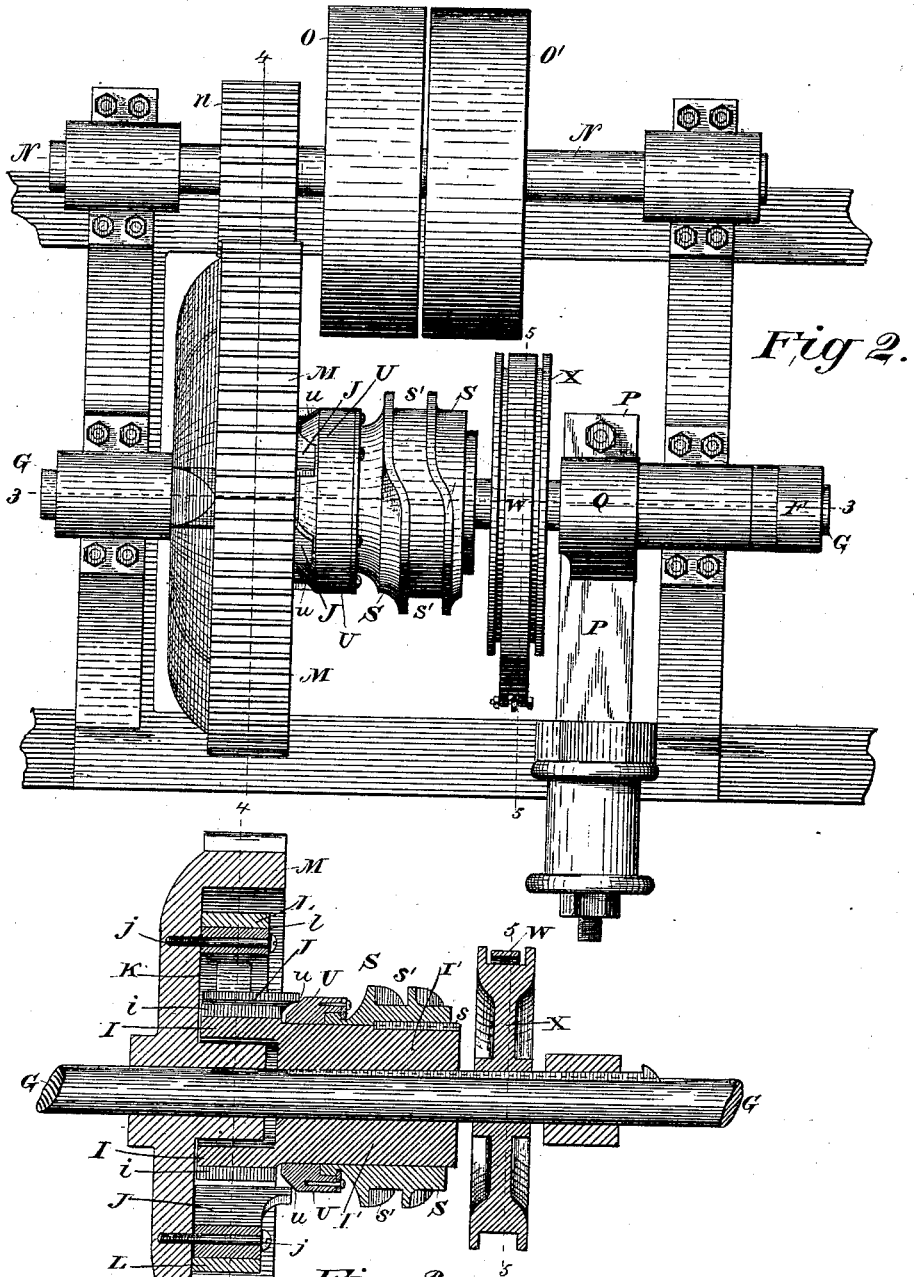

Fig 2.

Fig 3.

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Fig 4.

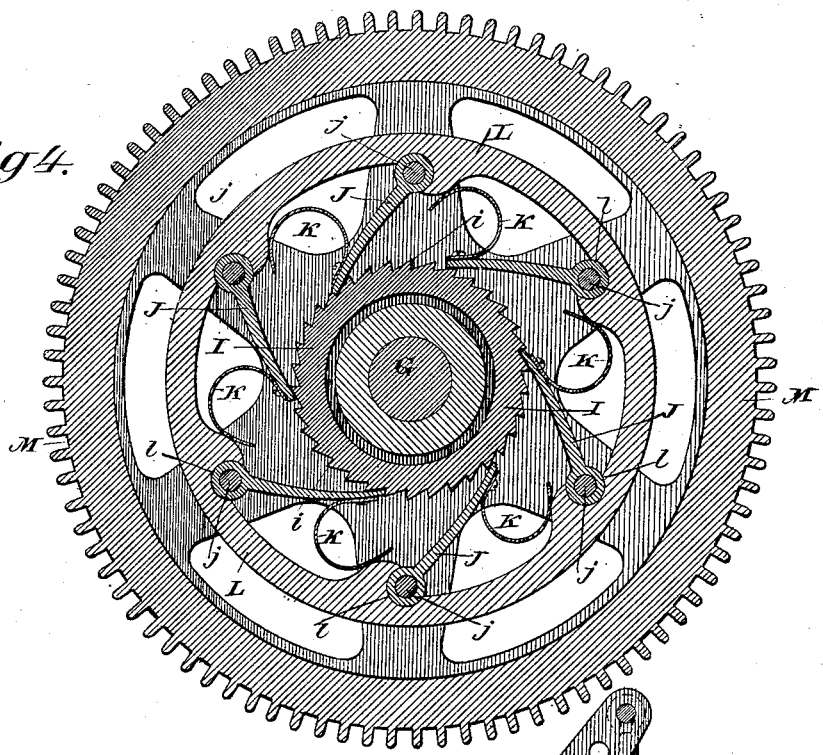
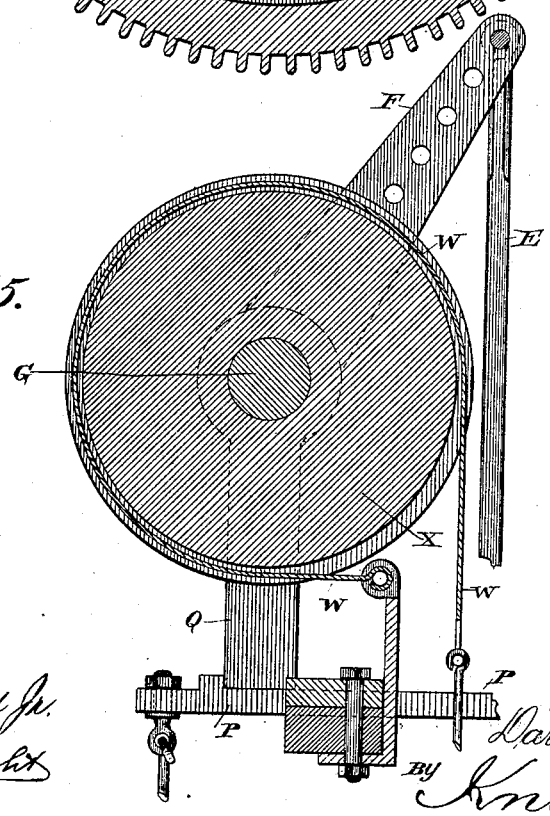


Fig 5.



Attest:
Geo. P. Smallwood Jr.
Harry E. Knight

Inventor:
Darius Wilcox.
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UNITED STATES PATENT OFFICE.

DARIUS WILCOX, OF DERBY, ASSIGNOR OF ONE-HALF TO ISAAC P. HOWE, OF BIRMINGHAM, CONNECTICUT.

DEVICE FOR OPERATING DROP-HAMMERS.

SPECIFICATION forming part of Letters Patent No. 265,907, dated October 10, 1882.

Application filed February 9, 1882. (No model.)

To all whom it may concern:

Be it known that I, DARIUS WILCOX, a citizen of the United States, residing at Derby, in the county of New Haven and State of Connecticut, have invented a new and useful Device for Operating Drop-Hammers, of which the following is a specification.

My improvements relate to that class of drop-hammers in which a weight is raised by a crank.

My improvements consist, first, in the combination, with the crank-shaft, of a gear-wheel carrying a plurality of pawls to engage with ratchet-teeth on said crank-shaft, the pawls being arranged to engage successively with the ratchet-teeth, so as to reduce lost motion, as hereinafter described.

My improvements consist, secondly, in the combination of a sliding sleeve with the lifting-pawls for retracting the same automatically or holding them out of gear at the will of the operator, as hereinafter described.

My improvements relate, thirdly, to mechanism for operating the said sliding sleeve, the same consisting in a stud or pin which may be provided with an anti-friction roller engaging in a cam-groove in the sliding sleeve.

My improvements consist, fourthly, in the combination, with the sliding sleeve, of a loose collar formed with an oblique or beveled face or shoulder to engage with the pawls for retracting the same, and arranged to turn freely upon the sliding sleeve when the hammer is up and the shaft at rest, and permitting the sliding sleeve to turn within it when the hammer drops, so as to take the friction which would otherwise be applied to the pawls themselves.

My improvements consist, fifthly, in the combination, with the lifting devices of a drop-hammer, of a friction-brake to regulate the force of the blow, as hereinafter explained.

In order that the invention may be fully understood, I will proceed to describe it with reference to the accompanying drawings, in which—

Figure 1 is a rear elevation of the machine. Fig. 2 is a plan of the same. Fig. 3 is a longitudinal section on the line 3 3, Fig. 2. Fig. 4 is a vertical section on the line 4 4, Figs. 1, 2, and 3, showing the lifting-cams and ratchet-wheel. Fig. 5 is a section on the line 5 5, Figs. 1, 2, and 3, showing the braking device.

A represents an anvil supported on a bed, B, to which are fixed standards C C, forming guides for the hammer D.

E is the lifting-strap, attached by its upper end to the wrist *f* of the crank F, which is fixed on a shaft, G, mounted in suitable pillow-blocks or bearings on the beams or joists H. On the crank-shaft G is keyed a ratchet-wheel, I, with the teeth *i* of which engage a series of pawls, J, (six in number in the present illustration,) pivoted at *j*, and resting by their heels in sockets *l*, prepared for them in a rim, L, attached to the face of the arms of the gear-wheel M, inside of the rim thereof.

K K represent springs for pressing the pawls into gear with the ratchet-teeth *i*.

The gear-wheel M is driven by a pinion, *n*, on the counter-shaft N, provided with fast and loose pulleys O O′, to receive the belt by which the shaft is rotated when the machine is in operation.

By the appliances above described a continuous rotation would be imparted to the crank-shaft G through the medium of the pawls J engaging with the ratchet-wheel I; but in order that the crank may be arrested and held directly after passing the upper dead-center a latch, P, is employed, engaging with an arm, Q, keyed on the crank-shaft G. When the hammer is to be allowed to fall the said latch is retracted by means of a treadle, R, connected thereto by a rod, *r*.

S represents a sleeve sliding longitudinally on the hub I′ of the ratchet-wheel I, and caused to rotate therewith by means of a spline or key, *s*. On the periphery of the sleeve S is formed a cam-groove, *s′*, receiving a roller, *t*, surrounding a spindle projecting upward from a bracket upon the upper part of the frame.

On the end of the sliding sleeve S is a collar, U, formed with a beveled face, *u*, adapted, when the sleeve is moved endwise, to engage with the projecting sides of the pawls J, so as to disengage them simultaneously from the ratchet-teeth *i* or prevent their engagement

therewith. The roller *t* by its engagement with the cam-groove *s'* in the sliding sleeve S forces the said sleeve endwise at the proper moment to thus disengage the pawls, the beveled collar U preventing friction by turning on the sliding sleeve S, or permitting the sliding sleeve S to turn within it, the parts being so arranged that the pawls will be automatically disengaged from the ratchet-wheel at the moment that the crank F has passed sufficiently beyond its upper dead-center to permit the fall of the hammer. At this moment the crank-shaft is stopped by the engagement of the rigid arm Q with the latch P, unless the latter be retracted by means of the treadle R.

V is a second treadle, connected by a rod, *v*, with one extremity of a friction-band, W, resting on the periphery of a brake-wheel, X, keyed on the crank-shaft G, so that by the use of said treadle the operator may moderate the stroke of the hammer as desired.

The operation is as follows: The counter-shaft N, being continuously rotated, imparts a like simultaneous rotation to the gear-wheel M through the medium of the pinion *n*. The pawls J, engaging with the ratchet-wheel I, communicate this rotation to the crank-shaft G, so as to lift the hammer D by means of the crank F in the customary manner until the parts reach the position shown in Figs. 1 and 5. At this moment the roller *t* of the bracket T, acting on the cam-groove *s'* of the sliding sleeve S, forces the said sleeve endwise, so as to disengage the pawls J from the ratchet-wheel I, and if the latch P be not held down by the treadle R the said latch will engage the crank-shaft arm Q, so as to stop the shaft and hold the hammer in its elevated position, while the gear-wheel M continues its motion. When the time comes for the blow to be delivered the operator by depressing the treadle R retracts the latch P and permits the hammer to fall. If the treadle be held down, the blows will be delivered in regular succession at each revolution of the crank, and without cessation. When the crank is up and at rest in the position shown in Fig. 1 the counter-shaft and large gear-wheel run freely until the operator puts his foot on the treadle and disengages the latch that holds the arm Q attached to crank-shaft. Then the hammer falls. The pawls are thus held out of engagement with the ratchet-wheel, which leaves the crank-shaft free to rotate when the crank falls until the crank reaches the proper point. Then the sliding sleeve, with cam-groove *s'* turning with crank-shaft, brings the cam-groove *s'* in contact with the roll *t* and draws the sliding sleeve from under the projections on pawls, and lets the pawls come in contact with the ratchet-wheel, ready to lift the hammer when the blow is delivered. When the hammer is raised and the crank is perpendicular the sliding sleeve and cam-groove *s'* are in contact with pin or roll *t*, forcing the sliding sleeve under the projections on pawls, disengaging them from the ratchet-wheel. Then the counter-shaft and large gear-wheel are left to run freely.

It will appear that by the use of a number of pawls, as shown, the spaces between the teeth may be divided up, so far as required, in order to reduce lost motion. Thus with six pawls, if they are arranged so that two will engage simultaneously with teeth on opposite sides of the wheel the spaces between the teeth will be divided by three, causing lost motion only to the extent of one-third of the space between the teeth, or if three pawls be arranged to engage simultaneously the spaces may be reduced to one-half, or if the pawls be all arranged to engage in regular succession the lost motion will be reduced to one-sixth the space between the successive teeth.

The springs K K may be of any desired construction, and I have shown simple steel springs for the purpose of illustration only.

The placing of the heels of the pawls in solid socket-bearings, as shown in Fig. 4, entirely relieves their pins *j* of strain. The durability of the machine is thus materially increased.

With crank-lifters as heretofore constructed with a single pawl held only by a pin and having no solid socket-bearing for heel of pawl, as in my invention, if a pawl or pin breaks no work can be done until repairs are made. The whole strain coming on the pin, it is much more likely to break than in mine, where the socket-bearing for the heel of pawl leaves very little strain to come on the pin. If one or five of the pawls in my lifter were broken, the lifter could still be used as long as one perfect pawl remained. The more pawls the less liability there is of any one of them breaking. The shock and breaking of teeth which occur by the use of one pawl are reduced to a minimum where a plurality of pawls are used.

Having thus described my invention, the following is what I claim as new therein and desire to secure by Letters Patent—

1. In a crank lifting device for drop-hammers, a gear-wheel mounted loosely on a crank-shaft and provided with one or more pawls pivoted to the face of the wheel and seated at their inner ends within one or more sockets, whereby the working-strain is transferred from the pivotal point of the pawl to the face of the socket, substantially as and for the purposes set forth.

2. The combination of counter-shaft N, provided with a pinion, *n*, with the gear-wheel M, provided with the rim L, having sockets *l* and spring-pawls J, and the shaft G, with its ratchet-disk I', substantially as and for the purposes set forth.

3. In a crank lifting device for drop-hammers, the combination of a ratchet-wheel fixed to the crank-shaft, one or more pawls engag-

ing therewith, and a longitudinally-sliding sleeve to retract the pawl or pawls, substantially as set forth.

4. The combination of the crank-shaft G, ratchet-wheel I, one or more pawls, J, bracket T, with its roller *t*, and cam-wheel S *s'*, for actuating the longitudinally-sliding sleeve, substantially as herein set forth.

5. The combination, with the sliding sleeve S and one or more pawls, J, of the loose collar U, to prevent friction, as set forth.

DARIUS WILCOX.

Witnesses:
AMBROSE BEARDSLEY,
WM. SIDNEY DOWNS.