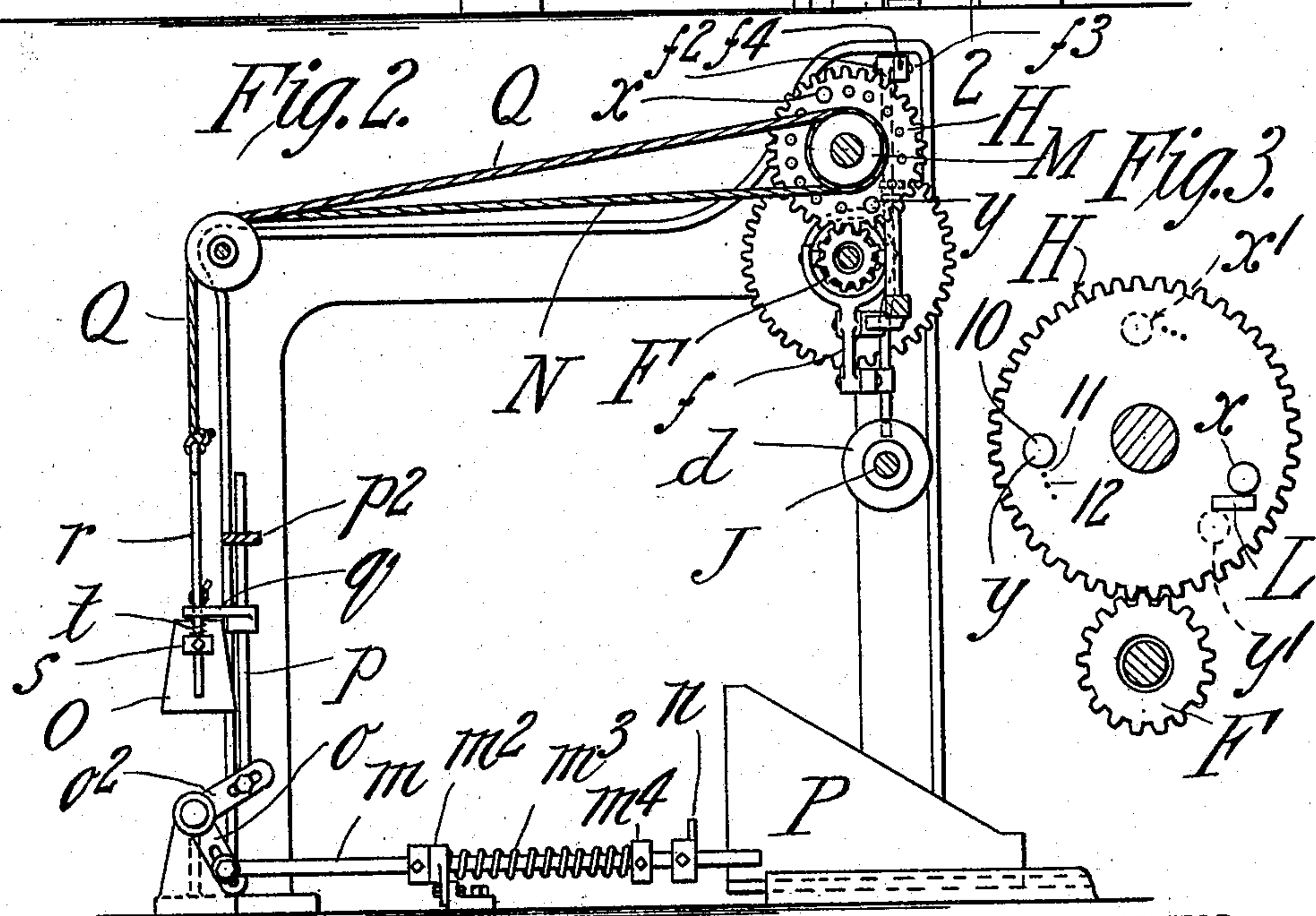
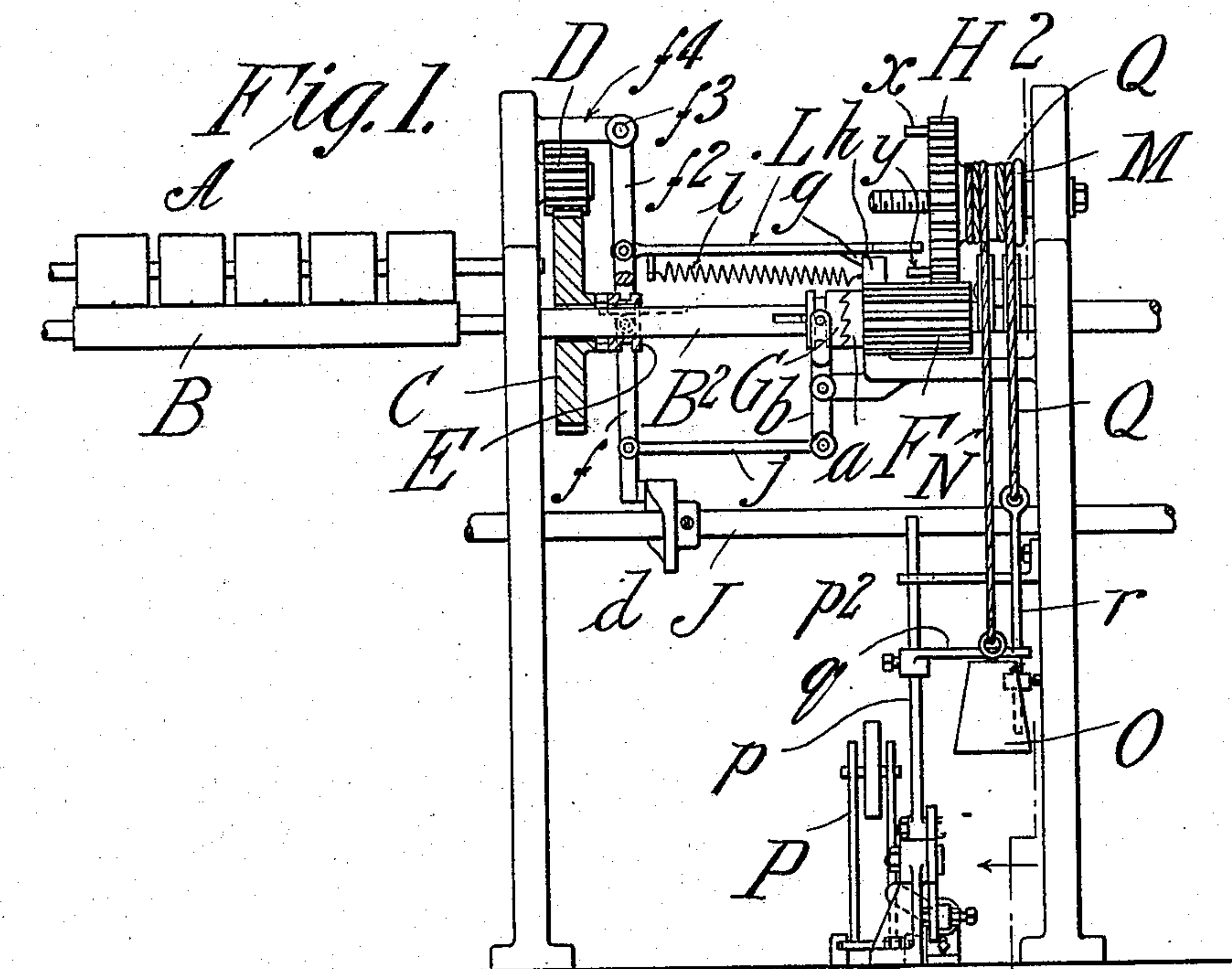


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*Robert J. Harrington*

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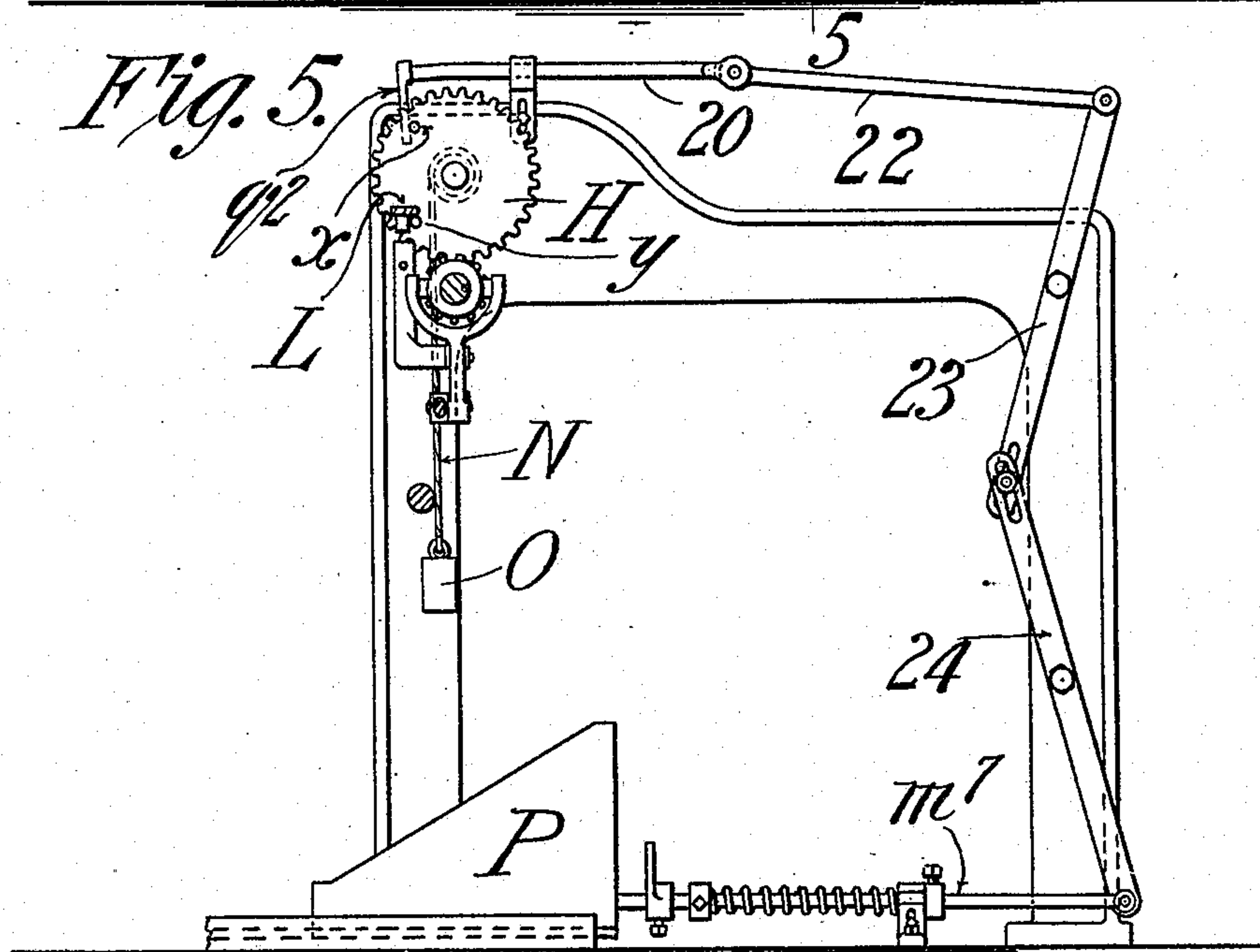
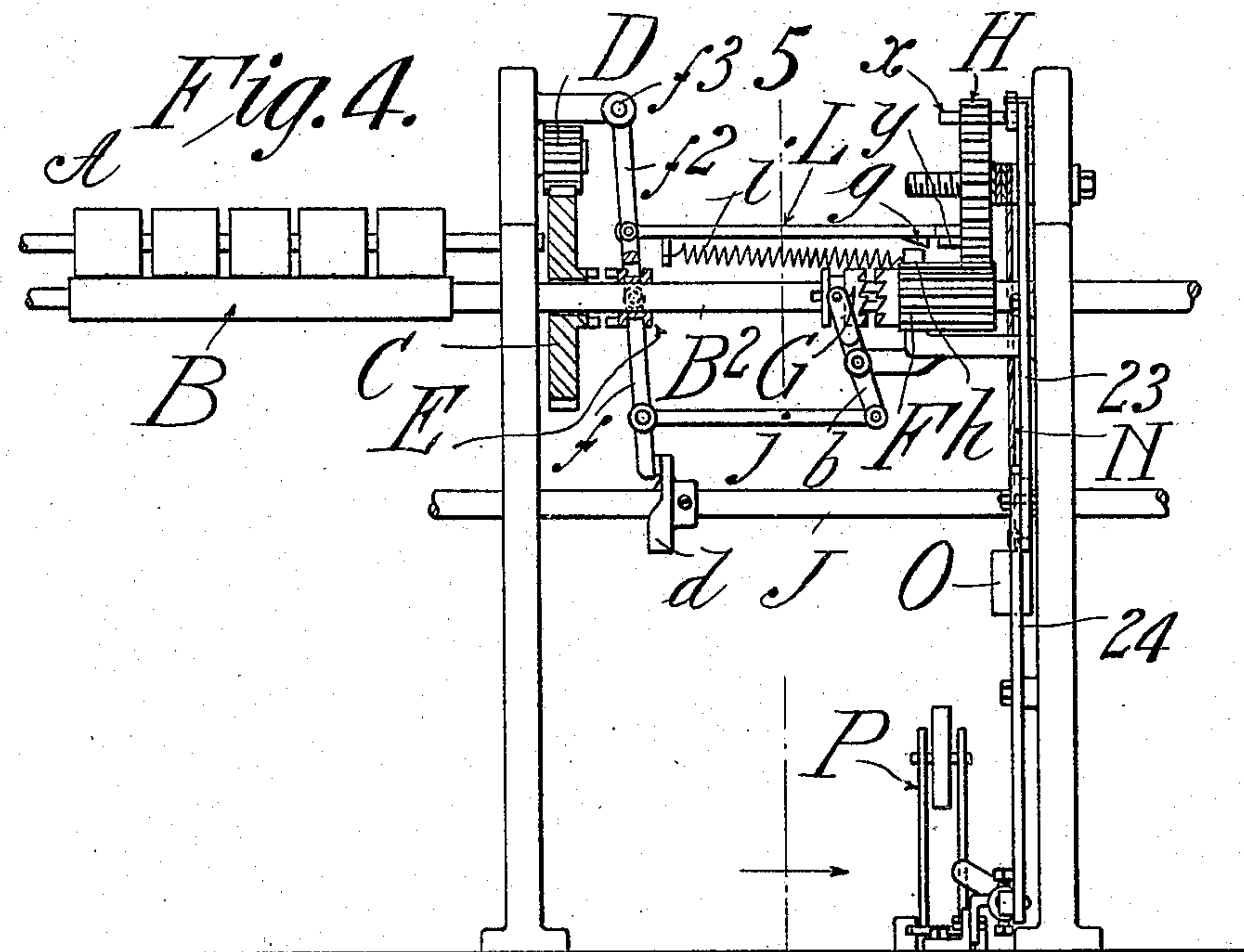
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# UNITED STATES PATENT OFFICE.

ROBERT J. HARRINGTON, OF DALTON, MASSACHUSETTS.

## SPINNING MACHINERY.

No. 907,792.

Specification of Letters Patent.

Patented Dec. 29, 1908.

Application filed June 3, 1908. Serial No. 436,328.

*To all whom it may concern:*

Be it known that I, ROBERT J. HARRINGTON, a citizen of the United States of America, and resident of Dalton, in the county of Berkshire and State of Massachusetts, have invented certain new and useful Improvements in Spinning Machinery, of which the following is a full, clear, and exact description.

This invention relates to mechanism or appliances for spinning mules having for its object the assuring in the production of yarn from delivered rovings of a uniformity in the yarn at all times in the working of the mule.

As well known, at the time the mule is working to produce and build yarn on bobbins near the upper conical ends thereof, there is more or less "throw off" of the yarn, which instead of being wound on the bobbins flies over the upper ends thereof, and in most cases the yarn made in the latter period of the bobbin filling is stretched and twisted less and is coarser and heavier than if carried on the lower portion of the bobbin.

This invention contemplates the provision of a yarn evening attachment for the spinning machine, controlled by the usual builder shoe and including means for varying the arc movement of a partially rotary reciprocating element which is periodically operative to unclutch or throw out from driving connection the roving delivery rolls. And the mechanism of the present invention is especially applicable on certain types of mules on which other devices attempted for corresponding purpose would not be available.

The invention consists in the combinations, arrangements of devices and the constructions and combinations of parts as hereinafter described in conjunction with the accompanying drawings.

In the drawings:—Figure 1 is a side elevation of sufficient of a mule to show my improved attachments in conjunction with the roving delivery mechanism thereof; Fig. 2 is a sectional elevation as taken at right angles to Fig. 1 on the plane indicated by line 2—2, and as seen looking to the leftward. Fig. 3 is a diagrammatic view of revoluble parts drawn on a larger scale and to be hereinafter particularly referred to. Figs. 4 and 5 are views similar to Figs. 1 and 2, but showing modified arrangements of some portions of my improved attachment.

Similar characters of reference indicate the same or analogous parts in all of the views.

In the drawings, A and B represent the top rolls and lower roll of the yarn delivery portion of the mule, these rolls having intermittent rotative actions for delivering the proper amount of rovings or stock for each draw which so delivered and drawn yarn is wound on the bobbin. The lower delivery roll B has a shaft extension B<sup>2</sup> on which is loosely mounted a spur gear wheel C in constant mesh with a pinion gear D having a constant rotary motion from driving connection commonly employed in mules and not here shown. The gear wheel C will be rotated and cause rotation of the delivery rolls when the clutch E is in clutch with the gear wheel C. The clutch E comprises a clutch collar splined and slidable on the shaft extension B<sup>2</sup>, the clutch collar constantly rotating with the shaft extension and causing rotation of the gear wheel C and of the delivery rolls when the collar is in clutch with said gear C.

F represents a spur gear wheel of comparatively small diameter also loose on the shaft extension B<sup>2</sup>, the same having a clutch member or end hub *a* coacting with which is a clutch collar G also splined, slidable along and rotative with the shaft extension B<sup>2</sup> and having an actuating lever *b* for throwing it in and out of engagement with the clutch member *a* provided on the gear F. In mesh with the loose gear F is a somewhat larger spur gear wheel H provided with two studs *x* and *y* extending from the face of the gear at suitably different portions around a circular line on the gear face.

J represents another constantly rotating shaft below the delivery roll shaft having a cam *d* thereon coacting with the pivot lever yoke *f* which engages the clutch collar E and upper extension *f*<sup>2</sup> of said yoke being hung by pivot *f*<sup>3</sup> to a bracket *f*<sup>4</sup> or stationary fixture.

L represents a catch or detent for periodically holding the clutch members E and G in clutch with the respective gear wheels C and F and operative to periodically release such clutch members so that for a period in each complete operation of the mule there will be a roving delivery and an idle period in which there is no delivery of roving, but in which the drawing of the roving is permitted. The aforementioned detent L is shown as in the form of a rod or bar pivotally connected to the lever yoke *f* and having a catch shoulder



*g* adapted to engage a stationary abutment or bracket *h* provided as a fixture of the frame of the machine. A spring *i* exerts a force to swing the lever yoke *f* so as to move  
 5 the clutch collar E out of clutch and with it simultaneously the clutch member G out of clutch,—the levers *f* and *b* being connected by the link *j*.

The gear wheel H which carries the studs *x*  
 10 and *y* is provided with a drum M made as a hub extension of the said gear H and a cord N having a weight O has a winding engagement with the said drum.

Now in the normal operation of the mule,  
 15 that is during approximately three-fourths of its service and when the bobbin is being built up from its bottom towards its top, the mule has its operation unaffected by the novel devices constituting this invention,  
 20 that is the cam *d* will periodically throw the delivery controlling and operating connections in clutch, they so remaining and the roving delivery continuing until the stud *y* in its partial revoluble movement comes to a  
 25 position under, engages and elevates the detent L, permitting the driving connections for the roving delivery to become unclutched, whereupon such delivery ceases during the time of the drawing; and so soon as the parts  
 30 become unclutched, the weighted cord which had been wound up on the drum while the roving was delivering reacts to restore the gear wheel H to its initial position, that is, with its stud *x* brought around to contact  
 35 against the end of the detent L, and consequently positioning the detent liberating stud *y* suitably back and away from the detent in readiness to give scope for the next roving delivery.

40 The contrivances of the present invention are brought into effect at the time in the operation of the mule when the bobbins are three-fourths, more or less, full and the yarn is being wound or laid on at the upper end of  
 45 the bobbin in conical or tapering form and for the purpose of insuring the production of even yarn, which would not be the case if as much roving were delivered to be made into yarn and built on the upper end of the bob-  
 50 bin as was previously delivered to be wound at the lower full sized portions of the bobbin; and for the attainment of the required object, I provide means controlled by the position of the builder shoe for gradually de-  
 55 creasing the length of time in which the clutches will be in engagement and the roving delivery continued by gradually decreasing the length of movement which the stud *y* on the gear wheel *h* may have between  
 60 the time when the delivery rolls are in clutch and being driven and the time when the stud *y* liberates the detent for permitting the throwing of the delivery rolls out of clutch to become non-effective, temporarily, for  
 65 roving delivery.

P represents the builder shoe which has a sliding movement on the floor under the mule as usual.

*m* represents a horizontal rod movable through a guiding support *m*<sup>2</sup> therefor yield- 70  
 ingly forced in the direction towards the builder shoe by encircling spiral spring *m*<sup>3</sup> between the guide support *m*<sup>2</sup> and a collar *m*<sup>4</sup> on the rod and the said rod has an abut-  
 75 ment *n* which the builder shoe may finally reach in its gradual horizontal movement and thereafter force against the pressure of the spring. The said rod *m* is connected with one arm *o* of a bell crank lever and with  
 80 the other arm *o*<sup>2</sup> of the bell crank lever a vertical rod *p* has a stud and slot engagement, said rod playing through a guide bracket *p*<sup>2</sup> therefor. The said rod *p* has an  
 85 abutment arm *q* projecting horizontally therefrom; and said abutment arm *q* is perforated and forms a guide for the vertical rod *r* which plays therethrough, said rod  
 90 being hung at the lower end of the cord or chain Q which has a winding engagement about the drum M unitary with the afore-  
 mentioned stud carrying gear wheel H,—the winding of this cord *q* being the reverse of that of the weight carrying cord N. Said  
 95 rod *r* carried as a depending extension of the cord Q has a stop shoulder or collar *s* below the abutment arm *q*, the small spiral spring  
*t* shown in Fig. 2 being a desirable, though not essential, provision for relieving shock.

Assuming now that the work of the mule  
 has so far progressed that the builder shoe 100  
 P has come to contact against the abutment *n* concurrent with the beginning of the laying on of the yarn at the upper end portion of the bobbin each successive complete operation of the mule advances the builder shoe 105  
 and forces the rod *m* to the leftward with the result of, through the bell crank downwardly drawing the rod *p*, bringing the abutment arm *q* to engagement with the shoulder *s* on  
 110 the cord suspended rod *r* so that then each rewinding of the cord or chain Q on the drum by the unwinding of the weight provided  
 115 cord N, at the periods when the clutches are disengaged will be in lessened extents. In other words, and explaining in conjunction  
 120 with the diagram Fig. 3, it will be assumed that under the ordinary running of the mule and without taking into account my present  
 125 new device, the unwinding of the weighted cord *n* will bring the stud *x* to a stopped position against the upper side of the detent  
 rod L, as shown in full lines, while the other stud *y* is retired around to the leftward to the position also shown in full lines, these  
 studs alternately having changed positions approximately to the positions shown by the  
 130 dotted circles *x'* and *y'* before the detent is liberated by a still slightly further revoluble movement of the stud *y*; but at each successive lowering of the abutment arm *q* after 130



the same has come to engagement with the shoulder's, the automatic unwinding of the weighted cord N will not be in quite such great extent as was formerly the case, and the stud  $y$  will retire, say for illustration instead of to the point 10 only as far as the point 11, and the next time only as far as the point 12, and so on successively in lessened distances from the detent, which distance from the detent corresponds to the time when the roving delivery mechanism is in clutch and controls the amount of roving to be delivered. In other words, while the cam  $d$  will regularly and periodically throw the parts into clutch, the unclutching will be hastened after the builder shoe has become effective in relation to the thrust rod  $m$  and in successively slightly earlier instants at each complete operation of the mule during the completion of the filling of the bobbin with yarn.

It may be mentioned that incidental to the operation of my device or attachment, the rod  $r$  has a reciprocatory movement vertically in its guidance through the hole therefor in the abutment arm  $q$ , but in each upward movement, while operative to effect the periodicity of the roving delivery it is restrained each time a little earlier, at a little lower point, than was the case in its previous engagement with the abutment arm.

It must now be clear that when the mule is working for the production of yarn being built on the lower and major portion of the bobbin, the studs  $x$  and  $y$  have oscillations through arcs, each of a greater length than is the arc through which the said studs oscillate after the builder shoe arrives at its engagement and for controlling effect upon and for varying the position of the part (Figs. 1 and 2, the abutment arm) which determines the initial point from which the liberating stud proceeds before it encounters the detent.

In the modification, Figs. 4 and 5, the restraining element is constituted by an abutment arm  $q^2$  carried on a rod 20 connected by link 22 to toggle-like bars 23 and 24 to one member of which is connected the thrust rod  $m^7$  arranged in relation to and coacting with the builder shoe P, as before described. In this form of the mechanism it is understood that the gear wheel H carrying the studs  $x$  and  $y$  is partially rotated first in one direction and then in the other by the same or equivalent means, as in the exemplification illustrated in Figs. 1 and 2, viz: the clutched gearing and the unwinding weighted cord N. The advancement of the builder shoe will gradually force the thrust rod  $m^7$ , advance the abutment arm  $q^2$  to intercept the stud  $x$  at successively earlier instants, consequently permitting a less far retirement of the stud  $y$  from the detent L and so that by reason of the lessened arc in which the stud  $y$  may

travel before liberating the detent, a corresponding lessened period for the roving delivery is assured.

I claim:—

1. In a spinning mule, in combination, a shaft appurtenant to the roving delivery rolls and having a driven gear wheel loose thereon, a clutch collar spline engaged and slidable on the shaft and adapted to clutch-engage said gear wheel, a second gear wheel loose on said shaft, and another clutch collar spline engaged and slidable on the shaft and adapted to clutch-engage said second named gear, means for concurrently operating the clutches, and a detent for holding the clutches engaged, a third gear in mesh with the second named gear having a detent liberating stud and a weighted cord having a winding engagement with the hub extension of such gear, the builder shoe, a thrust rod adapted to be gradually moved by the builder shoe, and means intervening between said thrust rod and said stud carrying gear wheel for controlling the extent of the rotary reciprocating motions of such wheel.

2. In a spinning mule, in combination, a shaft appurtenant to the roving delivery rolls and having a driven gear wheel loose thereon, a clutch collar spline engaged and slidable on the shaft and adapted to clutch-engage said gear wheel, a second gear wheel loose on said shaft and having a clutch member, and another clutch collar spline engaged and slidable on the shaft and adapted to clutch-engage said second named gear, means for concurrently operating the clutches, and a detent for holding the clutches engaged, a third gear in mesh with the second named gear having a detent liberating stud, and a stop stud movable in arc paths intersected by the detent, and a weighted cord having a winding engagement with a hub extension of such gear, the builder shoe, a thrust-rod adapted to be gradually moved by the builder shoe, a bell crank lever with one arm of which the thrust rod is engaged, a vertically guided rod, connected with the other bell crank-arm and having an abutment arm, a sheave guided cord having a winding engagement with said gear hub extension reversely to the winding engagement of the weighted cord, and carrying a depending rod provided with a stop for coaction with said abutment arm.

3. In combination, a shaft appurtenant to the roving delivery rolls and having a driven gear wheel loose thereon, a clutch collar spline engaged and slidable on the shaft and adapted to clutch-engage said gear wheel, a second gear wheel loose on said shaft and having a clutch member, and another clutch collar spline engaged and slidable on the shaft and adapted to clutch engage said second named gear, pivoted yoke levers, linked together, and engaging the clutch collars, a



detent for holding the clutches engaged, pivotally connected to one of the yoke levers, a spring, operable on the yoke levers to throw the clutches out of engagement with said  
5 gears, and a rotary cam engaging one of the yoke levers for periodically forcing the clutch members into their engagements, a third gear in mesh with the second named gear having a detent liberating stud, and a  
10 stop stud movable in arc paths intersected by the detent, and a weighted cord having a winding engagement with a hub extension of such gear, the builder shoe, a thrust-rod adapted to be gradually moved by the  
15 builder shoe, a bell crank lever with one arm

of which the thrust rod is engaged, a vertically guided rod, connected with the other bell crank-arm and having an abutment arm, and a sheave guided cord having a winding engagement with said gear hub extension so reversely to the winding engagement of the weighted cord, and carrying a depending rod provided with a stop for coaction with said abutment arm.

Signed by me at Springfield, Mass., in presence of two subscribing witnesses.

ROBERT J. HARRINGTON.

Witnesses:

WM. S. BELLOWS,

G. R. DRISCOLL.