3 Sheets--Sheet 1.

A. PAUL.

Self-Acting Spinning-Jacks.

No. 137,386. Patented April 1, 1873.

Fig. 1.

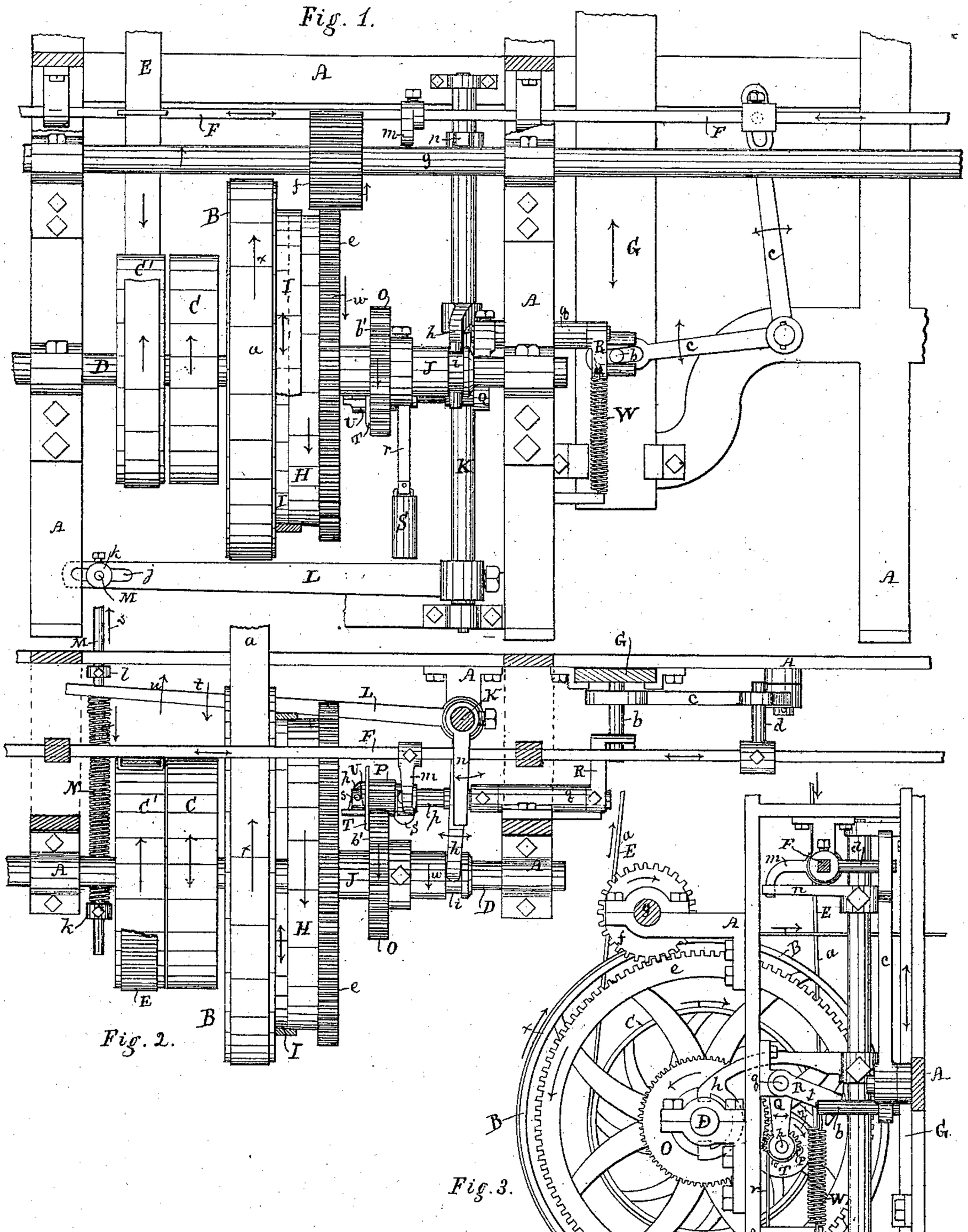

Fig. 2.

Fig. 3.

Witnesses:

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Austin F. Park.

Inventor:

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Fig. 6.

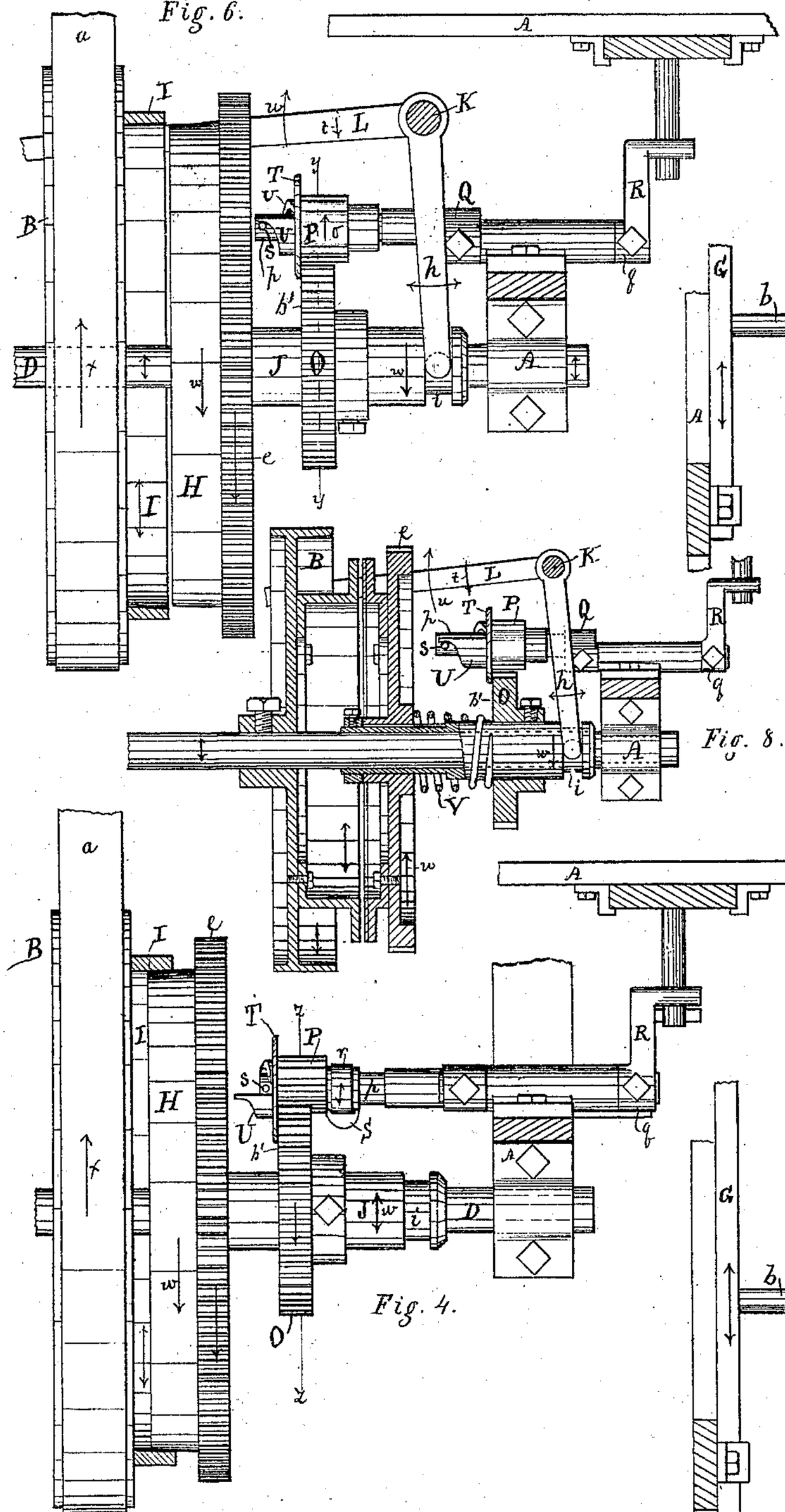


Fig. 7.

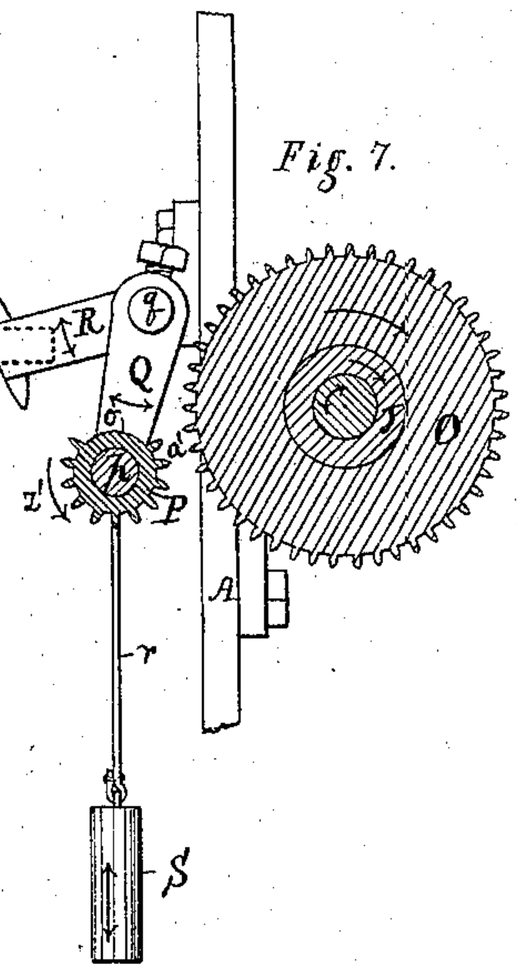
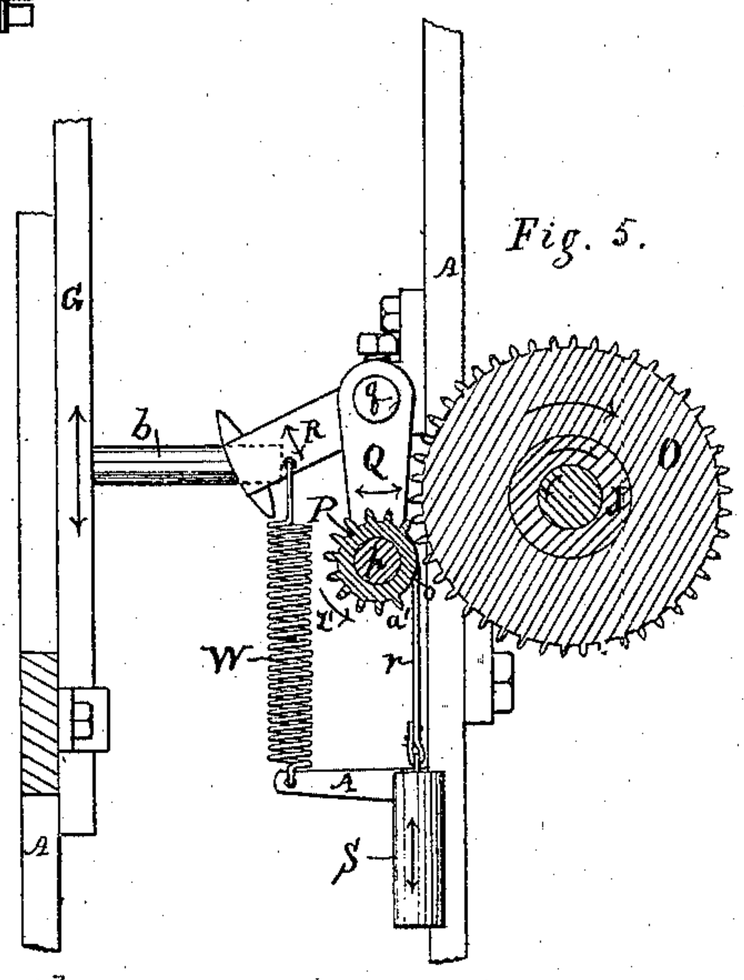


Fig. 8.

Fig. 4.

Fig. 5.



Witnesses:

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Archibald Paul

3 Sheets--Sheet 3.

A. PAUL.

Self-Acting Spinning-Jacks.

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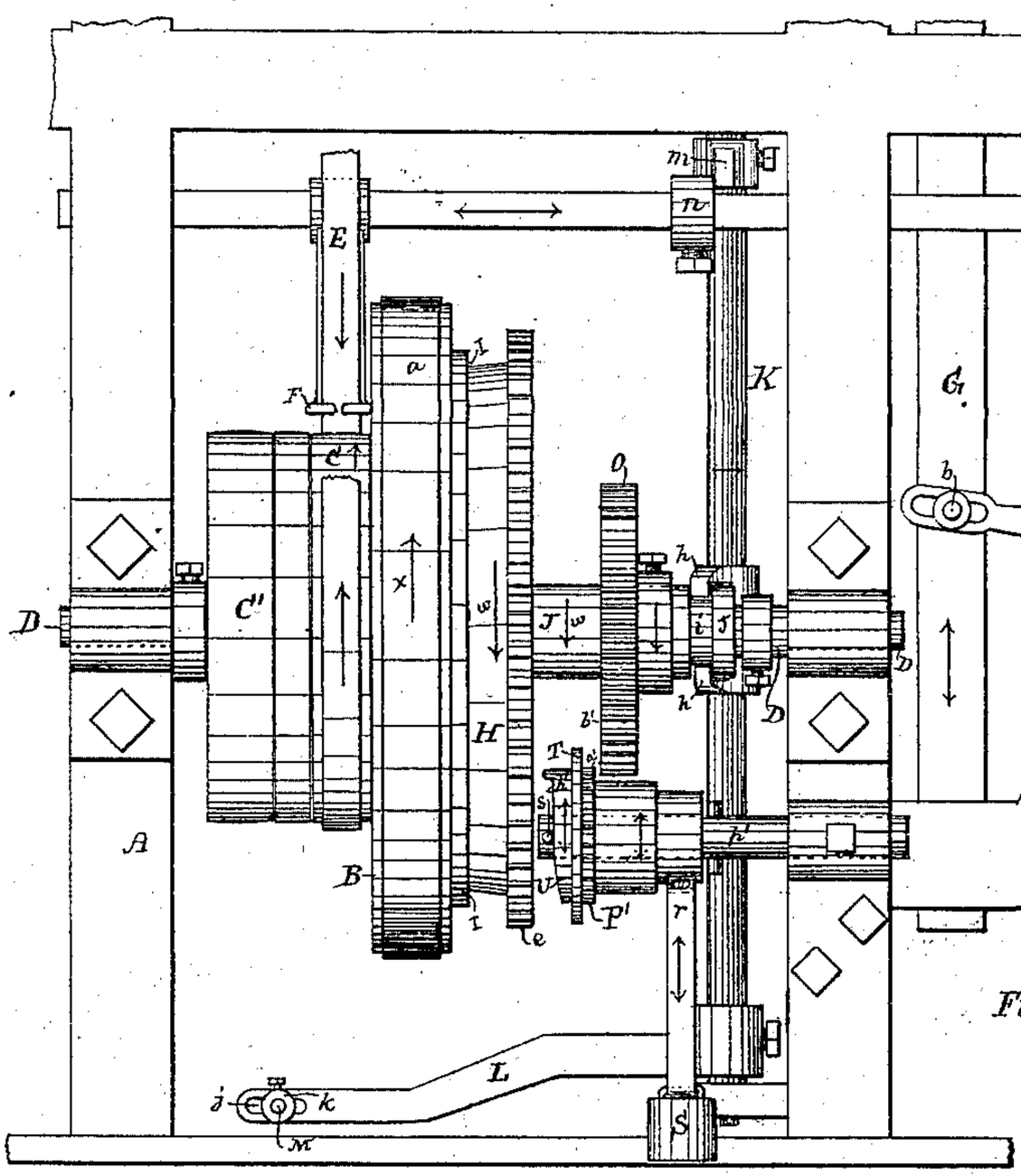

Fig. 9.

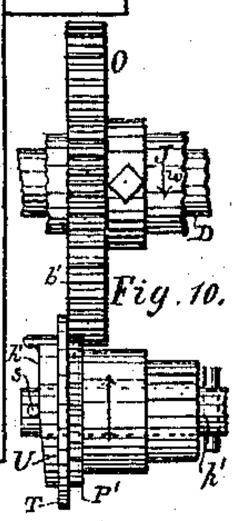

Fig. 10.

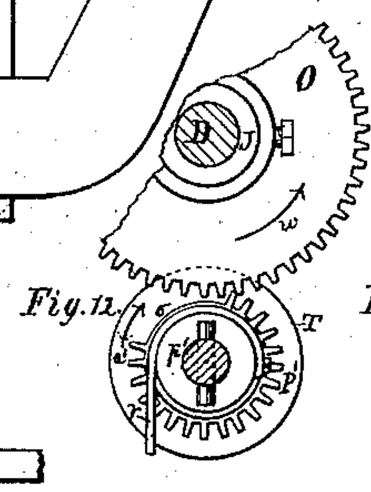

Fig. 12.

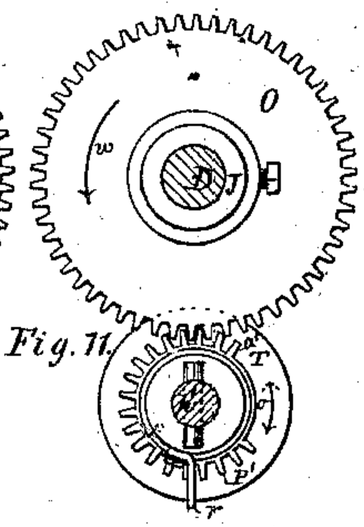

Fig. 11.

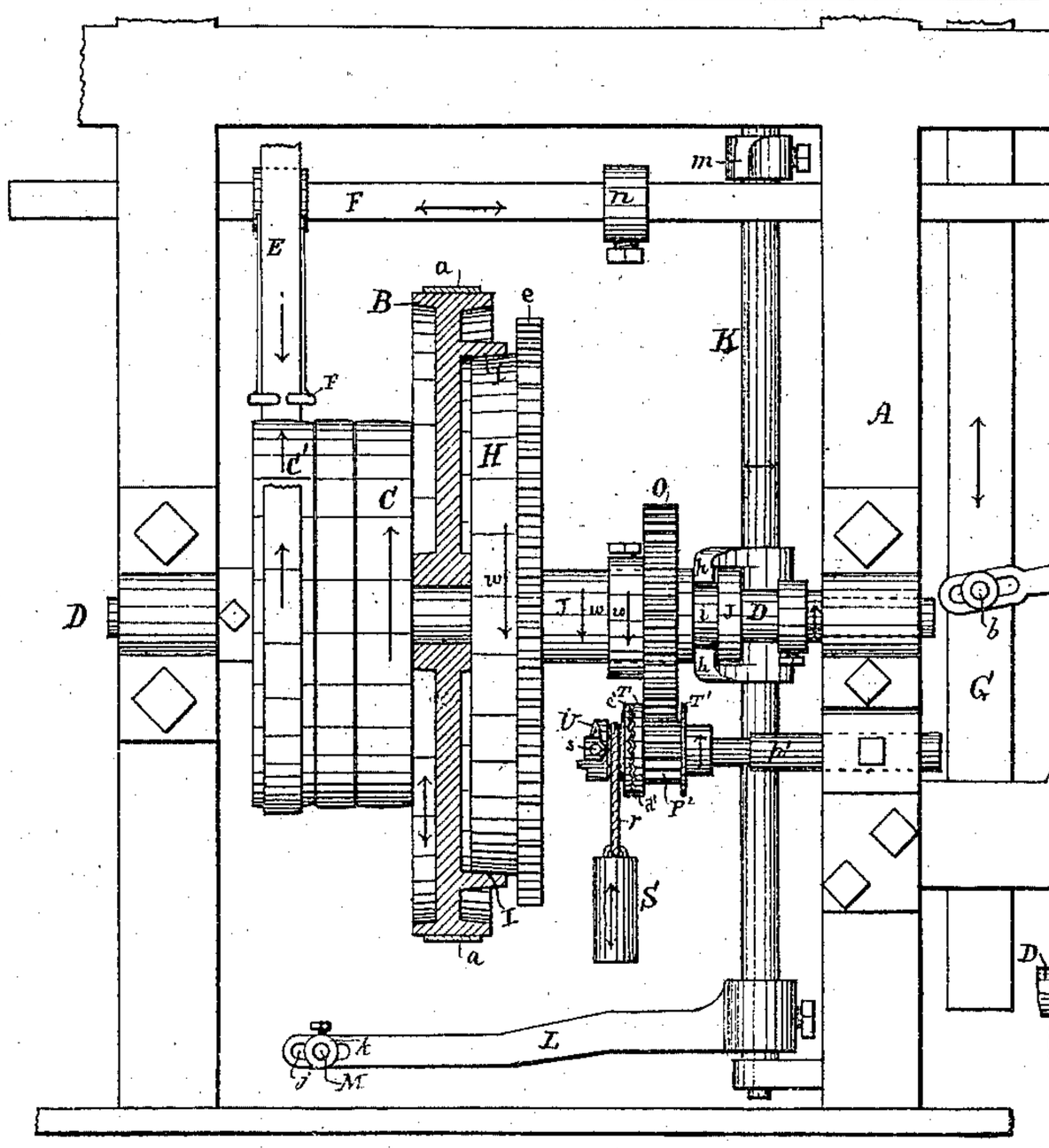

Fig. 13.

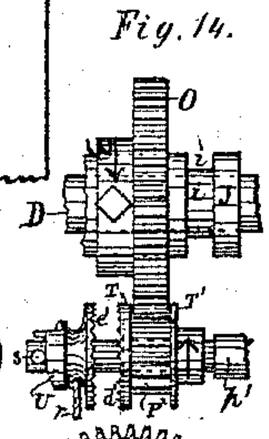

Fig. 14.

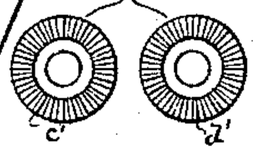

Fig. 16.

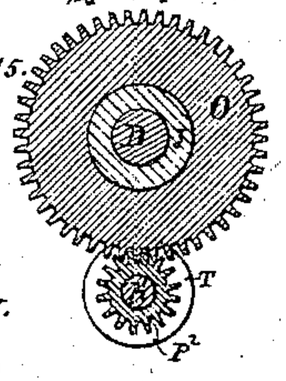

Fig. 15.

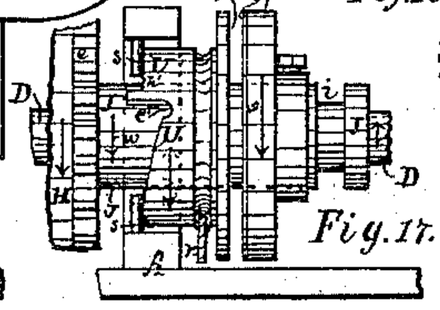

Fig. 17.

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Inventor:

Archibald Paul

UNITED STATES PATENT OFFICE.

ARCHIBALD PAUL, OF COHOES, NEW YORK.

IMPROVEMENT IN SELF-ACTING SPINNING-JACKS.

Specification forming part of Letters Patent No. **137,386**, dated April 1, 1873; application filed July 19, 1871.

To all whom it may concern:

Be it known that I, ARCHIBALD PAUL, of Cohoes, in the county of Albany and State of New York, have invented a new and useful Improvement in Self-Acting Spinning-Jacks, of which the following is a specification, reference being had to the accompanying drawing.

My invention relates to that class of self-acting spinning-jacks in which a rotary friction-clutch is, by means of a spring or springs, temporarily moved and pressed against or engaged with the spindle-driving pulley, so as to reverse the motion of the latter for a little time to back off the yarns from the spindles of the bobbins just after the twisting of each drawing of yarns has been completed. My invention consists of a certain combination of devices with the backing-off friction-clutch of a self-acting spinning-jack of the aforesaid class, substantially as hereinafter described, whereby the engagement of the backing-off friction-clutch with the spindle-driving pulley or shaft is retarded or rendered gradual without requiring any material alteration of such self-acting jacks in common use, and with only a very small and cheap addition thereto.

In the drawing, Figure 1 is an elevation of the back side of a part of the head of a spinning-jack which embodies one form of my invention; and Fig. 2 is a plan, and Fig. 3 is an end elevation, of the same. Fig. 4 is a plan, partly in section, and Fig. 5 is an elevation, of a section at the line *z z*, of a part of the same machinery on a larger scale when the backing-off clutch is engaged with the bobbin-driving pulley. Fig. 6 is a plan, partly in section, and Fig. 7 is an elevation of a section at the line *y y*, of the same mechanism when the friction-clutch is disengaged. Fig. 8 is a sectional plan to illustrate a modification of my invention. Fig. 9 is a rear elevation of a part of a spinning-jack having another form of my invention; and Figs. 10, 11, and 12 are parts of the same. Fig. 13 is a sectional elevation of a portion of a spinning-jack which embodies a different form of my invention; and Figs. 14, 15, and 16 represent parts thereof. Fig. 17 illustrates another modification of my invention.

Like parts are marked by like letters in the different figures, and the arrows therein indicate the directions in which the parts move.

A is the stationary frame-work which supports the other parts. B is the pulley, which drives the bobbin-spindles by means of a belt, *a*, which turns a pulley that is connected with and turns the drums to which the bobbin-spindles are banded on the carriage, as usual in spinning-jacks. When the pulley B is turned to twist the drawings of yarn it revolves in the direction of the arrow *x*, and it is turned in the opposite direction to back off the yarn. C is a fast pulley, and C′ is a loose one, on the shaft D, to which the pulley B is fastened. E is a belt, which, when running on the pulley C, turns the pulley B to twist the yarns. F is a belt-shipper, which is connected to the clock-slide G by a pin, *b*, lever *c*, and stud *d*, so that the upward movement of the clock-slide shifts the belt E from the loose pulley C′ to the fast one C, and so that the falling of the clock-slide shifts the belt back onto the loose pulley C′. H is the rotary friction-clutch, which is temporarily engaged with the pulley B through a friction-surface, I, on that pulley. The clutch H is mounted on a sleeve, J, which can be moved endwise and turned around on the shaft D; and the clutch and sleeve are slowly turned in the direction of the arrow *w* by a toothed wheel, *e*, fast on the clutch, and a pinion, *f*, on a shaft, *g*, or by other suitable means, driven by the motor that runs or turns the shaft D. An arm, *h*, has its forked end in a groove, *i*, in the sleeve J, and is fast on a rock-shaft, K, to which is fastened an arm, L, which has in its outer part a slot, *j*, Figs. 1, 9, and 13, through which extends an endwise movable rod, M, which has collars *k l*, Fig. 2, fixed on it at opposite sides of the arm L, and a spiral spring, N, between the arm L and collar *k*. The rod M is connected with devices at the front side of the jack, as usual, so that as the carriage completes its outward movement the rod M is drawn endwise in the direction of the arrow *v*, so as to compress the spring N between and against the collar *k* and arm L, so that the spring N then tends to move the arm L in the direction of the arrow *u*, and consequently to press the clutch H against the pulley B. At that time the clock-slide G is elevated, and the shipper F makes the belt E run on the fast

pulley C, and has a stop, *m*, which then intercepts an arm, *n*, fast on the shaft K, so that the spring N cannot move the clutch H. When the clock-slide G falls it moves or permits the movement of the shipper F, so that it carries the belt E onto the loose pulley C′, and removes the stop *m* from the arm *n*, and thereby lets the spring N move the lever L, shaft K, arm *h*, sleeve J, and clutch H so as to press the latter against the pulley B.

When the belt-shipper F releases the arm *n*, and thereby the spring N, the latter will then force the revolving friction-clutch H against the reversely-revolving pulley B instantaneously, if there is nothing to prevent it, the same as is the case in the common self-acting spinning-jacks, so as to cause very great and injurious strain and wear and frequent breakage of the belt, drum-connections, and bands by which the pulley B drives the bobbin-spindles. To lessen or prevent that difficulty I cause the spring to engage the clutch H with the pulley B gradually by means of an impeding-cam, U, or its equivalent, substantially as hereinafter described.

In one form of my invention, shown by Figs. 1, 2, 3, 4, 5, 6, 7, and 8, a toothed wheel, O, is fast on the sleeve J; and P is a corresponding toothed pinion, having a section, *o*, Figs. 5 and 7, without teeth. The pinion P is mounted so that it can be turned and moved endwise on a pin, *p*, fast on an arm, Q, which is fast to a rock-shaft, *q*, to which is also fastened a forked arm, R, which engages with the pin *b* on the clock-slide G. S is a weight on a strap, *r*, that is fastened to a hub on the pinion P. A flange, T, on the pinion P extends against that side *b′* of the wheel O which is nearest to the clutch H. The cam U is fast on the pinion P, and *s* is a stop fast on the pin *p* for the cam to bear against. When the clock-slide G is raised the stud *b* moves and holds the arm R so as to remove and retain the pinion P away from the wheel O; and at the same time the weight S turns and holds the pinion with the forward portion *a′* of its teeth toward the wheel O, as shown in Fig. 7, and with the wide part of the cam U opposite to the stop *s*, as shown in Figs. 6 and 8. When the clock-slide G falls it moves the pinion so that the forward portion *a′* of its teeth engages with the teeth of the wheel O, which then turns the pinion in the direction of the arrow *z′*; and at the same time the spring N, through the parts L, K, and *h*, Fig. 2, presses the sleeve J, with the wheel O and clutch H, toward the pulley B; but the face *b′* of the wheel O then bears against the flange T on the cam U, and the latter bears against the stop *s*, so that the clutch H can be moved toward the pulley B only just as fast as the turning-cam U moves endwise on the pin *p*. The wheel O turns the pinion P until the toothless part *o* is reached, as shown in Fig. 5, at which point the clutch H is fully engaged with the pulley B. Instead of having the clock-slide G move the arm R and pinion P, the belt-slipper F may do it by a pin in the lever *c*.

In another form of my invention, represented by Figs. 9, 10, 11, and 12, the toothed wheel O is fast on the sleeve J; and P^1 is a correspondingly-toothed pinion, having a section, *o*, Figs. 11 and 12, without teeth. This pinion P^1 is mounted so as to turn and slide endwise on a stationary stud, *p′*. A flange, T, on the pinion P^1 extends past the edge of the wheel O, as shown. The cam U is fast on the pinion P^1, and a stop, *s*, is fixed on the pin *p′* for the cam U to bear against. When the clutch H is disengaged from the pulley B the wheel O is away from the pinion P^1, as shown in Fig. 9; and at the same time a weight, S, on a strap, *r*, that is fast to a hub on the pinion, holds the latter with the forward portion *a′* of its teeth opposite to the teeth of the wheel O, as shown in Fig. 11, and with the widest part of the cam U opposite to the stop *s*, as in Figs. 9 and 10. When the sleeve J is pressed toward the pulley B by the spring N, Fig. 2, acting on the lever L, Fig. 9, the teeth of the wheel O first slide into gear with the forward portion *a′* of the teeth of the pinion P^1, as indicated in Figs. 10 and 11, and then turn that pinion with the cam U, until the toothless part *o* of the pinion is reached, as shown in Fig. 12. As the cam U is thus turned it is pressed and moved endwise on the stud *p′* against the stop *s* by the wheel O, until the narrowest part of the cam is opposite to that stop, at which time the clutch H, by following with the wheel O the endwise movement of the cam, has gradually become fully engaged with the pulley B.

In another form of my invention, which is shown by Figs. 13, 14, 15, and 16, the toothed wheel O, which is fast on the sleeve J, is constantly in gear with a pinion, P^2, which has flanges T T′ on both sides of the wheel, and is fitted to turn and slide endwise on a fixed stud, *p′*. The cam U is separate from the pinion, and is free to be turned and moved endwise on the stud *p′*, and has next to the pinion a toothed clutch-plate, *c′*, which is formed to engage with a corresponding clutch-plate, *d′*, on the flange T of the pinion. When the friction-clutch H is disengaged from the pulley B the part *d′* is away from the part *c′*, as shown in Fig. 14, and at the same time a weight, S, on the cord *r*, that is fast to a hub of the cam U, holds that cam with its widest part opposite to the fixed stop *s*. When the spring presses the sleeve J toward the pulley B, as above specified, the wheel O presses the clutch-plate *d′* against the part *c′*, and by means of the pinion P^2 turns the cam U against the stop *s* until the friction-clutch H gradually becomes fully engaged with the pulley B, and the stop *s* is opposite to a recess in the cam, as shown in Fig. 13, so as to free the clutch-plate *c′* from the part *d′*, and let the pinion P^2 turn freely without turning the cam. The parts *c′* and *d′* may have friction-surfaces instead of toothed-faces. In Fig. 17 the cam U is double, and is mounted so as to turn and slide endwise on the sleeve J. O′ is a friction-plate fast on the sleeve J, and *f′* is a corre-

sponding face on the cam U. When the friction-clutch H is disengaged from the pulley B, as in Figs. 6 and 8, the friction-plates *f'* O' are apart, as shown in Fig. 17; and at the same time a weight or spring on a cord, *r*, that is fastened at one end to the hub of the cam U, holds the latter with its widest parts opposite to the fixed stops *s s* on the frame A. When the revolving sleeve J is pressed by the spring toward the bobbin-driving pulley, as above specified, the friction-plate O' is thereby pressed against the plate *f'*, and consequently turns the cam U against the stops *s s* until the backing-off friction-clutch H has gradually become fully engaged with the pulley B by following the endwise movement of the cam U on the sleeve J, and until recesses *e'* at the narrowest part of the cam receive the stops *s s* and release the cam, so as to let the disk O' turn freely without turning the cam U while the clutch H remains engaged with the pulley B. The parts O' and *j'* may be toothed on their inner sides to clutch together.

In each case above described the cord or strap *r* is wound upon the hub of the cam U while that cam is being turned to make the friction-clutch H engage with the pulley B gradually; and when the cam U is released, upon withdrawing the friction-clutch or moving the belt-shipper, the weight S unwinds the cord or strap, and thereby turns back the cam U until its wide part is opposite the stop *s*. By having the first part of the cam U flat, or not inclined, as shown at *h'* in Figs. 9 and 10, the beginning of the engagement of the clutch H with the pulley B may, if desired, be delayed until the belt-shipper F shall have caused the belt E to leave the driving-pulley C entirely. Instead of having the cam U turn and slide endwise against a fixed pin or stop, *s*, the cam U may be stationary, and the pin or stop *s* turned and slid against the fixed cam to cause the gradual engagement of the clutch H with the pulley B. Whenever the pulley B is turned backward by the clutch H sufficiently the latter is then withdrawn from the former by the usual automatic endwise movement of the rod M, Fig. 2, so as to make the collar *l* move the arm L in the direction of the arrow *t*. In Figs. 1, 2, 3, 4, 6, 9, and 13 the clutch H is fast on the sleeve J, and the friction-surfaces are somewhat tapering and yielding, as they commonly are in spinning-jacks, so that they bear and adhere together harder and harder as the part H enters the part I further and further. In Fig. 8 the friction-clutch surfaces are flat, and the clutch is made to slide on a feather on the sleeve J as the latter moves toward the pulley B after the friction-surfaces have met; and the gradually-increasing adhesion between those surfaces as the sleeve J moves toward the pulley B is secured by means of a spring, V, which has less strength than the spring that moves the sleeve, and which spring V increases in strength as it is gradually compressed more and more by the endwise movement of the sleeve within the hub of the friction-clutch.

I believe that it has been heretofore proposed to construct self-acting spinning-mules, in which the backing-off friction-clutch was to be engaged with the spindle-driving shaft by means of a spring or weight which was to be retarded in its action so as to cause the gradual engagement of the said backing-off friction-clutch by means of an intermittingly-rotary reciprocating cam, or a constantly-revolving ratchet-wheel or screw, which was to be arranged away from and not turned by or from the backing-off friction-clutch, but by some other and distant part of the mule, and which was to be connected with the said friction-clutch by means of a combined follower or pawl and clutch-lever.

What I claim as my invention, and desire to secure by Letters Patent, is—

In a self-acting spinning-jack, the combination of the cam U, cam-bearing *s*, and flange T with the wheel or disk O, or their described equivalents, and the backing-off friction-clutch, substantially as herein set forth.

ARCHIBALD PAUL.

Witnesses:

JOHN C. GREENE,

AUSTIN F. PARK.