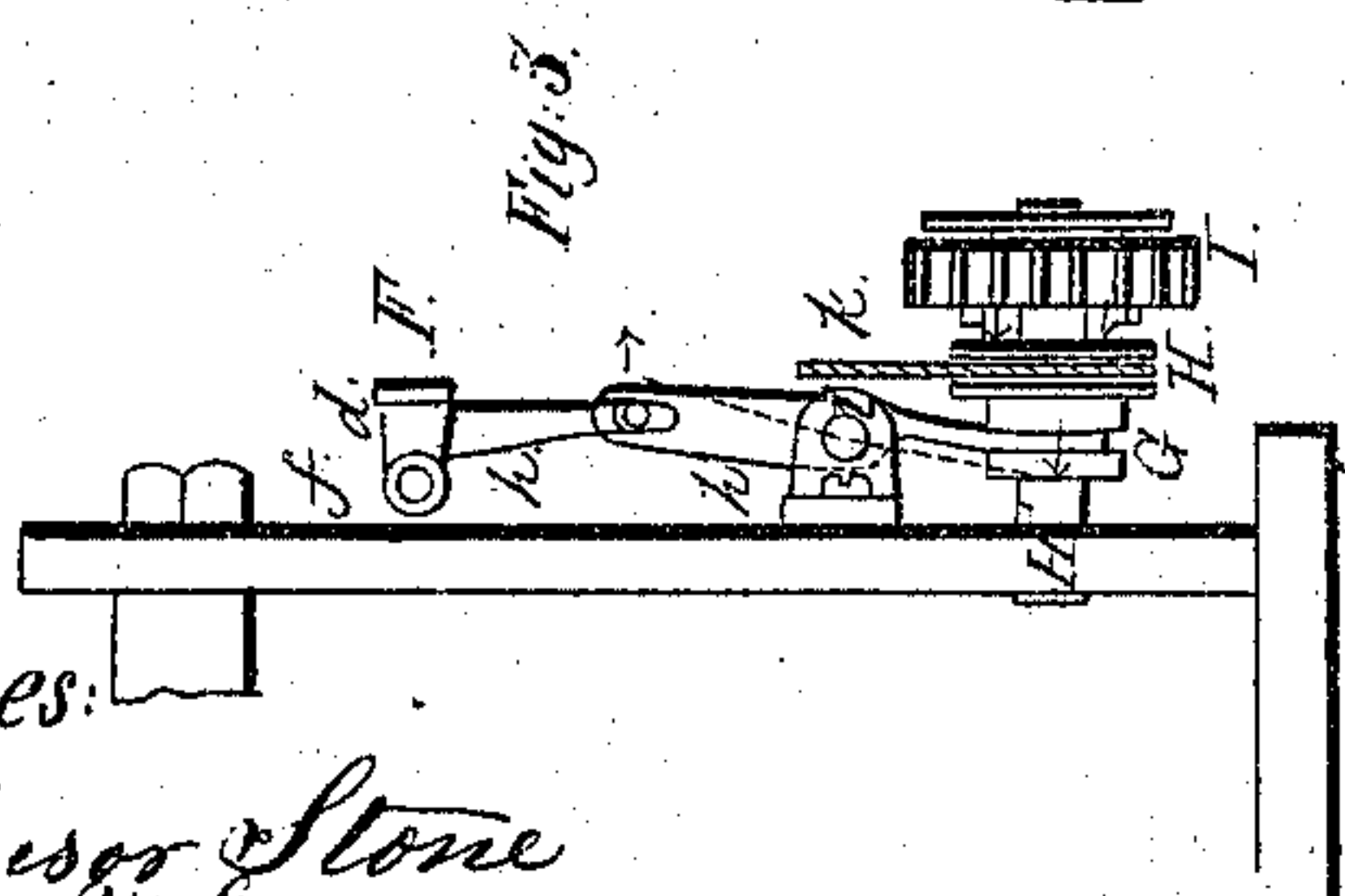
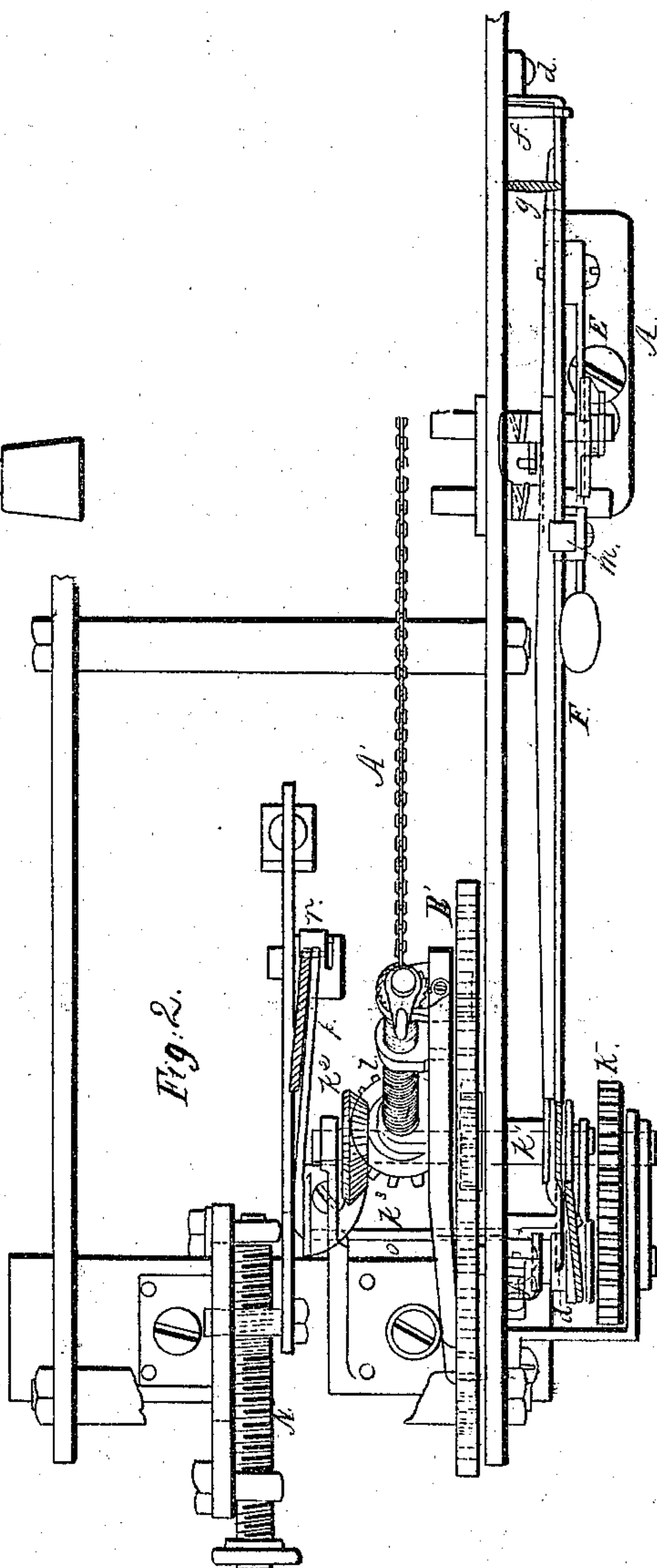
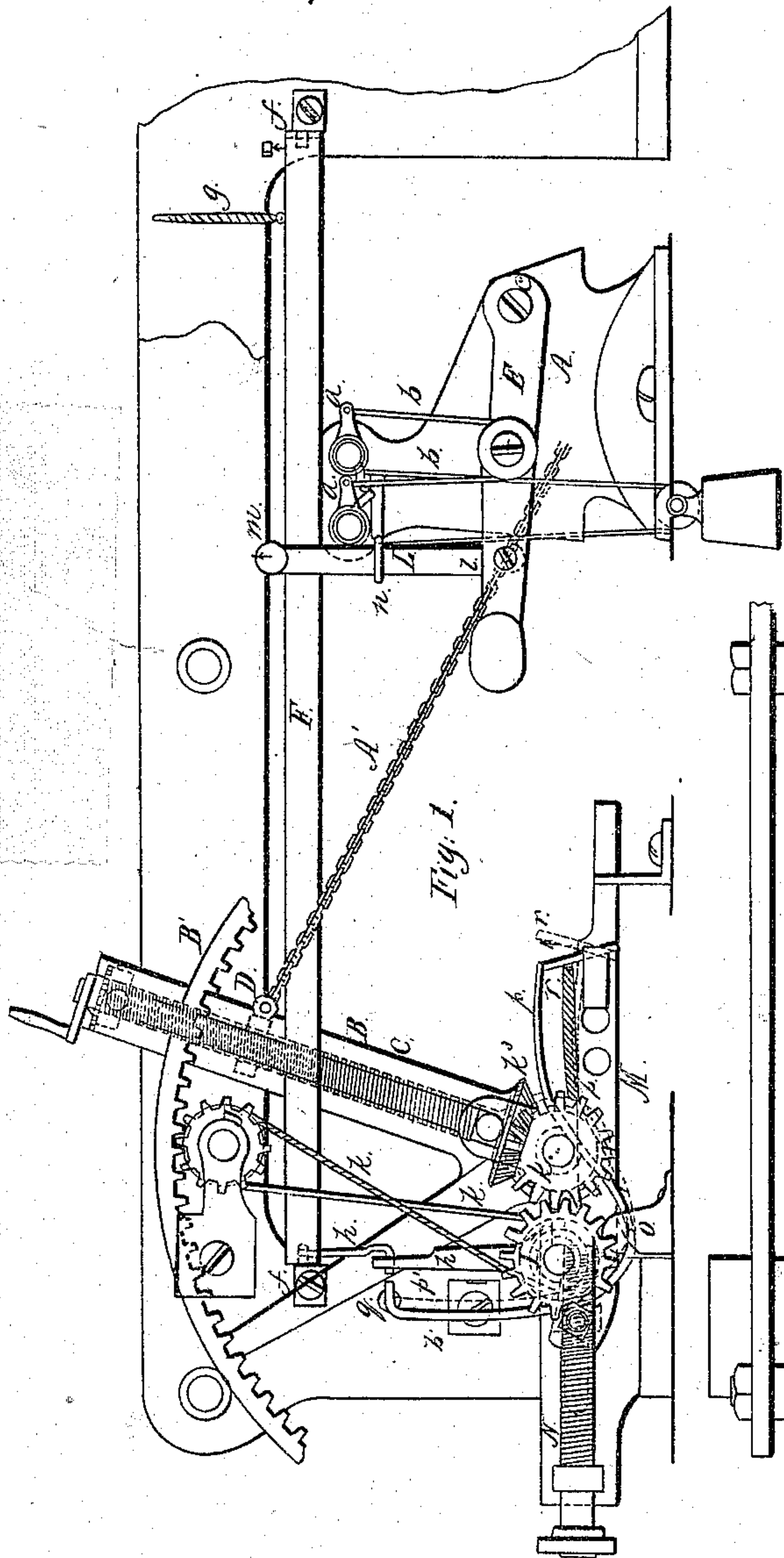


Spinning Mule & Jack.

N^o 89.807.

Patented May 4, 1869.



Witnesses:

Wieser Stone
Chas W. Greene

Inventor:

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ALBERT STOCKWELL, OF PROVIDENCE, RHODE ISLAND, ASSIGNOR TO CHARLES W. GREENE, TRUSTEE, AND SAID GREENE, AS TRUSTEE, ASSIGNS TO ALBERT STOCKWELL AND WINSOR STONE.

Letters Patent No. 89,807, dated May 4, 1869.

IMPROVEMENT IN MULE FOR SPINNING.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, ALBERT STOCKWELL, of the city and county of Providence, in the State of Rhode Island, have invented a new and useful Improvement in Self-Operating Mules; and I do hereby declare that the following specification, taken in connection with the drawings making a part of the same, is a full, clear, and exact description thereof.

Figure 1 is a side elevation of so much of a self-operating mule as is necessary to show my improvement.

Figure 2 is a top view.

Figure 3 is a partial end view.

A self-operating mule employs an analogous process to that which is performed in spinning cotton upon the hand-spinning wheel.

Portions of yarn are forcibly stretched in the direction of their length, for the purpose of elongating and reducing those parts of the yarn which have a greater diameter and are less twisted than the other parts, so that the size and twist of the thread may be rendered uniform throughout.

To effect this process of stretching, the spindles are mounted upon a carriage, which is moved backward and forward across the floor, receding from the feed-rollers when the threads are to be stretched and spun, and returning when the finished threads are to be wound upon the forming-cop.

It is not proposed, in this specification, to give a full description of all the many parts which, in almost infinite variety of combination, make up a complete self-operating mule, performing so many and so various functions, as to justly entitle the organized apparatus to take rank as first in the first class of machines.

It will be sufficient, to enable the hereinafter-described improvement to be understood by builders of this class of machines, to state its relation to certain leading operations which the mule performs.

After the carriage bearing the spindles has moved to its farthest extent, and the full twist has been put into the yarn, a backing motion is given to the spindles, to slacken the yarn, and then the yarn is, by the action of bars located in front of the spindles, and technically known as the upper and under "faller," caused to drop from the tips of the spindles, and is guided while the carriage is running in, so as to be wound upon a cop, the spindle turning, during this time, in the same direction as when spinning, but no faster than to wind up the yarn proportionably to the speed at which the carriage is running in.

The yarn-cops are not intended to be cylindrical in form, but are enlarged at the base, which is "built up" first, and are constantly increasing in size as they form, so that the required number of turns to be given to the spindles, to wind up the stretch of spun yarn, is constantly varying. In addition to this, atmospheric influence affects, somewhat, the yarn, so that in a moist air it will contract more while winding than in a clear, dry atmosphere.

The means for giving the requisite number of turns to the spindles, proportionably to the size of the cop, in winding up the yarn, consist, in the best kind of mules, of a vibrating lever, which vibrates with the movement of the carriage, and to which one end of a chain is attached, the slack of such chain being wound around a drum, whose revolution gives the movement to the spindles. The greater the number of the turns which this chain makes about the drum, the greater will be the number of revolutions which the spindle will make, because the effect of the carriage running in, is to unwind the chain by revolving the drum.

The carriage has always the same extent of travel, and consequently the number of times which the chain shall wind about the drum, can be lessened only by making the point of attachment of the chain variable upon the vibrating lever, so that the length of chain to be unwound shall be a differential quantity, and equal to the space travelled over by the carriage, less the space through which the fixed end of the chain moves, by reason of the vibration, in the same direction, of the lever to which it is attached.

The point between the two extremes of the lever at which the chain operating the drum which turns the spindles shall be attached, is made variable by means of a screw-rod set lengthwise with the lever, which, as it is turned, moves along its length, a nut having a ring, into which the chain is hooked.

The present improvement has reference to a means for enabling the mules to automatically reduce the number of revolutions of the spindle while winding up the spun yarn, in the event that, from any exceptional cause, an undue strain is brought upon the yarn.

The drawings represent only such parts of a self-operating mule as are necessary to be shown to make the invention intelligible.

A represents the carriage upon which the spindles are mounted, and around a drum which it carries, (not shown,) the chain A' is wound.

B, the vibrating lever, with its quadrant, B';

C, the screw-rod;

D, the nut thereon, to which one end of the chain is attached; and

a a, the two fallers, all as usually constructed.

The fallers a a are connected by means of a band, b, with a lever, E, pivoted to the carriage at c, and when the strain upon the yarn is in excess of what is proper, the fallers will be borne downward, and the lever E, in consequence, be depressed.

F is a tilting-bar, extending the length of the frame of the mule, and connecting two short arms, d d', fig. 2, which are pivoted to the frame at f.

A spring, g, fig. 1, sustains the bar F at any determined point of elevation. This bar F, when tilted, will set in motion the screw-rod C, and thereby shift the position of the nut D. This is accomplished by means of a system of levers, h h', fig. 3, the former of which projects downward from the bar F, and the lat-

ter is hinged to the standard of the frame at *i*, and has its lower end forked, so as to embrace the hub *G* of a loose pulley *H*, which has a clutch-face, fitted to engage with a corresponding clutch-face upon the gear-wheel *I*, when the two are brought into connection.

The tilting of the bar *F* will cause the pulley *H* to be slid along the stud-shaft *H'*, and communicate its rotary movement to the gear *I*, which runs loose upon the same shaft.

The pulley *H* is made to rotate, in this instance, by means of the band *K* passing around it, and another pulley, to which latter motion is given by the teeth upon the moving quadrant *B*, setting in motion the gear-wheel *J*, fig. 1, upon the same shaft with such pulley.

The toothed gear *I* imparts motion to the toothed gear *K*, figs. 1 and 2, thereby causing the shaft *K'* to revolve, and, in consequence, the bevel-gear *K²*, keyed to the opposite end of such shaft, engaging with a fellow bevel-gear, *K³*, upon the foot of the screw-rod *C*, causes such rod to be turned in its bearing, and alter the position of the nut thereon.

The undue depression of the fallers *a a* is made to operate upon the tilting-bar *F*, at any point in the movement of the carriage, when the occasion arises, by means of the link *L*, fig. 1, one end of which is pivoted to the weighted lever *E* at *l*, the other end being furnished with a pin, or lip, *m*, projecting from its side, and overhanging the top edge of the bar *F*, a guide, *n*, through which such link passes, sustaining the link in a perpendicular position.

So long as the fallers *a a* are in their proper position, the projecting lip *m* of the link *L* will stand clear of the bar, but upon the fallers becoming depressed, the lever *E*, dropping to a lower position, will cause the link *L* to tilt the bar *F*, whereupon the results before explained will follow.

The apparatus above described, for enabling an exceptional excess of strain upon the yarn to automatically reduce the number of revolutions which the spindles shall make in winding up the spun yarn, is, in addition to the ordinary mechanism for producing a like result, to compensate for the change in the size and form of the cop, employed in self-operating mules, with which constructors of this class of machinery are familiar.

Other devices, to accomplish the same result, have been contrived, but all with which I am acquainted are not, like the one which I have described, absolutely certain and positive in their operation.

For example, an apparatus is shown in the drawings attached to Kay, Hartley, and Mallinson's English patent of October 25, 1860, No. 2,602, which consists of a lever of the first order, with its fulcrum located at or near the end of the path of travel of the carriage, and so arranged that upon the undue depression of the "fallers," a weight will act upon the longer arm of the lever, and bearing it down, cause the shorter arm of the lever to close a clutch-box, and thereby effect the shifting of the point of attachment of the chain upon the quadrant-lever.

This apparatus is obviously incapable of acting upon the application of the same degree of pressure upon the lever at all points at which the carriage may be, but the power required to operate the lever is a constantly-varying quantity, and will increase as the carriage approaches the fulcrum of the lever, and dimin-

ish as it recedes from it. The distance, too, through which the weight must move to operate the lever to close the clutch, varies with the positions of the carriage.

While I shall not, therefore, lay claim broadly to the mode of operation which the apparatus exhibits, I do, on the other hand, mean to include every apparatus for the same end, which employs its essential and distinguishing features.

Another improvement consists in a device which is attached to the cop-forming mechanism for blocking the apparatus hereinbefore described, after the base of the cop has been formed, when the remaining portion of the cop to be completed is nearly cylindrical.

It consists of a wire, or small-sized rod, bent so as to form a shaft, *o*, with two arms, *p p'*, as shown in blue, partly at fig. 1, and partly at fig. 2.

The portion *o*, forming the shaft, is suitably held in bearings, and the two arms *p p'* are nearly at right angles with each other.

When the horizontal arm *p* is elevated, the perpendicular arm *p'* is thrown backward, so as not to interfere at all with the levers *h h'*, controlling the clutch-gear before described.

When, on the contrary, the horizontal arm *p* is depressed, as shown in red outline, the perpendicular arm *p'* will so stand that its bent end *q* will block the movement of the lever *h'*, and prevent the bar *F* from tilting.

The end of the arm *p* rests on a supporting-block, *r*, which is pivoted, at its base, to the cop-shaping mechanism *M*, and is held upright by a spring, and such supporting-block can be so adjusted that when the base of the cop has been completed, and there is no longer any occasion for enabling the tilting-bar to act, the next movement of the carriage, in running out, will, in the exercise of its ordinary function of turning the screw *N* a prescribed distance, to shorten the chain to allow for the increase of the size of the bobbin, cause the supporting-block *r* to be moved beyond the end of the arm *p*, whereupon the arm will fall, and, as before described, the levers *h h'* will be blocked.

To start a new cop, the operator turns backward the screw *N*, as usual, and the block *r* being hung upon a pivot, and held upright by a yielding spring, the parts readjust themselves, and the end of the lever *p* is again raised as before.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination of the spindle-bearing carriages *A*, with the mechanism for shifting the point of attachment of the spindle-driving chain *A'*, to the quadrant-lever *B*, by means of the yielding bar *F*, or its equivalent, and a suitable lever-connection, *E L*, for operating the same, substantially as described, for the purposes specified.

2. The combination of the cop-shaping mechanism with the levers *h h'*, or equivalent devices, for putting into action the hereinbefore-described mechanism, which shifts the point of attachment of the spindle-driving chain to the quadrant-lever, and with the vibrating levers *p p'*, and the yielding supporting-block *r*, substantially as described, for the purposes specified.

ALBERT STOCKWELL.

Witnesses:

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