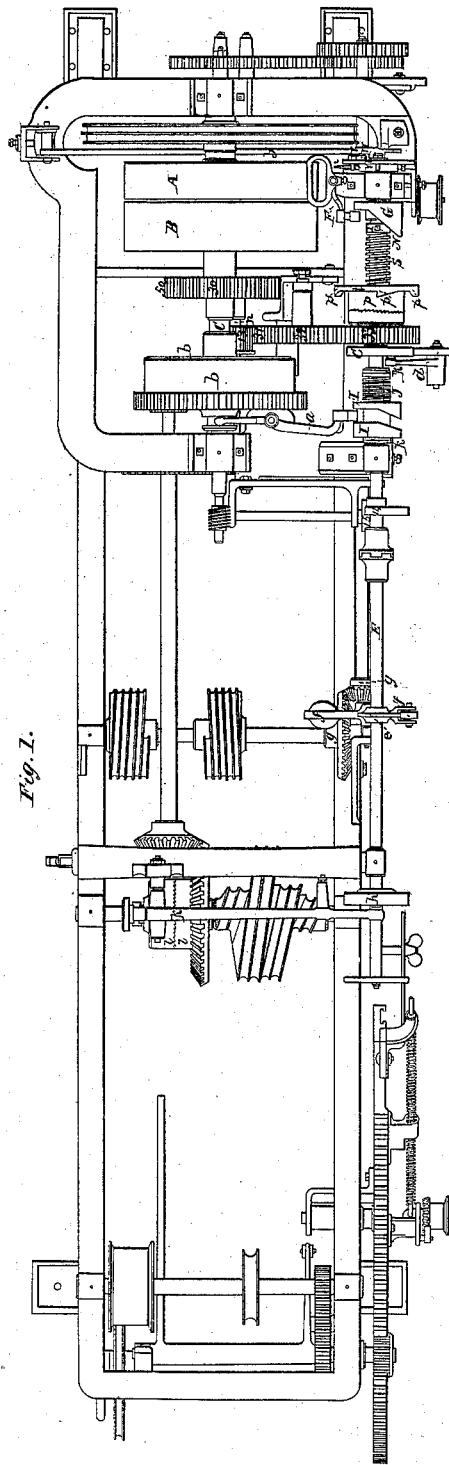


W. C. Darol.
Spinning Mule.

N: 54,699.

Patented May 15, 1866.



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Sheet 2 - 2 Sheets.

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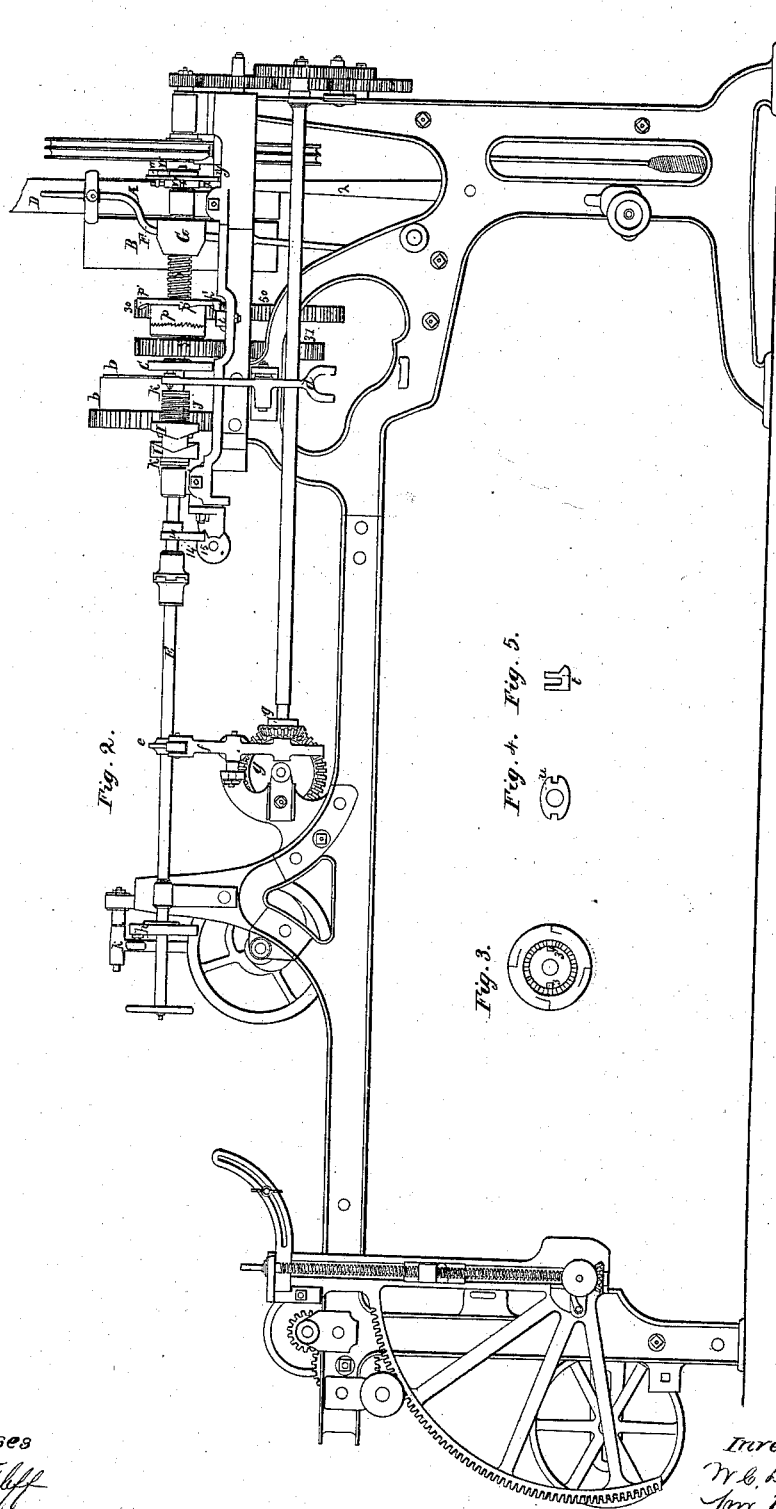


Fig. 2.

Fig. 4. Fig. 5.

Fig. 3.

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UNITED STATES PATENT OFFICE.

WILLIAM C. DAVOL, OF FALL RIVER, MASSACHUSETTS.

IMPROVEMENT IN SPINNING-MULES.

Specification forming part of Letters Patent No. 54,699, dated May 15, 1866.

To all whom it may concern:

Be it known that I, WILLIAM C. DAVOL, of Fall River, in the county of Bristol and State of Massachusetts, have invented certain new and useful Improvements in Spinning-Mules, the machine here in part represented, and to which my invention is applied, being known as the "Sharp & Roberts Self-Acting Mule for Spinning Cotton or other Fibrous Substances;" and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making part of this specification, in which—

Figure 1 is a plan or top view. Fig. 2 is a side elevation of the head-stock of the mule containing the cam-shaft with my new combination of mechanism for turning the same. Figs. 3, 4, and 5 represent certain parts in detail, which will be hereinafter described.

In each of these figures like parts are designated by the same letters or figures.

The nature of my invention consists, among other things, in an improved mode of turning and operating the cam-shaft of mules. In addition to the ordinary escape-plate on that shaft, I use a second escape-plate, which acts in connection with a fixed stud, and combine these parts with a system of geared wheels, a clutch-box, the usual escape-lever stop-finger and its plate, and a helper-spring for the purpose of operating the cam-shaft. These several parts are arranged and combined to operate together for turning the cam-shaft one-quarter of a revolution at intervals, in order to put the different parts of the mule into and out of gear.

To enable those skilled in the art to fully understand and construct my invention, I will proceed to describe it with its immediate connected parts. That part of the mule-head which lies to the left of the stop-finger 14 in Figs. 1 and 2 is only represented to show the connection, but my improvement is found only in that part which lies to the right of the stop-finger. The parts of said figures to the left of said stop-finger are therefore to be considered surplusage, and not necessary to the illustration of my invention.

In Figs. 1 and 2, A is a fast, and B a loose, pulley on the shaft C, which is commonly called the "rim-shaft." From this shaft motion is communicated to the respective parts of the apparatus by suitable gearing.

In Fig. 2, D is a strap connected with a pulley from a counter-shaft of the mill for driving the mule. This strap is made broad enough to partially cover the loose gearing-pulley B on the shaft C, thus keeping it in motion. On the shaft E, which is called the "cam-shaft," and which is parallel with the rim-shaft C, there are five cams for the purpose of connecting and disconnecting the different parts of the mule with the main shaft.

The double cams I I and spiral spring J, with adjustable nuts K K, serve to give motion at the proper times to the backing-off wheel. Another cam, c, puts the front roller clutch-box in and out of gear. The other cams (marked e and h) will not be described, since they are not represented in the model.

The escape-wheel *p'* has four escapements, as shown in Fig. 3. These escapements are equidistant from the center of the cam-shaft, and are also arranged at equal distances from each other. The escape-wheel itself is fixed on the movable part of the catch or clutch P. During the revolution of the shaft, whenever one of the escapements of the wheel *p'* comes in contact with the fixed latch or stud *t*, (seen in detail in Fig. 5,) the escape-wheel and the movable part of the clutch are moved endwise on the cam-shaft and the clutch is put out of gear. By reason of the equal distribution of the escapements on the wheel *p'*, as above stated, it follows that they will always, at regular intervals of the revolution of the said wheel, come in contact with the said latch or stud *t*. One of the advantages of this construction and arrangement, and of using a fixed instead of a movable stud to throw the clutch P out of gear, is that the movements are thereby effected with greater positiveness and accuracy, and the several parts are less liable to get out of order and less liable to displacement, and no devices are required to hold the cam-shaft from turning while the second twist is being put in the yarn after the mule-carriage has made a stretch, because at that time the clutch is held out of gear by means of the stud and the escape-plate *p'*.

The new combination in the arrangement of geared wheels and clutch-box with the escape-plate clutch-box *p*, combined for turning the cam-shaft E, is as follows: Attached to the hub of the loose pulley B is a spur-wheel, 30, (shown in Figs. 1 and 2,) that drives the wheel 50, which is keyed to a short shaft, *n*. On this

same shaft is another spur-wheel, 13, driving the intermediate wheel 31, which turns loosely on a stud and gives motion to another intermediate wheel, 32, which also turns loosely on a stud and drives the wheel 33. This gear-wheel 33 has a catch-box attached firmly to it, which turns loosely on the cam-shaft E when otherwise unacted upon by its counterpart escape-plate *p* and clutch-box P, which latter is connected with the cam-shaft E by a feather, 3, in the clutch-box, as shown in Fig. 3, which clutch-box is fitted to slide endwise on the cam-shaft in one direction by the force of the spiral spring *s*, and in the opposite direction by the riding of the inclines of escapement *p* against the fixed latch or stud *t* through a notch in the disk *n*, (shown in Fig. 4,) and which is keyed to the cam-shaft E inside of the escapement clutch-box, which turns the cam-shaft E, when put into gear with its loose counterpart 33. The escape-plate and clutch-box *p* (shown in Figs. 1 and 2) has four escapement inclines projecting from the clutch-box side of the plate, and equally distant from each other and of equal distance from the center of the escape-plate. It also has a long hub projecting back, surrounded by a spiral spring, S, one end of which presses against the plate and the other end against the adjustable collar *r*, which is made fast to the shaft E by a set-screw, V.

The mode in which the two escape-plates and clutch-box combined are operated upon for turning the cam-shaft E one-quarter of a revolution at intervals, in order to put the different parts of the mule in and out of gear, is as follows: On the back of the first escape-plate, W, which is fixed to the back end of the cam-shaft E, are four cylindrical pins, *x x x x*, successively acted upon by the helper-spring 2, (shown in Fig. 2,) which is placed in such a position with regard to those pins as to turn the cam-shaft E, with the second escape-plate or wheel, *p*, and clutch-box P, a little way in the direction of the arrow in several instances in the operation of the machine, namely: first, whenever the projection near the end of the escape-lever *y* is removed by any ordinary means, not necessary to be here stated, from being in contact with any one of the three projections *w w w* on the first escape-plate, W, which projections are at different distances from the center of the escape-plate W; secondly, whenever the end of the stop-finger 14, that is fixed to the cam-shaft E, is permitted by the revolution of the stop-plate 15 to pass through the notch in the stop-plate 15, for in this condition, by

the action of the helper-spring 2, (shown in Fig. 2,) the escape-plate and clutch-box P *p'* are turned a little way, thus causing one of the four wedge-shaped escapements on escape-plate *p'* to be liberated from the fixed latch *t*, (partly shown in Fig. 2, also see Fig. 5,) and allows the spiral spring *s* to force the escape-plate clutch into gear with its counterpart clutch-box and gear 33, which turns the cam-shaft E around until another of the wedge-shaped escapements comes in contact with the fixed latch or stud *t*, which, with the aid of helper-spring 2, forces it out of gear, in which position it is held either by the stop-finger 14, which comes in contact with the face of the stop-plate 15, or by one of three projections on the first escape-plate, W, coming against the projection near the end of the escape-lever *y*, which holds the cam-shaft E from being turned until either the stop-plate 15 or the escape-lever *y* is removed by the operation of the mule, as occasion requires.

I disclaim the invention claimed by H. S. Bartlett in his patent dated April 12, 1864.

I claim as new and desire to secure by Letters Patent—

1. The escape wheel or plate *p'* on the clutch P, constructed and operated substantially as described, for the purpose of engaging and disengaging the clutch P at stated intervals, in combination with the fixed stud, the escape-plate W, and helper-spring 2, as above set forth.

2. The fixed latch or stud *t*, in combination with the escapements of the escape-wheel *p'*, substantially as described, for the purpose of moving and holding the escape-plate clutch-box P out of gear at intervals.

3. The combination of the escape-wheel *p'* and the clutch-box P with the stop-finger 14 and stop-plate 15, for turning the cam-shaft E at intervals, substantially as described.

4. The combination of the escape-wheel *p'* and the clutch-box P with the escape-plate W, escape-lever *y*, and helper-spring 2, substantially as described.

5. In combination with the escape-plate W, the helper-spring 2, the escape-lever *y*, the stop-finger 14, the stop-plate 15, and the catch or clutch-box P, with its escapement *p'*, arranged substantially as above shown.

The above specification of my invention signed by me this 25th day of May, 1865.

WILLIAM C. DAVOL.

Witnesses:

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C. L. TOPLIFF.