(No Model.) 3 Sheets—Sheet 1.

W. ASHNESS.

FRICTION REGULATOR FOR REVERSING MOTION OF SPINNING MULES.

No. 469,414. Patented Feb. 23, 1892.

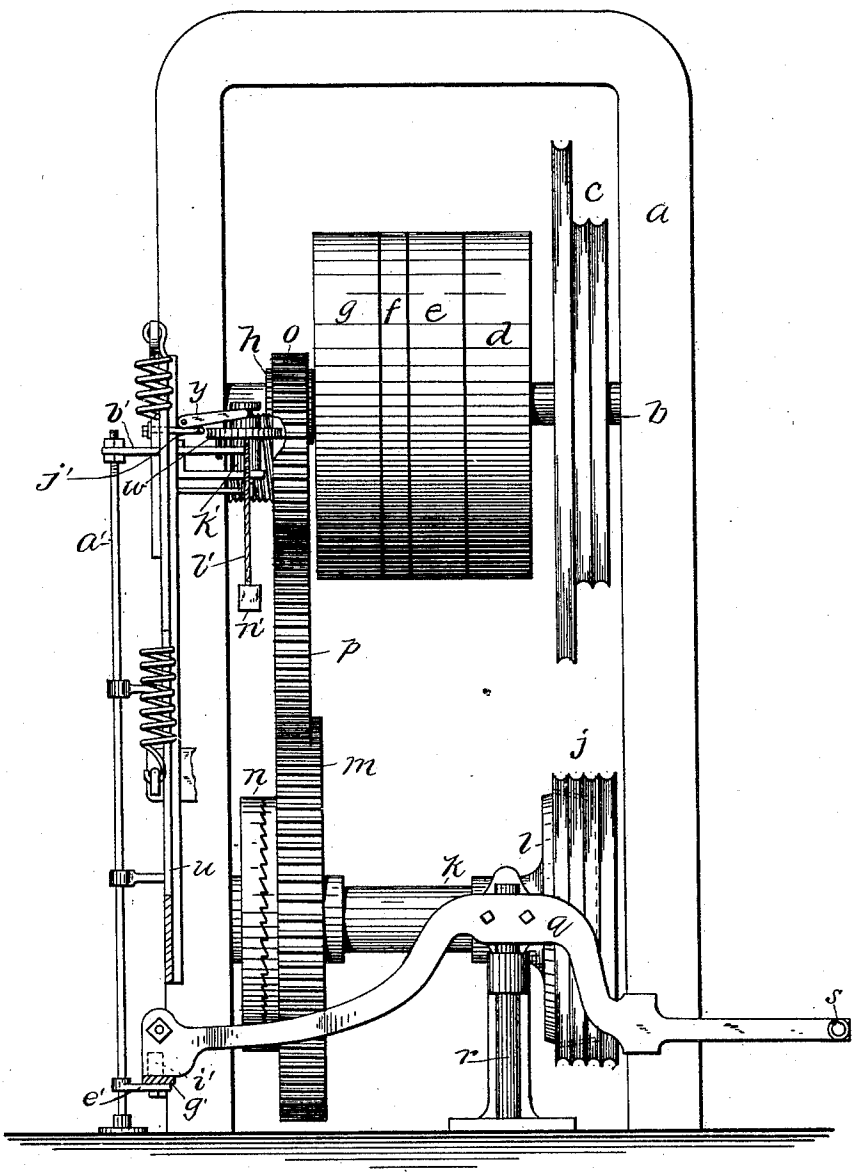

Fig. 1.

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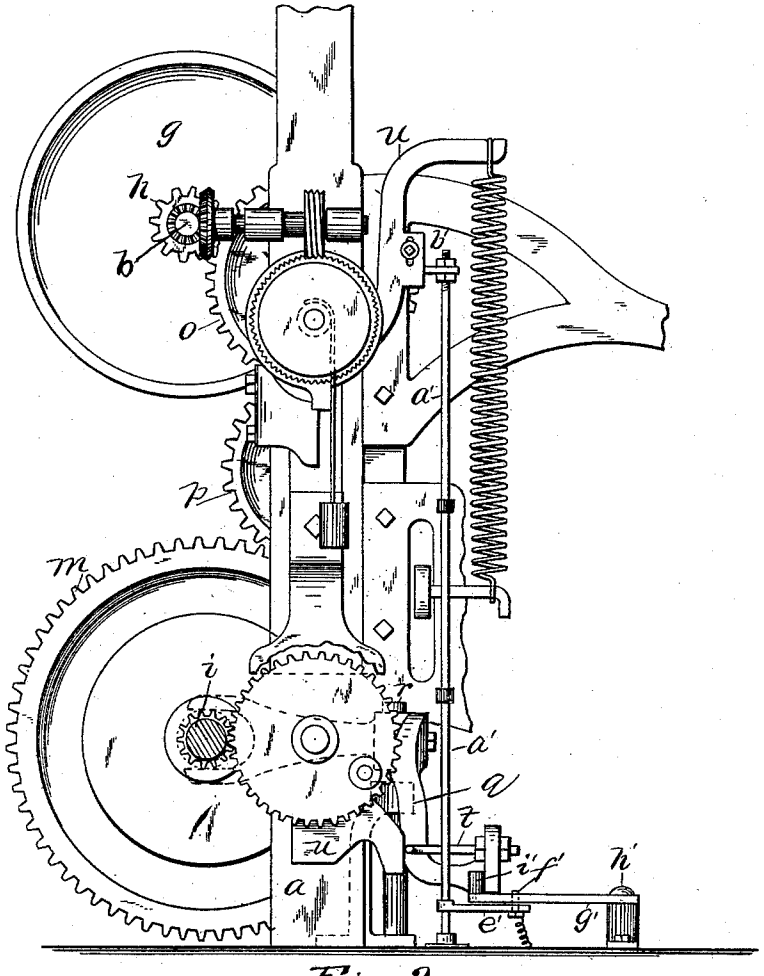

Fig. 2.

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(No Model.) 3 Sheets—Sheet 3.

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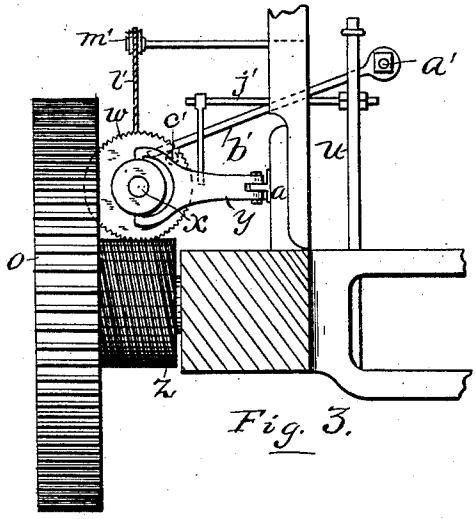

Fig. 3.

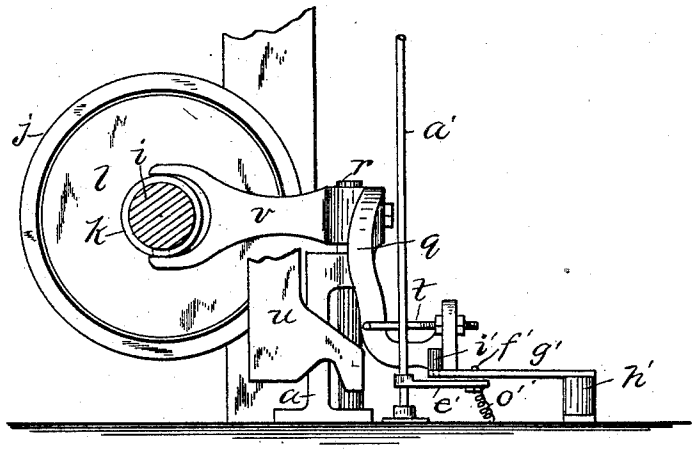

Fig. 4.

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UNITED STATES PATENT OFFICE.

WILLIAM ASHNESS, OF ANDOVER, MASSACHUSETTS.

FRICTION-REGULATOR FOR REVERSING MOTION OF SPINNING-MULES.

SPECIFICATION forming part of Letters Patent No. 469,414, dated February 23, 1892.

Application filed September 21, 1891. Serial No. 406,353. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM ASHNESS, of Andover, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Friction-Regulators for Reversing Motion of Spinning-Mules, of which the following is a specification.

My invention has relation to spinning-mules generally, and is particularly well adapted for application to what is commonly known among spinning artisans as the "Davis and Furber mule."

In the process of mule-spinning it is usual in the spinning of a stretch of yarn, during the first part of the outward run of the carriage and while the roving is being delivered, to run the spindles at a comparatively slow speed, then to ship the belt and run the spindles at a comparatively high speed to finish the twist, then to again ship the belt and suddenly stop the twisting operation of the spindles, reverse the motion of the latter, "back off," and wind the yarn upon the cop on the inward run of the carriages. In changing from the twisting operation when the spindles are run at their highest speed to the back-off motion, in which the movement of the spindles is reversed, the operation is so abrupt and sudden as to have a damaging effect upon the machine as well as the spinning process. Of the breakage of ropes, belts, laces, and spindle-bands, and many other parts of the machine by far the greater number occur at the moment of change from twisting to backing off.

It is the object of my invention to overcome the difficulties and objections before mentioned, and this I accomplish by providing means whereby the backing-off clutch may not be thrown into operation until after the twisting motion of the machine shall have been gradually "slowed down."

The invention will first be described in connection with the annexed drawings and letters of reference marked thereon, forming a part of this specification, and then be pointed out in the claims.

In the said drawings, Figure 1 is a front view of a portion of a mule-head having my improvements applied thereto. Fig. 2 is a sectional side view of the same. Fig. 3 is a detail top plan view of the timing device, hereinafter more particularly described. Fig. 4 is a side view in detail of the clutch-sleeve shipping means and devices immediately connected therewith.

Similar letters of reference designate similar parts or features, as the case may be, wherever they occur.

In the illustration of my invention I have, for the sake of clearness, omitted to show more of the old parts of a spinning-mule than is necessary to an understanding of my improvements.

In the drawings, *a* designates a portion of the frame of the mule-head.

b is the driving or main shaft, upon which is mounted the rim-band wheel *c*, the fast-speed pulley *d*, the slow-speed pulley *e*, the backing-off and drawing-in pulley *f*, the loose pulley *g*, and the drawing-in pinion-gear *h*.

i designates the center shaft, upon which is mounted the rim-band pulley *j*, constructed to serve, also, as a female friction-clutch part, the clutch-sleeve *k*, provided upon one end with a male friction-clutch part *l*, adapted to cooperate with the female clutch part, the drawing-in gear *m*, and the drawing-in clutch *n*. The gear *m* and movable part of the clutch *n* are connected with the clutch-sleeve *k*.

o p are idle-gears connecting the drawing-in pinion *h* with the drawing-in gear *m*.

q is the back-off shipping-lever, which is fulcrumed upon a stud or standard *r*, a spring *s* (partially shown in Fig. 1) being connected with one end and the other end being provided with an inwardly-projecting finger *t*, adapted to bear against the lower edge of the twist-slide *u* when the latter is in raised position, as is represented in Fig. 2. The other right-angled arm *v* of the said lever is forked or bifurcated and is arranged to operate in a groove of the clutch-sleeve *k*. (See Fig. 4.)

w designates a worm wheel or disk adapted to turn on a journal-stud *x*, connected with a bracket *y*, pivotally connected with the frame *a*. The said disk *w* when in lowered position is arranged to be engaged and turned by the worm-sleeve *z*, connected with the idle-gear *o*.

a' is a rock-rod vertically arranged in bearings connected with the frame and provided at its upper end with a finger *b'*, extending horizontally to a point beneath the disk *w*, so that in the rotation of the latter a pin *c'*, ar-

ranged in one of the holes d', formed in the disk, may be brought into contact with the said finger, move it, and rock the rod a'. The said rod is provided at its lower end with a horizontal arm e', in the free end of which is a pin f', which extends through a slot (not shown) formed in an arm g', pivoted at one end upon a stud h', the opposite end of the said arm g' being provided with a stud i', which is adapted to be moved back of and away from the adjacent end of the shipping-lever q.

j' designates an angular arm connected with the upper end of the twist-slide u and extending under the bracket y to raise and lower the same as the said slide is raised and falls. The disk w is provided with an elongated hub k', (see Fig. 1,) with which one end of a cord l' is connected. The said cord extends over a pulley m' and is provided on its free end with a weight n'.

The use of my invention in the operation of spinning a stretch of yarn may be described as follows: Upon starting the carriage upon its outward run and while the roving is being delivered from the rolls the driving-belt will be upon the pulley e and the spindles will be operated by the smaller of the rim-band pulleys c at a comparatively slow speed. After the delivery of roving shall have ceased or subsequent thereto the driving-belt may be shipped from pulley e to pulley d and the spindles will be driven at a relatively high rate through the medium of the larger of the rim-band pulleys c and connections. Just before the twisting operation is completed the belt will be shipped from pulley d to the pulleys $f\,g$, which normally have no effect by way of operating the machine. Upon this last-mentioned shipping of the belt being effected the twist-slide u will be released and drawn down in the usual way, leaving the finger t free from contact therewith, as shown in Fig. 4; but the pin i' on arm g', resting behind the end of the shipper-lever q, will still hold the said lever against movement by the spring s. When the twist-slide u drops, the angular arm j' will also be drawn down, lowering the bracket y, so that the worm-disk w will be brought into engagement with the worm-sleeve z, resulting in the turning of the said disk until the pin c' is brought into contact with the free end of the finger b'. After the belt is shipped from the pulley d to the pulleys $f\,g$ and before the operation of the clutch mechanism the rotation of the spindles and consequent twisting of the yarn will continue under the momentum of the machine; but the movement of the latter will be gradually, though rapidly, slowed down. It is during the action of the machine under this momentive force and while its speed is being gradually decreased that what I term the "timing mechanism," consisting of the worm-disk w and its adjuncts, is operated. When the pin c' comes into contact with the finger b', it will press the said finger outward, move the rod a' and arm e', drawing the stud i' on the arm g' away from behind the shipper-lever q, and allow the said lever to be operated by the spring s to move the clutch-sleeve k so as to engage the male clutch part l with the co-operating female clutch part and effect a reverse motion of the spindles to accomplish the backing-off of the yarn. The lever q will now be moved by the usual means to move the clutch-sleeve k in the opposite direction, connecting the parts of the drawing-in clutch n, which will cause the running in of the carriage and the winding of the yarn on the cop. Between the time of the shipping of the belt from the high-speed pulley d to the pulleys $f\,g$ and the release of the shipping-lever q but a few moments will have elapsed. Still the time will have been sufficient to gradually check the speed of the machine and give it a tendency to stop in its movement, so that when the lever q is released to accomplish the operation of engaging the friction-clutch and effecting the backing off no appreciable jar or concussion will occur. When the lever q is moved back to normal position, the spring o' will effect a return of the rod a' and its adjuncts to their normal position. As the worm-disk w is revolved the cord l' will be wound upon the hub k', so that when the said disk is released from engagement with the worm-sleeve z (as it will be when the twist-slide u and angular arm j' are raised) the weight n', operating by gravity upon the cord, will unwind it and turn the disk back to its normal position. By adjusting the pin c' in the holes d' of the worm-disk the release of the lever q may be effected sooner or later after the shipping of the belt and the falling of the twist-slide.

The gist of my invention resides in the timing mechanism and its adjuncts, whereby the operation of the clutch-lever and backing off is delayed until after the belts for effecting the twisting of the yarn have been shipped and the operation of the machine under momentive force has to some extent been reduced in speed with a tendency to stop.

The construction and arrangement of the timing mechanism may of course be varied without departing from the nature or spirit of the invention.

Having thus explained the nature of my invention and described a way of making and using the same, though without attempting to set forth all of the forms of construction or modes of use, I declare that what I claim is—

1. A spinning-mule comprising in its construction a driving-shaft, a clutch mechanism for setting in operation the backing-off devices, a lever for operating the said clutch mechanism, a spring for moving the said lever to operate the clutch mechanism, a locking device for holding the said lever against the stress of the said spring, and a tripping mechanism and connections intermediate of

the driving-shaft and locking device for tripping the latter, as set forth.

2. The combination, with the spring *s*, clutch-sleeve *k'*, and shipping-lever *q*, of a locking device for holding the lever against the stress of the spring, the driving-shaft, a movable tripping mechanism and its connections intermediate of the said shaft and locking devices for tripping the latter, the twist-slide, and connections between the twist-slide and tripping mechanism for moving the latter out of and allowing it to move into operative position, as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 5th day of September, A. D. 1891.

WILLIAM ASHNESS.

Witnesses:
ARTHUR W. CROSSLEY,
A. D. HARRISON.