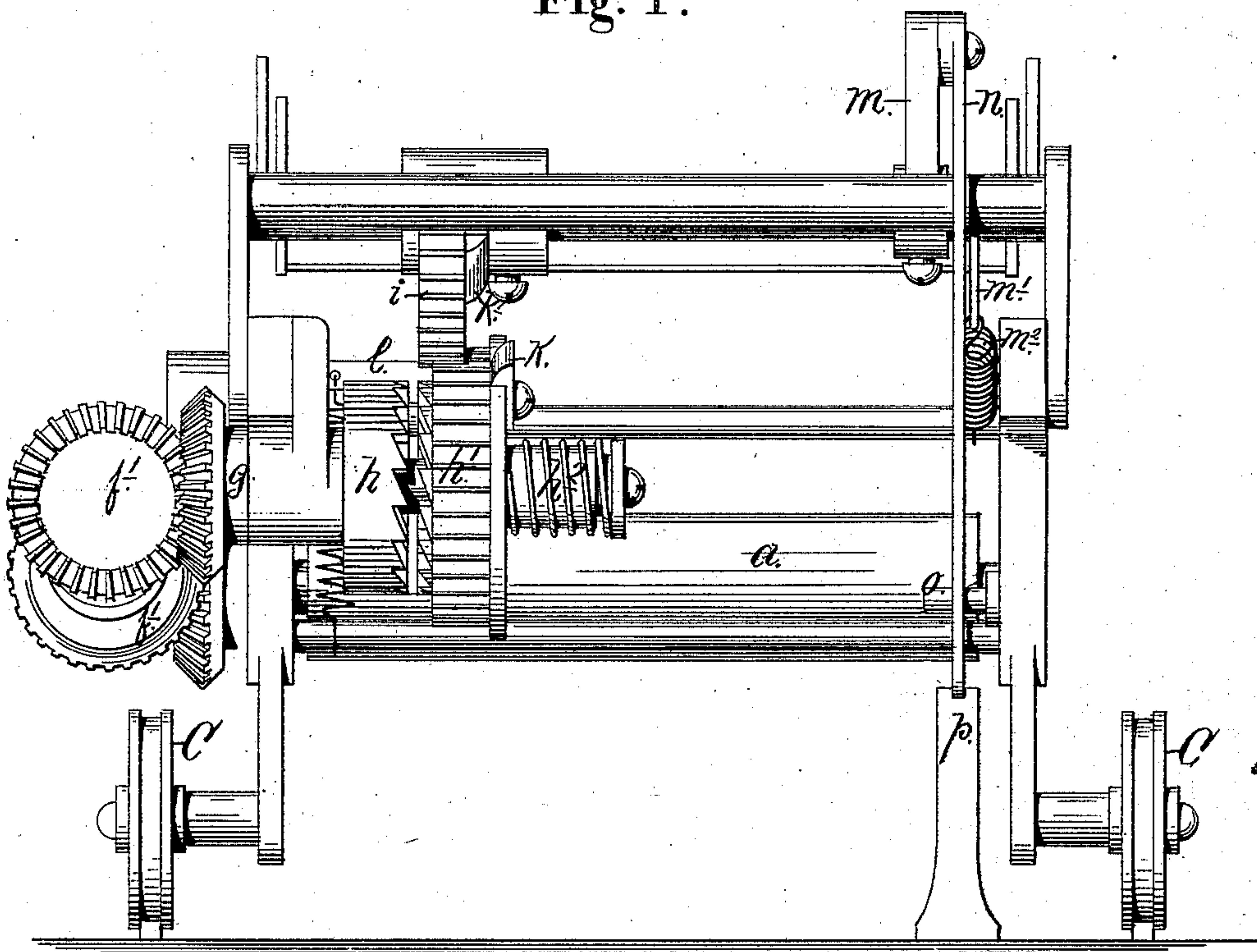


J. NOONAN.  
Spinning-Mule.

No. 214,690.

Patented April 22, 1879.

Fig. 1.



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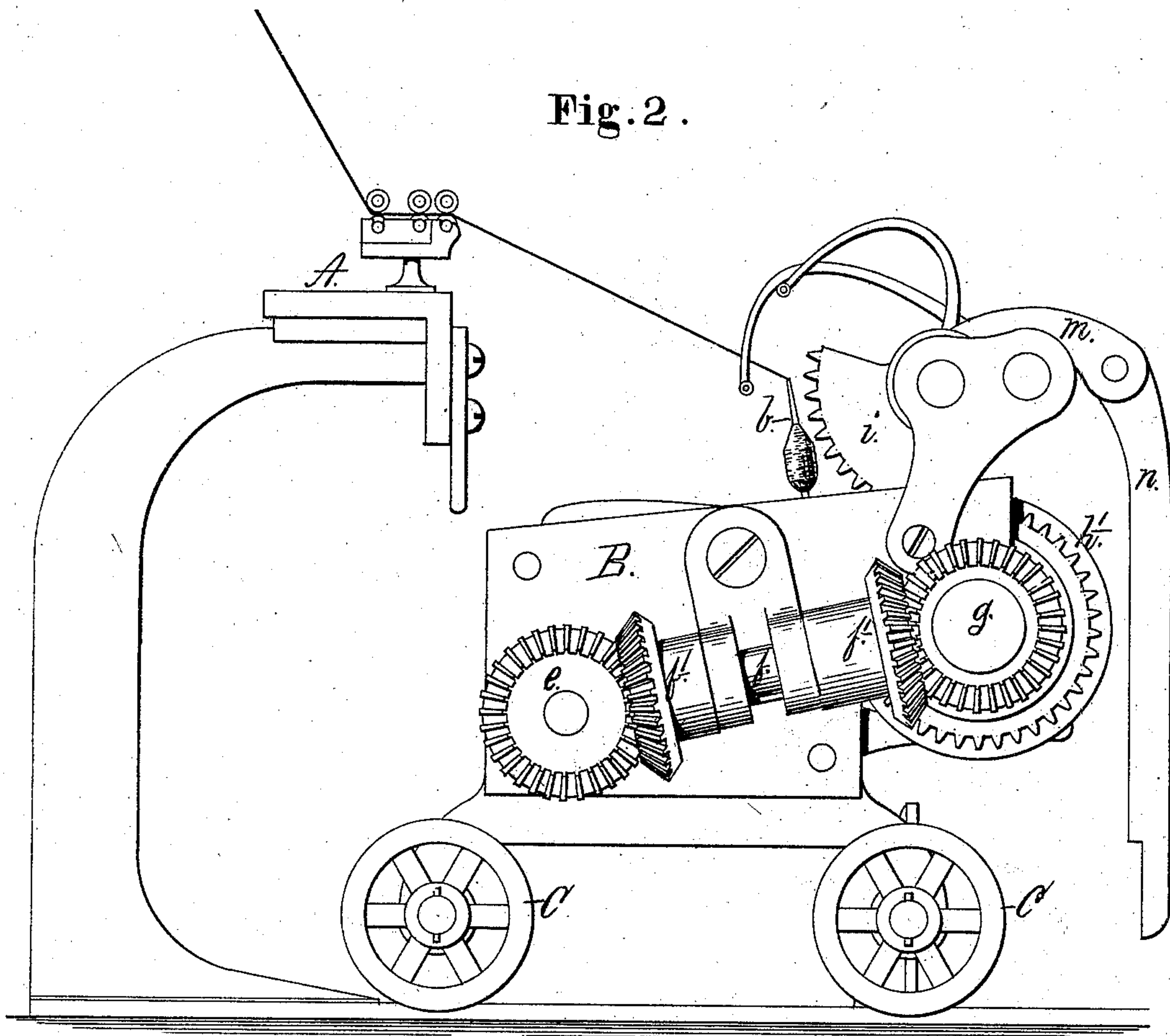
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Fig. 2.



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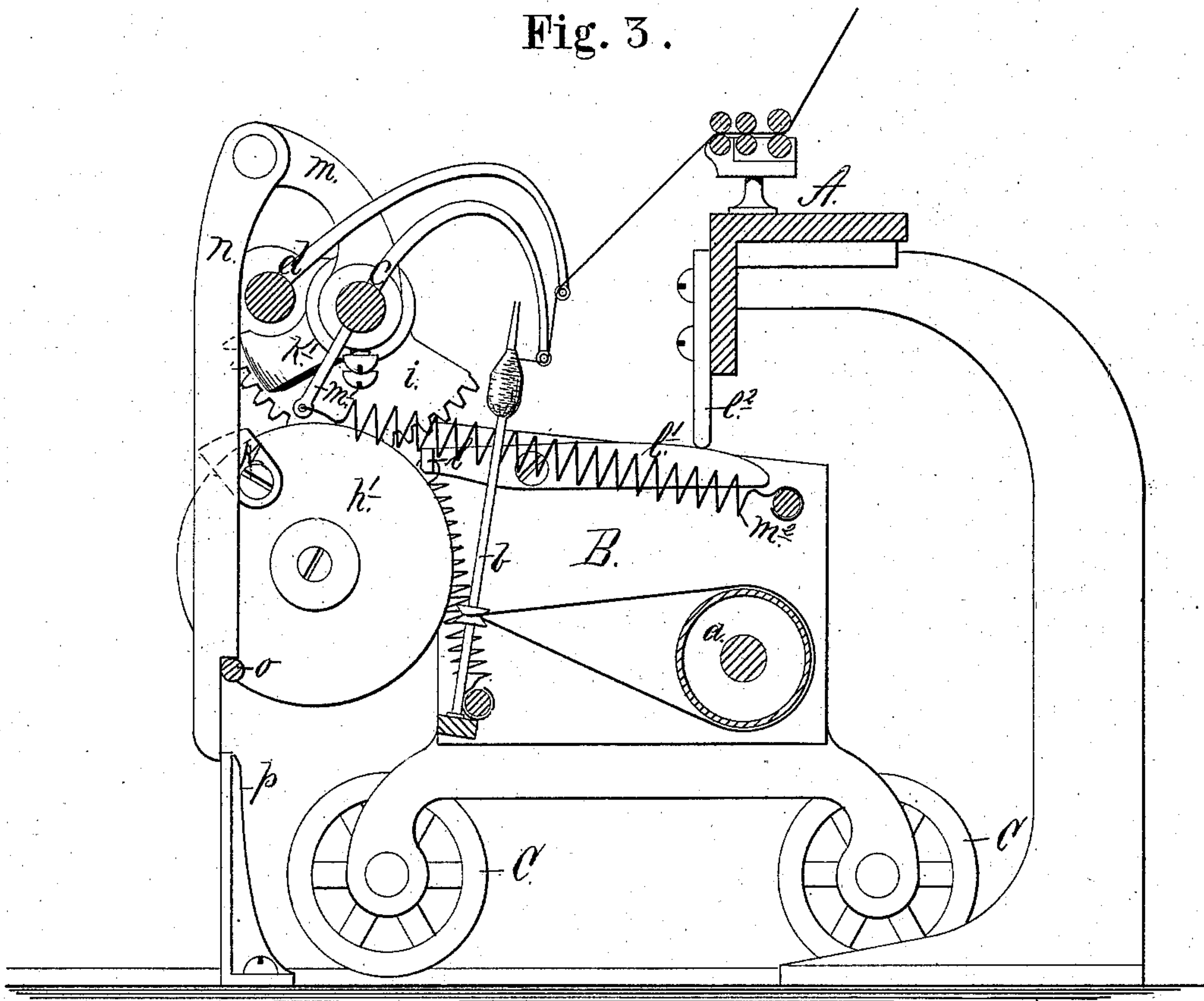
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Fig. 3.



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# UNITED STATES PATENT OFFICE.

JOHN NOONAN, OF PAWTUCKET, RHODE ISLAND.

## IMPROVEMENT IN SPINNING-MULES.

Specification forming part of Letters Patent No. **214,690**, dated April 22, 1879; application filed June 20, 1878.

*To all whom it may concern:*

Be it known that I, JOHN NOONAN, of Pawtucket, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Spinning-Mules; and I hereby declare that the following is a full, clear, and exact description of the same, which will enable others versed in the art to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

This invention has reference to improvements in spinning-mules, and particularly to that portion of the mule-carriages known as the "upper or shaper faller," being the wire extending the length of the carriage, and bearing on the yarn, so as to guide the same properly onto the spindles and form the cops. This wire or faller usually rises above the spindles at the end of the inward traverse of the mule-carriage, and slack yarn hangs from the upper end of the cop to the bite of the delivering or front rolls. This yarn is liable to kink, and such kinked yarn will not run freely from the shuttle. To prevent this kinking is the object of this invention; and it consists in the application of mechanism to the shaft of the upper or shaper faller, and suitable gearing connecting this mechanism with the spindle-driving cylinder, so that the rising of the upper faller is controlled by the driving-cylinder, and the yarn following the faller-wire is laid on the spindles in open spirals to the tops of the spindles, and a uniform tension is maintained on the yarn, as will be more fully set forth hereinafter, and pointed out in the claims.

Figure 1 is a front view of one end of a spinning-mule carriage, showing the application of the improvement and its connection with the spindle-driving cylinder and the upper faller. Fig. 2 is an end view of the carriage of a mule spinning-machine, showing the improved mechanism connecting the upper faller with the spindle-driving cylinder, the carriage being shown on its outward traverse when spinning and twisting the yarn. Fig. 3 is a sectional view of a mule-carriage, shown close to the roller-beam on its inward traverse, winding the yarn on the spindles, and at the moment when the clutch has connected the sector-gear on the upper faller-shaft with the

gears connecting with the driving-cylinder. The faller rises gradually while the spindles turn and wind the yarn.

In the drawings, A represents the roller-beam of a mule spinning-machine; B, one of the mule-carriages, and C the wheels of the same. *a* is the spindle-driving cylinder; *b*, one of the spindles; *c*, the shaft to which the upper-faller arms are secured, and *d* the shaft to which the lower-faller arms are secured. *e* is a bevel-gear secured to the end of the shaft of the spindle-driving cylinder. *f* is a shaft, provided with the bevel-gears *f'*, one on each end. *g* is a bevel-gear secured to a short shaft, on which the clutch *h* is secured.

*k* is a cam secured to the flange of the clutch-gear *h'*, which cam, when it comes in contact with the projecting cam *k'*, secured to the segmental gear *i*, will disengage the clutch by sliding the clutch-gear *h'* laterally.

*l* is a lateral extension of the hinged lever *l'*, extending to the rim of the clutch-gear *h'*, and resting on the same, being kept in contact therewith by a coiled spring or its equivalent. The arm *l* is provided with a shoulder, which rests against the flange on the clutch-gear *h'* when the same is disengaged and held in the position shown in Fig. 1. This arm *l*, when raised, releases the clutch-gear *h'*, and the spring *h''* connects the same with the clutch *h*.

The upper faller, when disengaged by the shaper mechanism, is controlled in rising by the spindle-driving cylinder, and it cannot rise faster than the driving-cylinder turns the clutch *h*, with which it is connected.

The combined clutch and gear *h'* is automatically thrown in engagement with the continuously-revolving clutch *h* by the following mechanism.

The end of the arm *l* of a hinged lever rests against the flange of the combined clutch and gear *h'* when said arm is in a depressed position, and thus retains the clutch *h'* out of engagement with revolving clutch *h*.

When the carriage is moved beneath the roller-beam A the raised end *l'* of said hinged lever strikes an adjustable stop, *l''*, which latter operates to depress the end *l'* and raise the opposite end or arm, *l*, of the lever, moving the latter out of engagement with the com-



bined clutch and gear  $h^1$ , and allowing the spring  $h^2$  to force the clutch  $h^1$  laterally on its shaft and connect the same with the continuously-revolving clutch  $h$ , and, by gearing connected therewith, with the spindle-driving cylinder.

Connected with the shaft  $c$  of the upper or shaper faller is the arm  $m$ , to which the stop-arm  $n$  is hinged, the lower part thereof resting upon the pin  $o$ .

When the carriage has reached the desired point of its inward traverse the arm  $n$  comes in contact with the stop  $p$  at the same time when the clutch is connected, and thus the faller-shaft, connected with the clutch-gear  $h^1$  by the segmental gear  $i$ , is connected with the spindle-driving cylinder, which allows the faller to rise, and, being controlled in its motion by the driving-cylinder, the yarn is laid on the spindles, and all the slack is taken up without kinking the yarn.

To more clearly define the invention it must be understood that the upper or builder faller in all kinds of mule spinning-machines is now controlled in its motion by suitable mechanism, so as to lay the yarn on the spindles and form cops, and that in all spinning-mules this motion of the faller is controlled by the shaper-cam; further, that all spinning-mules are provided with a spindle-driving cylinder or cylinders in each carriage and a faller-shaft,  $c$ . This invention is therefore applicable to all spinning-mules.

In the drawings, the mechanism for controlling or operating the upper or shaper faller is not shown, as such forms no part of my invention, which applies solely to means for controlling the shaper-faller when rising above the cop at the end of the inward traverse, so that the yarn is wound on the spindles as the faller rises.

When this improvement is connected with the upper faller and the driving-cylinder the clutch  $h$  revolves when the spindles revolve, it being directly geared to the driving-cylinder. If the clutch-gear  $h^1$  is connected with the clutch  $h$  while the upper faller is controlled, and before it is allowed to rise above the cop, the clutch-gear  $h^1$  will slide laterally, being held by the coiled spring  $h^2$ ; but when the faller is released and allowed to rise rapidly the motion is controlled by the clutch  $h$ , and through the same by the spindle-driving cylinder.

If the clutch-gear  $h^1$  is connected with the clutch  $h$  at the moment when the upper faller is about to rise above the cop, the motion of the spindles, and the upper or shaper faller are controlled by the spindle driving-cylinder. As the upper faller is arranged to rise only while the last coils of the yarn are being wound on the spindles, it operates to prevent all slack in the yarn, and hence obviates the kinking of the same.

If desired, motion may be imparted to the spindles through the faller-shaft, and the faller allowed to rise at that moment when, after having reached the limit of the inward traverse, the spindles cease to revolve for a short time by securing to the arm  $m^1$  a coiled spring,  $m^2$ , of sufficient power. When the faller is released, and the clutch  $h^1$  is in gear, the motion of the faller will turn the spindles through the gears described and the yarn will be wound, following the faller as it rises, and all slack avoided.

I am aware that the builder-fallers in mule spinning-machines have before my invention been controlled so as to prevent the kinking of the yarn, and I do not claim this broadly as my invention.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination, with the spindle-driving cylinder or cylinders of a mule-carriage, of the segmental gear  $i$ , clutch-gear  $h^1$ , clutch  $h$ , and gears connecting with the driving-cylinder spring  $h^2$ , the lever  $l^1$ , adapted to be thrown in or out of engagement with the clutch-gear  $h^1$  and stop  $p^2$ , substantially as set forth.

2. The combination, with the upper-faller shaft,  $c$ , segmental gear  $i$ , spring-pressed clutch-gear  $h^1$ , and clutch  $h$ , of the cams  $K$  and  $K'$ , substantially as set forth.

3. In a mule spinning-machine, the combination, with the spindle-driving cylinder or cylinders and counter-shaft and intervening gearing, of a clutch rigidly secured to said counter-shaft, a sliding clutch-gear mounted thereon, and gearing connecting the upper-faller shaft with said sliding clutch-gear, substantially as set forth.

JOHN NOONAN.

Witnesses:

JOSEPH A. MILLER,  
JOSEPH A. MILLER, Jr.