(No Model.)

2 Sheets—Sheet 1.

W. HACKALEY.

SPINNING MULE.

No. 381,069. Patented Apr. 10, 1888.

Fig. 1.

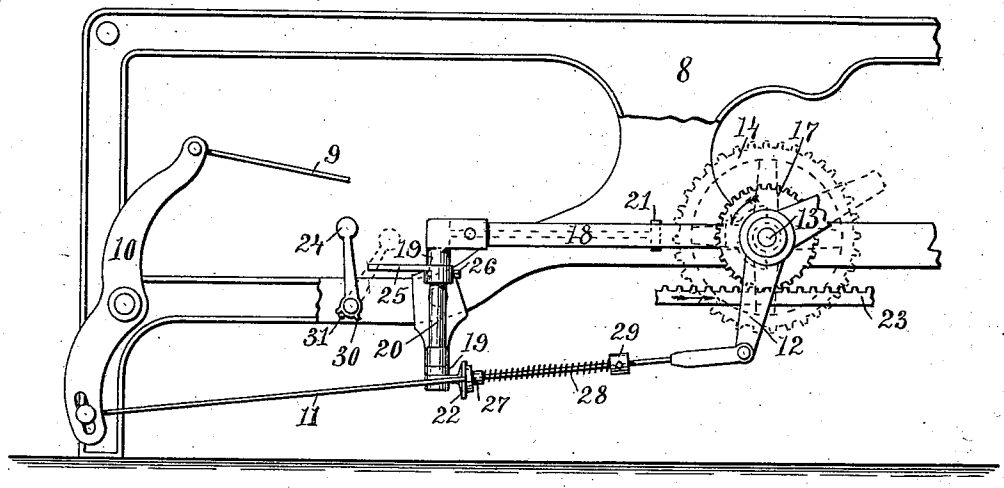


Fig. 2.

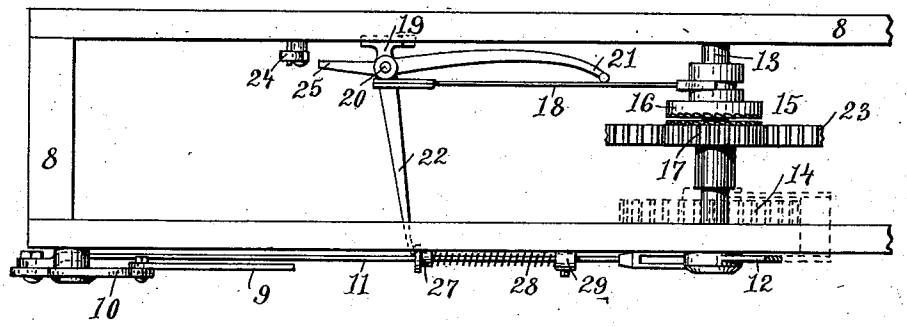
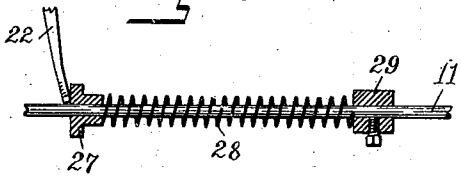


Fig. 3.



WITNESSES:

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(No Model.)

2 Sheets—Sheet 2.

W. HACKALEY.

SPINNING MULE.

No. 381,069. Patented Apr. 10, 1888.

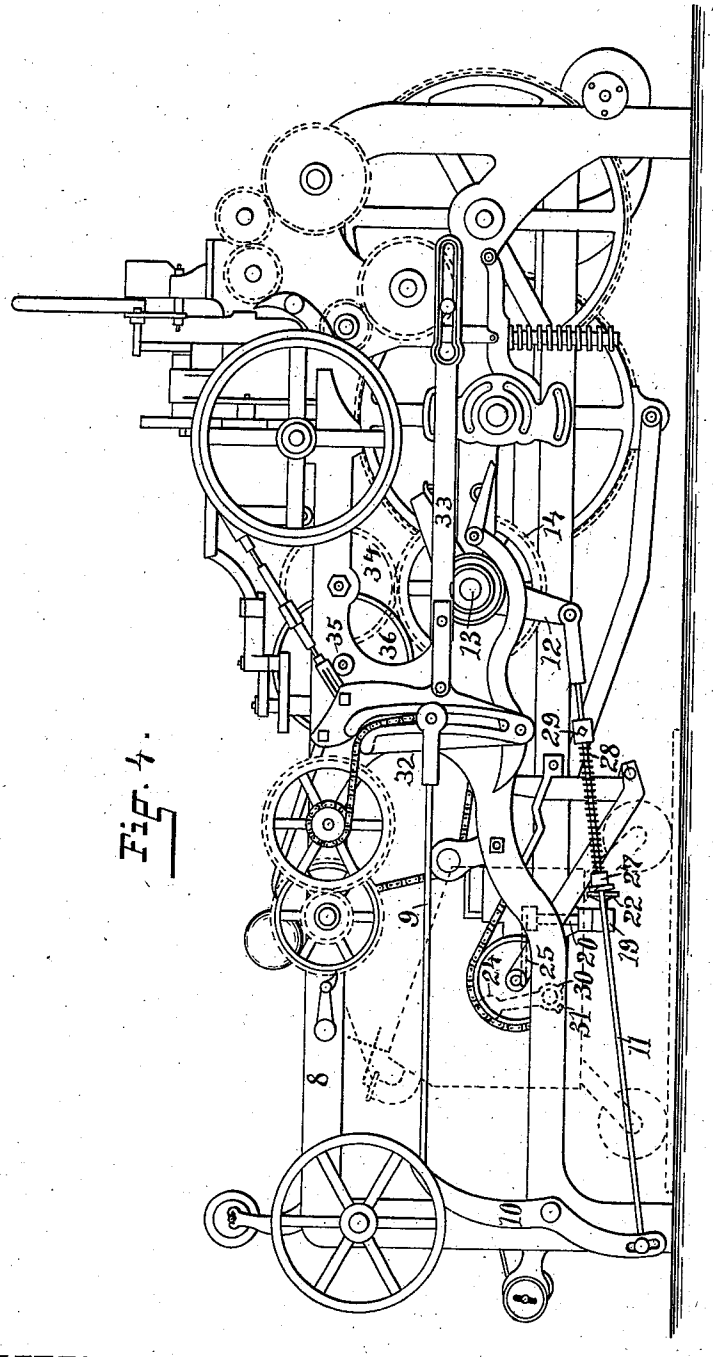

Fig. 4.

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UNITED STATES PATENT OFFICE.

WILLIAM HACKALEY, OF FALL RIVER, MASSACHUSETTS, ASSIGNOR OF TWO-THIRDS TO JOHN HACKALEY AND JAMES P. HILLARD, BOTH OF SAME PLACE.

SPINNING-MULE.

SPECIFICATION forming part of Letters Patent No. 381,069, dated April 10, 1888.

Application filed March 5, 1887. Serial No. 229,853. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM HACKALEY, of Fall River, in the county of Bristol and State of Massachusetts, have invented certain new and useful Improvements in Spinning-Mules, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

This invention relates to what is ordinarily known as a "self-acting" spinning-mule.

I have illustrated my invention in conjunction with sufficient portions of the well-known Mason mule to readily enable any one skilled in this class of spinning machinery to fully understand the co-operation of my improvements and the objects thereof.

The operations of the spinning-mule comprise three sets of motions, as follows: first, running out the carriage, turning the draw-rollers, and rotating the spindles for spinning the yarn; second, backing off or unwinding the yarn from the spindle-heads to the cops and depressing the front faller; third, running in the carriage and winding on the previously drawn and twisted yarn. The doffing of the cops from the spindles is usually performed while the carriage is at the outward limit of its travel, or after the carriage has been run in a little distance. This time is selected because the front faller has then depressed the yarn toward the base of the cop, so that after doffing the broken end of yarn can be secured to the spindle at a point where the base of the next-formed cop is to begin. In doffing it is customary, after the machine has stopped, to manipulate the machine by hand in order to turn the spindles forward and backward to wind on a little by hand and to gain sufficient slack to tie the yarn ends to the spindles, and moving the machine by hand in order to slightly operate the spindles has become such a necessity that in doffing one or two operators are required to pull upon the driving-belt to effect the desired result on the spindles. During the period of the operation of the wind-on motion and the simultaneous running-in motion in the form of mule wherein a top sliding rack having but two motions is used as a part of the winding-on mechanism it necessarily happens that the various intricate parts of machinery are in connection from the running-in pulley in the mule-head to the winding-spindles on the carriage, and when it is desired to manipulate the mule by hand during the connections just alluded to all the various connected parts must be moved, and this requires great labor.

One object of my invention is to prevent the wind-clutch from clutching and to maintain the clutch open during doffing, whereby the clutch-pinion may be idle on the wind-shaft, so that in doffing, when it becomes necessary to turn the spindles, it will only be required to move the machinery connected intermediate of the spindles and the clutch-pinion, since the parts stand disconnected at that point. My invention may be properly termed a "doffing motion."

Another object of my invention is to prevent the connections which operate the wind-clutch and which are intermediate of the wind-clutch and the back-off rod from being broken or ruptured while I keep the wind-clutch open.

To the above purposes my invention consists in the certain combinations set forth in the claims at the end of this specification, and which comprise the following mechanical devices, namely: the wind-clutch and the intermediate connections for operating the wind-clutch, a movable stop for holding the wind-clutch open, an adjustable stop-arm fixed on the connections and acting with the stop, the back-off rod, a sliding wind-clutch dog on the back-off rod, a spring for the dog, and an adjustable block for the spring to take against.

In order that my invention may be fully understood, I have illustrated in the accompanying drawings and will proceed to describe the best form of my invention so far devised by me, which form may be variously modified.

In the accompanying drawings, Figure 1 represents a side elevation of a sufficient portion of the outer end of the mule-head to demonstrate the functions of my improvements which are shown attached thereto, the ma-

chine-frame, back-off arm, and section-rod being broken off and the back-off wheel being in broken lines. Fig. 2 represents a top plan view of the parts shown in Fig. 1. Fig. 3 represents an enlarged detached view of portions of the back-off rod and the wind-clutch lever, together with my spring-acted wind-clutch dog and adjustable block for the spring. Fig. 4 represents a side elevation of a Mason mule-head having my improvement attached thereto.

In the said drawings like numbers of reference designate corresponding parts throughout.

Referring to the drawings, the number 8 designates the machine framing of the mule-head for supporting the various mechanisms situated therein. The sector-rod 9 is connected to the sector 32, which is actuated by the connecting-rod 33 in the usual manner, and the sector-rod rocks the sector 32 and back-off rocker 10, which is pivoted to the frame, and to the lower end of which the back-off rod 11 is loosely attached, while the other end of the back-off rod is pivoted to the lower end of the back-off arm 12, (shown partly in full and broken lines,) and which is loosely mounted on the wind-shaft 13, journaled across the machine-frame.

Upon the wind-shaft is keyed the back-off gear 14, (shown in broken lines,) and the wind-clutch 15 is also mounted on the shaft 13, and consists of the wind-clutch pinion 17, which is not fixed to the shaft, and the part 16, which is secured by a longitudinal feather on the shaft, and which is adapted to slide on the shaft and to always turn therewith. When the wind-clutch is open, the pinion 17 runs idle or loose, and when the clutch is closed the pinion obviously runs fast with the wind-shaft.

The immediate connections, which lie intermediate of the back-off rod 11 for operating the wind-clutch to clutch and unclutch, consist in a wind-clutch spring-fork, 18, which is fixed to the stand 19, which is secured upon the machine-frame and supports the rock-shaft 20, to one end of which is keyed the clutch-arm 21 for bearing upon the back of the spring-fork 18, which tends normally to keep the wind-clutch open, as shown. To the base of the rock-shaft is made fast the wind-clutch lever 22. When the lever 22 is moved toward the left, the rock-shaft will be rocked and will cause the clutch-arm to bear upon the clutch-fork, and thereby close the clutch, which, upon the releasing of the lever, will be opened by virtue of the spring tension of the spring-fork. In the old form of machine the moving of the wind-clutch lever to close the wind-clutch is effected by means of an adjustable wind-clutch dog mounted on the back-off rod 11, and which is made fast thereon when acting. The top sliding rack, 23, is shown in portion and lies constantly in mesh with the wind-pinion 17.

The above-described parts are old and their respective functions are well known, and the following description will be easily understood.

The drawings show the several parts of the machine in a position while the back-off motion is being performed by virtue of the sector-rod 9 being moved inwardly indirectly by the connecting-rod 33, thereby rocking the back-off rocker 10 and drawing outwardly the back-off rod 11, which serves to throw down the upper end of the back-off arm 12, provided with a pawl, (not shown,) which pawl takes into the teeth of the back-off gear 14 only during this downward motion of the back-off arm and acts to turn the back-off gear throughout the downward movement of said arm. The motion is transmitted from the back-off gear 14 to the spindles by means of an idle-gear, 34, meshing with a gear fixed upon the friction-clutch shaft 35, and as the friction-clutch 36 carries the spindle band or rope and is closed during the back-off the spindles are backed off or reversed through these means. At the completion of the back-off the wind-clutch dog 27, fixed on the back-off rod 11, is so adjusted as to push upon the wind-clutch lever 22, and thereby indirectly close the wind-clutch 15. At this time the lower rack is run inwardly, and as this moves the top rack in, the pinion 17 being now fast relative to the wind-shaft and the connected back-off gear, this movement of the top rack obviously rotates the spindles through the intermediate apparatus before alluded to, and winds on the yarn which has been previously drawn and spun.

As before stated, the doffing of the cops is usually performed when the carriage has moved in slightly from the outward limit of traverse, and under this condition of the carriage the wind-clutch is necessarily closed and the entire apparatus between the spindles and the running-in pulley is all connected when the machine is stopped for doffing, so that to turn the spindles slightly by hand all of the aforesaid apparatus must be moved, and this I deem a great defect.

It is the chief object of my invention to overcome this defect by holding the wind-clutch open during doffing, thereby disconnecting the apparatus at this point. This result I accomplish by means of using a stop which may be moved in or out of engagement with the immediate connections for operating the wind-clutch, which, when the stop is interposed, is prevented from closing. I have here shown the stop as being used to affect directly the operation of the rock-shaft 20. The stop itself consists of a movable member, 24, pivoted to the machine-frame and adapted to be thrown into engagement with the adjustable stop-arm 25, which is mounted on the rock-shaft and turns therewith, and is provided with a set-screw, 26, for holding the stop-arm in adjusted position. The stop 24 is provided at the pivoted end with the spaced lugs 30, which act in conjunction with the fixed pin 31 on the machine-frame to limit the throw of the stop in

an evident manner. Just before the machine is stopped for doffing I throw the stop 24 over into the dotted-line position of Fig. 1, so as to lie in the path of the stop-arm 25 when the wind-clutch lever is moved by the back-off rod to close the wind-clutch and obviously stop the rock-shaft and the connected clutch-arm from moving sufficiently to close the wind-clutch, thereby leaving it unclutched and holding it so while doffing, so that when the spindles have to be turned by hand only the apparatus between the same and the spindle-band, and also the closed friction-clutch, its shaft and gear, and the idle-gear and back-off gear and the wind-shaft have to be moved, thus avoiding the labor of moving all the heavier apparatus intermediate of the wind-shaft and the running-in pulley before referred to.

The employment of the character of stop I show for holding the wind-clutch open requires a yielding mechanism to be used at a place near by in order to prevent breaking or rupturing the machinery immediately connected with the wind-clutch. This need I supply by the use of a yielding wind-clutch dog, 27, sliding on the back-off rod 11, in place of the heretofore rigid dog. This sliding dog is free on the rod, and is engaged by a spiral spring, 28, coiled about the rod and abutting against the adjustable block 29, which is designed to be adjusted in order to regulate the time when the compression of the spring will be sufficient to push the wind-clutch lever to close the wind-clutch in the ordinary manner while the cops are being built. It is evident that when the stop 24 is put in play for doffing the back-off rod will operate, as usual, to push the dog against the wind-clutch lever and close the clutch; but the stop will hold the lever rigidly and the spring 28 will be compressed to compensate for the stoppage of the dog, and thus prevent the lever or other adjacent parts from being broken.

It is to be observed that my yielding wind-clutch dog will perform the requisite function of closing the wind-clutch while the machine is running and forming the cops, and is adjustable by virtue of its spring and block to regulate precisely the time for closing the wind-clutch for the wind-on. My invention permits of the yarn being easily wound upon the cops by hand to the required extent in doffing, and this is an important advantage, since thereby the likely destruction of the cop-nose is rendered less liable than heretofore.

I desire to be understood as not being confined to the exact construction I have here shown of my invention, since there are many ways in which a stop can be arranged to cooperate with the immediate connections for operating the wind-clutch for the purpose of preventing the closing of the wind-clutch, as described.

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

1. In a spinning-mule, the combination, as hereinbefore set forth, with a wind-clutch and a shaft therefor, and mechanism, substantially as described, for clutching and unclutching the wind-clutch, of a movable stop acting to prevent the wind-clutch from clutching, whereby the wind-clutch may be left open or unclutched when desired.

2. In a spinning-mule, the combination, as hereinbefore set forth, with a wind-clutch and shaft, a wind-clutch spring-fork, an arm engaging the fork, a stand or support for the fork and arm, and a wind-clutch lever for operating the wind-clutch, of a movable stop adapted to prevent the wind-clutch lever from operating the wind-clutch when the stop is in action, whereby the wind-clutch may remain open in doffing, for the purpose herein described.

3. In a spinning-mule, the combination, as hereinbefore set forth, with a wind-clutch and shaft, the back-off rod, and connections intermediate of the wind-clutch and the back-off rod for operating the wind-clutch, of a spring-acted wind-clutch dog mounted on the back-off rod and acting yieldingly on said connections, and a movable stop for holding the connections against the action of the wind-clutch dog, substantially as herein described, whereby the stop may prevent the wind-clutch dog on the back-off rod from closing the wind-clutch in doffing, for the purpose described.

4. In a spinning-mule, the combination, as hereinbefore set forth, with the wind-clutch and shaft, the back-off rod, and connections intermediate of the wind-clutch and the back-off rod, said connections provided with an adjustable stop-arm for striking the stop, of a wind-clutch dog sliding on the back-off rod and a spring for the dog, an adjustable block mounted on the back-off rod for the spring to abut against, and a movable stop for preventing the action of the wind-clutch dog from causing the wind-clutch to clutch, substantially as and for the purpose herein described.

5. In a spinning-mule, the combination, as hereinbefore set forth, of the wind-clutch and shaft, the back-off rod provided with the wind-clutch dog 27 and the spring 28, the connections intermediate of the wind-clutch and back-off rod for operating the wind-clutch, the adjustable stop-arm 25, mounted on said connections, and the movable stop 24, for preventing the action of said connections, substantially as and for the purpose herein described.

his
WILLIAM × HACKALEY.
mark.

Witnesses:
J. A. MILLER, Jr.,
M. F. BLIGH.