H. H. Goff.

Spinning Mule.

No. 42,330. Patented Apr. 12, 1864.

Fig. 1.

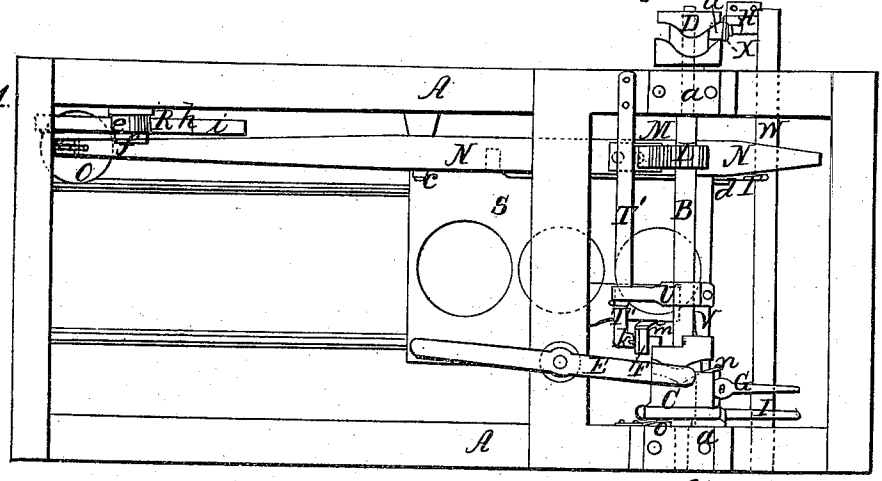


Fig. 2.

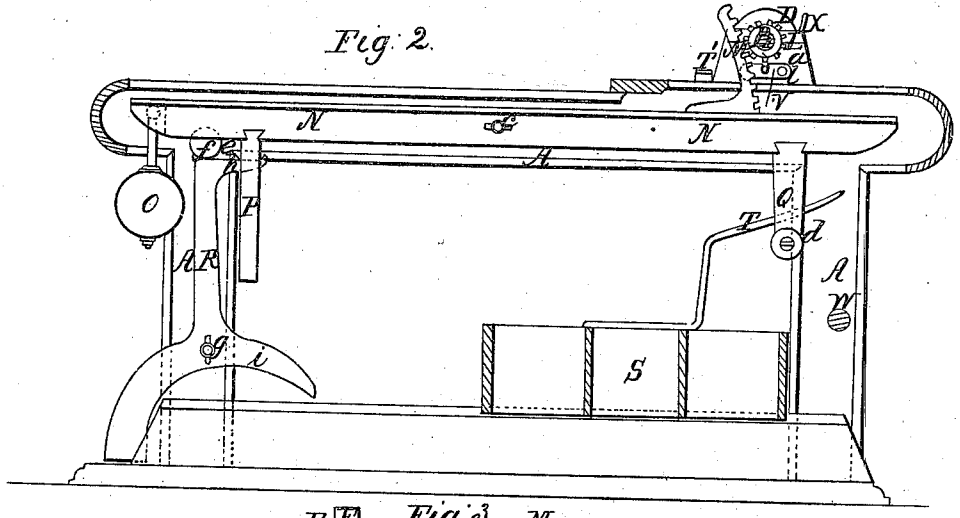
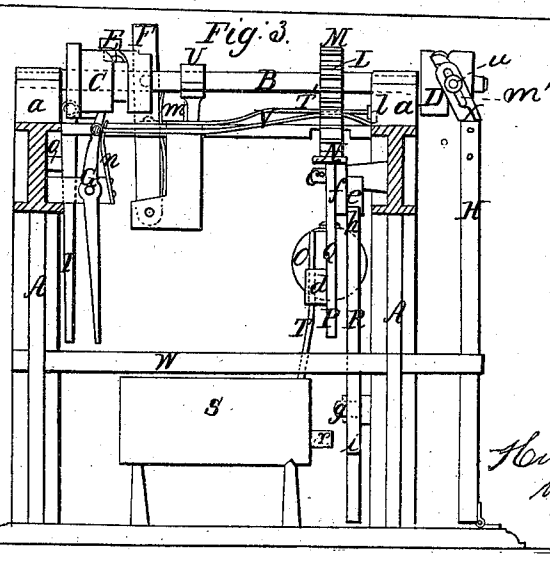


Fig. 3.



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IMPROVEMENT IN MULES FOR SPINNING.

Specification forming part of Letters Patent No. **42,330**, dated April 12, 1864.

To all whom it may concern:

Be it known that I, HIRAM H. GOFF, a resident of Lonsdale village, of the town of Cumberland, in the county of Providence and State of Rhode Island, have made a new and useful Invention having reference to Mules for Spinning; and I do hereby declare the same to be fully described in the following specification and represented in the accompanying drawings, of which—

Figure 1 is a top view, Fig. 2 a longitudinal section, and Fig. 3 an end elevation, of the said invention, its purpose being to effect the requisite changes in the operation of several parts of the mule at the termination of each movement of the mule-carriage on its railway.

I have not represented the whole of a mule in the accompanying drawings, but only those parts thereof to which my invention is specially applicable.

In the drawings, A denotes that portion of the mule-frame which serves to support my invention, there being a cam shaft, B, sustained in boxes *a a*, upheld by this portion A, and arranged therein, as shown in the drawings. This shaft is the usual cam-shaft of the self-acting mule, and carries certain cams, C D, suitably formed to effect the movements of the levers E, F, G, H, and I. The lever E is for the purpose of moving what is termed the "roller-clutch" of the mule. The lever F is for the purpose of shifting the driving-belt of the mule. The lever G is for operating the "scroll clutch," by which the mechanism for running the carriage in is put in operation. The lever H is for operating the "back-off friction," or the mechanism by which the rotary motions of the spindles are reversed. The lever I serves to put in operation the mechanism by which the carriage is run out. With these levers, their cams, and shafts, I have combined my invention, which may be described as follows: On the cam-shaft B is a gear, L, which engages with a curved rack, M, projected upward from a lever, N, which is arranged within the frame A, in manner as shown in Figs. 1 and 2, the said lever being supported on a horizontal fulcrum or pin, *c*, on which it can play in a vertical plane. To the rear extremity of the lever N a weight, O, is suspended. The said lever has also two arms, P Q, projecting down from it, and arranged as seen in Fig. 2, one of the said arms—viz., Q—being provided with a friction-roller, *d*, arranged on a pin projecting from the inner side of the arm. There is another such roller, *e*, suitably applied to a projection, *f*, extending from the rear arm of the lever N. This roller *e* operates with a weighted rocker-lever, R, shaped and arranged as shown in Figs. 1 and 2, and playing or being supported on a pin or fulcrum, *g*. This lever R has two projections, *h i*, which are formed and extended from it, as shown in Fig. 2; and, furthermore, the lower arm of the lever is a weight, made so heavy as to overbalance the rest of the lever and its projections *h i*.

S is the center head of the mule carriage or carriages. This center head and its carriages are supported by wheels running on railways, in the usual manner. Furthermore, an arm, T, projects from the center head, as shown in Fig. 2, and serves to act on the roller *d*, and serves to trip or pull down the front arm of the lever N while the center head may be running in.

T′, Fig. 1, is a spring-catch, which is fastened to the frame A, and operates with a stud, *k*, extending from the rear side of the lever F. For throwing this spring-catch out of action with the said stud *k*, there is an arm or finger, U, which projects from the cam shaft B and over the catch, as shown in Fig. 1. A long rod or latch, V, is jointed to the lever G, extends under the shaft B, and has a catch on its outer end to catch on a catch-plate, *l*, arranged as shown in Fig. 2. There is a spring, *m*, *n*, or *o*, to each of the levers F G I, such spring being for the purpose of moving the said lever in a direction contrary to that which it receives from its cam.

W (see Figs. 2 and 3) is the shaft which serves to support and operate the mechanism or portions thereof not only by which the carriage is reversed, but by which the back-off of the spindles is effected. The lever H has its fulcrum at its foot, in order that the lever may swing both toward and away from the frame A. At the upper end of the said lever H is a plate, X, through which there is a slot, *m′*, arranged at an obtuse angle with the lever, and serving to support a pin, *u*, which slides freely up and down in the slot and extends into the groove of the cam D, there being a

friction-roller on that part of the pin which projects into the groove. The object of the slotted plate X and its movable stud is to prevent the lever H from being moved by the cam D when the carriage arrives at the beam or completes its inward movement. The cam-shaft, instead of making an entire revolution, as it does in ordinary mules, has, by my invention, a reciprocating rotary motion, and therefore there must be some means of preventing the lever H from being moved by the cam D, when the carriage completes its inward movement. The inclined slot enables the stud to rise in the groove of the cam, and counteracts the movement of it which the cam would make. During the outward movement of the carriage a pin, *x*, (or its equivalent,) projecting from the center head will be carried into contact with the part *i* of the rocker-lever R, and will so move the rocker-lever from the roller *e* as to enable the weight O to depress the longer arm of the lever N, and thereby cause the curved rack, by its action on the pinion or gear L, to put the cam-shaft B in rotation in one direction. During the return movement of the carriage the arm or dagger T will be so moved against the upper part of the periphery of the roller *d* as to depress the shorter arm of the lever N, and of course elevate the longer arm of such lever, which will be caught and held up by the rocker-lever, which will be moved back by the gravitating power of its weighted lower arm. This latter movement of the lever N will cause the curved rack, by its action on the gear, to rotate the cam-shaft in an opposite direction. The upward movement of the shorter arm of the lever N causes the elevation and unlatching of the latch V from its catch-plate, on which it will have been previously latched by the lever G. The unlatching of the latch V enables the spring of the lever G to move the said lever. While the carriage may be running in, the finger U will be turned down, so as to unlatch the catch T′ from the stud *k*, thereby setting the lever F free. When the carriage of the mule has been run out, the carriage friction apparatus and the roller-clutch are thrown out of action, and the driving belt is moved from the "driving-out" to the "driving-in" pulley. The back-off friction apparatus is also put in operation, and causes the spindles to reverse their movements. The carriage is now prepared to be run in, which will be effected by throwing out of action the back-off friction apparatus and by throwing the scroll-clutch into action. On the arrival of the carriage at the beam the scroll-clutch is to be thrown out of action, the carriage friction apparatus and the roller-clutch being again thrown into action, and the driving-belt being shipped to the driving-out pulley. These same operations are continued for each stretch of the mule-carriage. Heretofore these effects have been produced by a long lever, a spiral spring, a contact-pulley, a leather friction-pulley, a "boot," a lever-spring, an elbow, a rubber spring, a stud, and a pitman or "dagger," they causing the cam-shaft B to make an entire revolution during each stretch of the carriage—that is, while the carriage may be running out and in.

In carrying out my invention I have dispensed with all of these mechanical contrivances, except the long lever and the dagger or arm, they being used as shown at N and T in Fig. 2, and I employ the gear L, rack M, the weight O, the spring-catch T′ and its stud *k*, the latch V, the finger U, and the slotted inclined plate X and its movable stud or pin *u*, all of which are arranged and applied as hereinbefore specified, the cam-shaft B having imparted to it, as hereinbefore stated, reciprocating instead of continuous rotary motions.

The advantages of my invention, comparatively speaking, are, the attainment of less expense of mechanism, certainty of action, and little or no noise, better winding of the cops, less liability of breakage of the mule-head, less repairs, and a greater production of yarn under like velocities of the spindle.

I claim as my invention—

The combination of the lever N, dagger or arm T, gear L, rack M, weight O, spring-catch T′, with its stud *k*, the latch V, the finger U, the slotted inclined plate X, and its movable stud or pin *u*, the whole being applied to the cam-shaft and the levers as hereinbefore described, and so as to operate substantially as specified.

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