(No Model.)

4 Sheets—Sheet 1.

B. T. STEBER.

MATCH SPLINT MACHINE.

No. 273,908. Patented Mar. 13, 1883.

Fig 1.

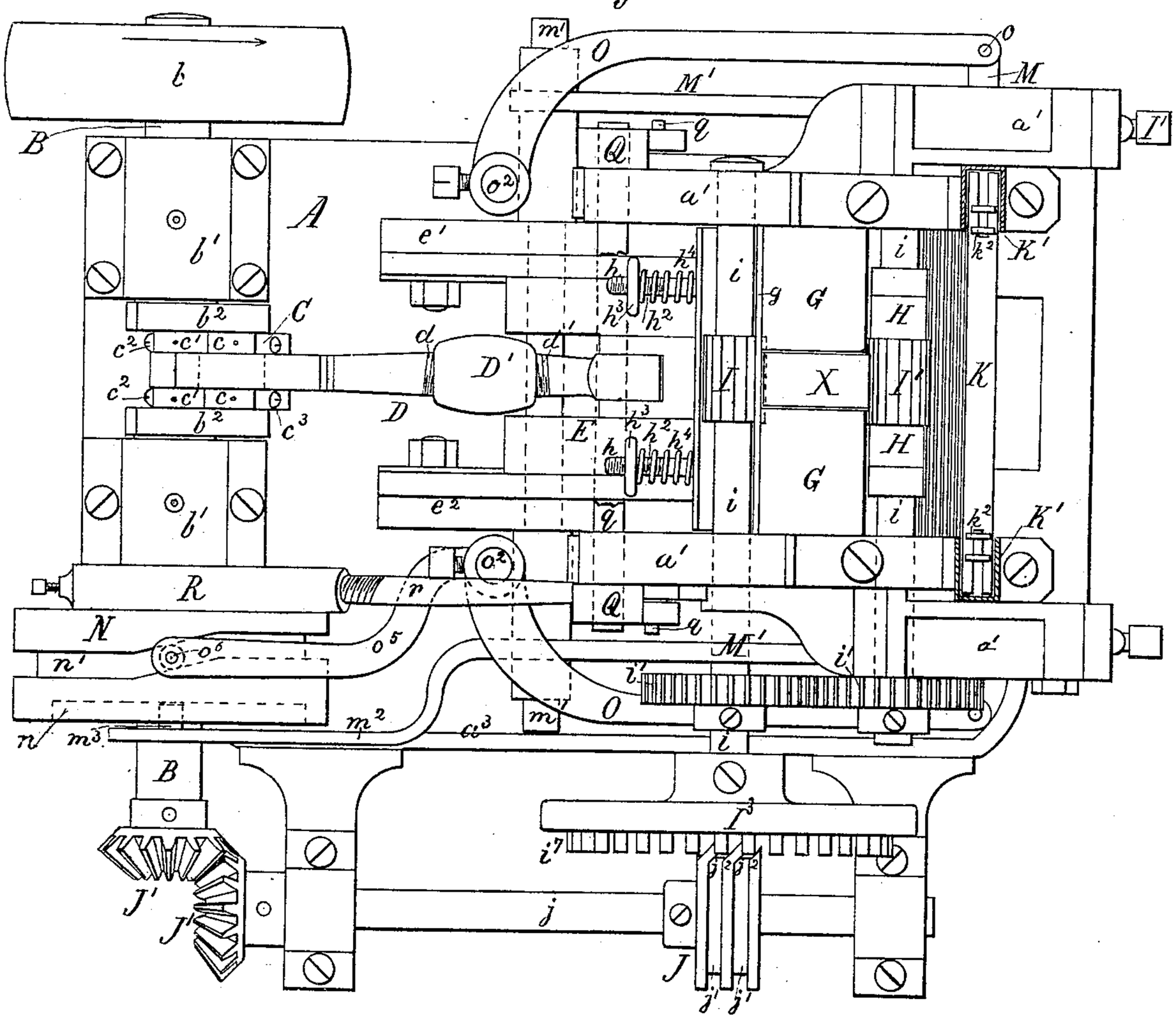
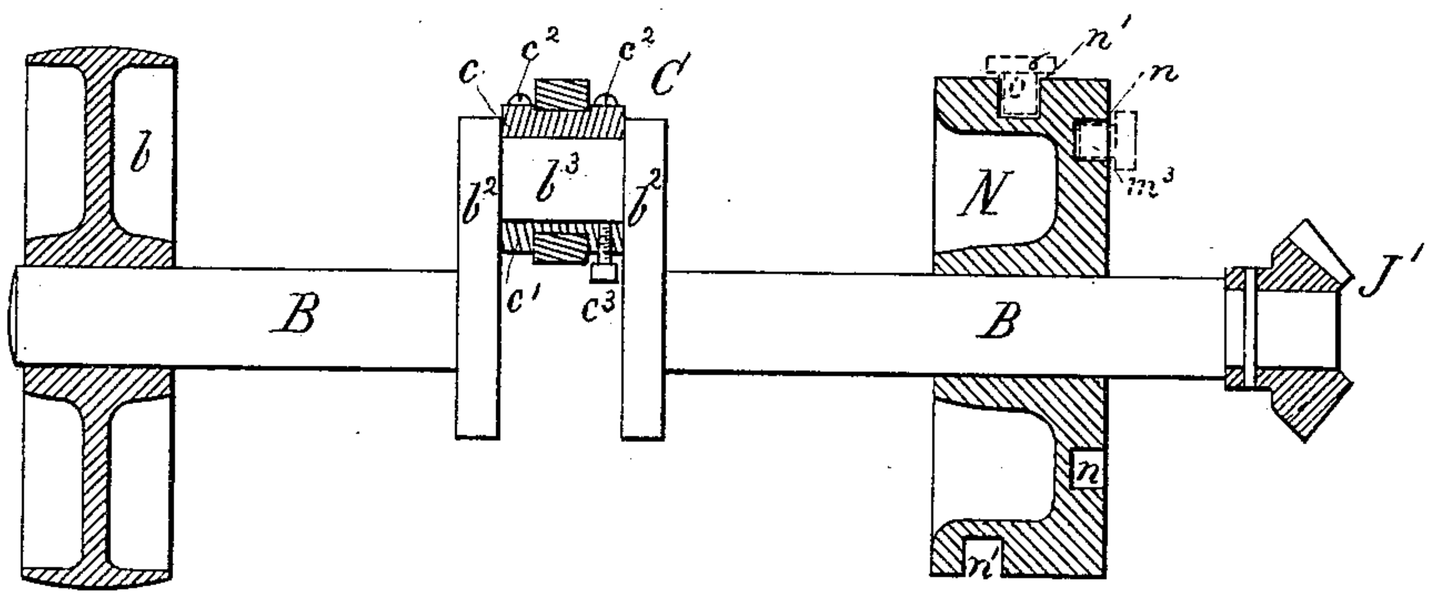


Fig 2.



Witnesses:
J. P. Theo. Lang.
Robt. L. Fenwick.

Inventor:
Bernard T. Steber
by his attys
Fenwick and Lawrence

(No Model.) 4 Sheets—Sheet 2.

B. T. STEBER.

MATCH SPLINT MACHINE.

No. 273,908. Patented Mar. 13, 1883.

Fig 7.

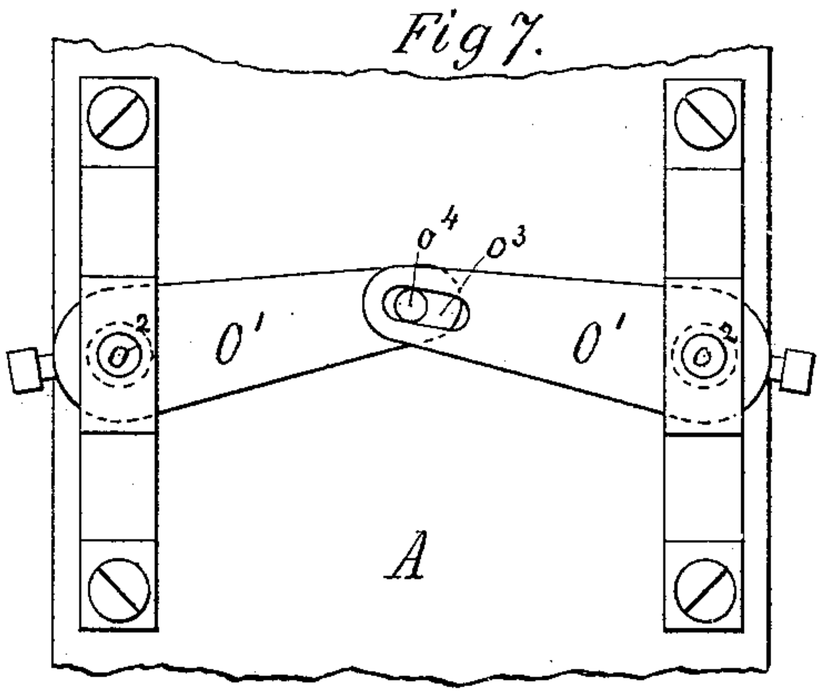
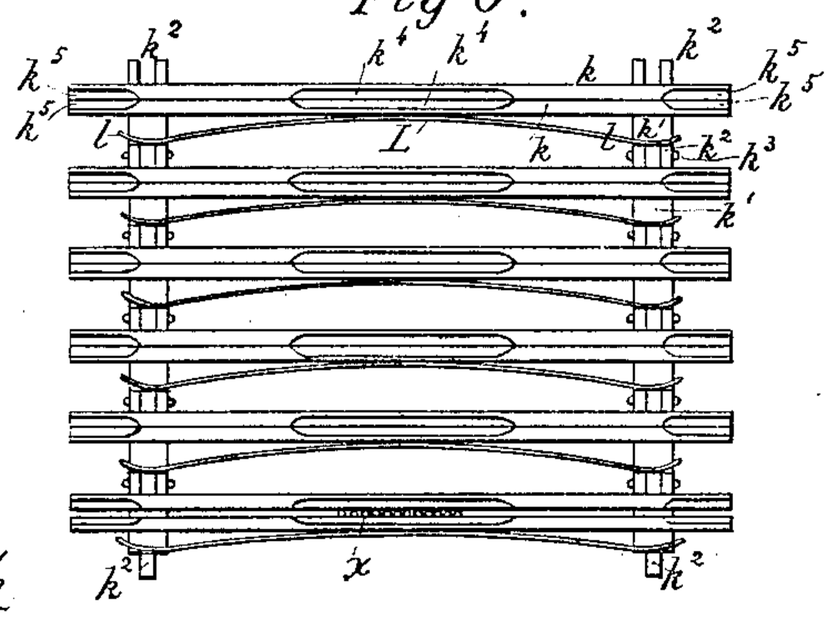


Fig 3.

Fig 6.



Witnesses:
J. P. Theo. Lang
Robt. L. Tennuck

Inventor:
Bernard T. Steber
by his attys
Tennuck and Laurence

(No Model.)

4 Sheets—Sheet 3.

B. T. STEBER.

MATCH SPLINT MACHINE.

No. 273,908. Patented Mar. 13, 1883.

Fig 9.

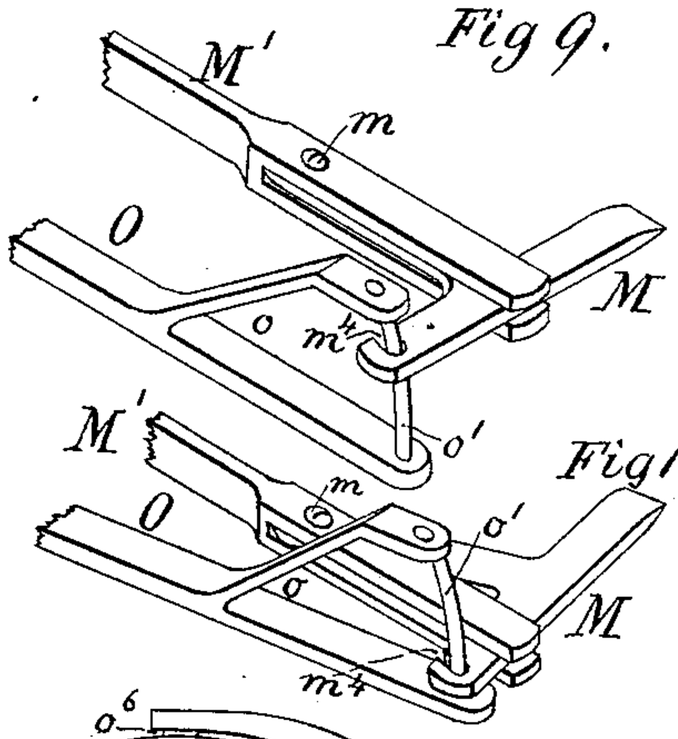


Fig 10.

Fig 4.

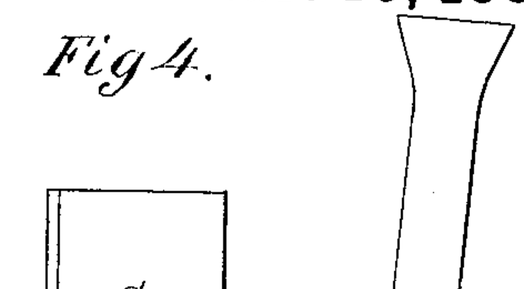
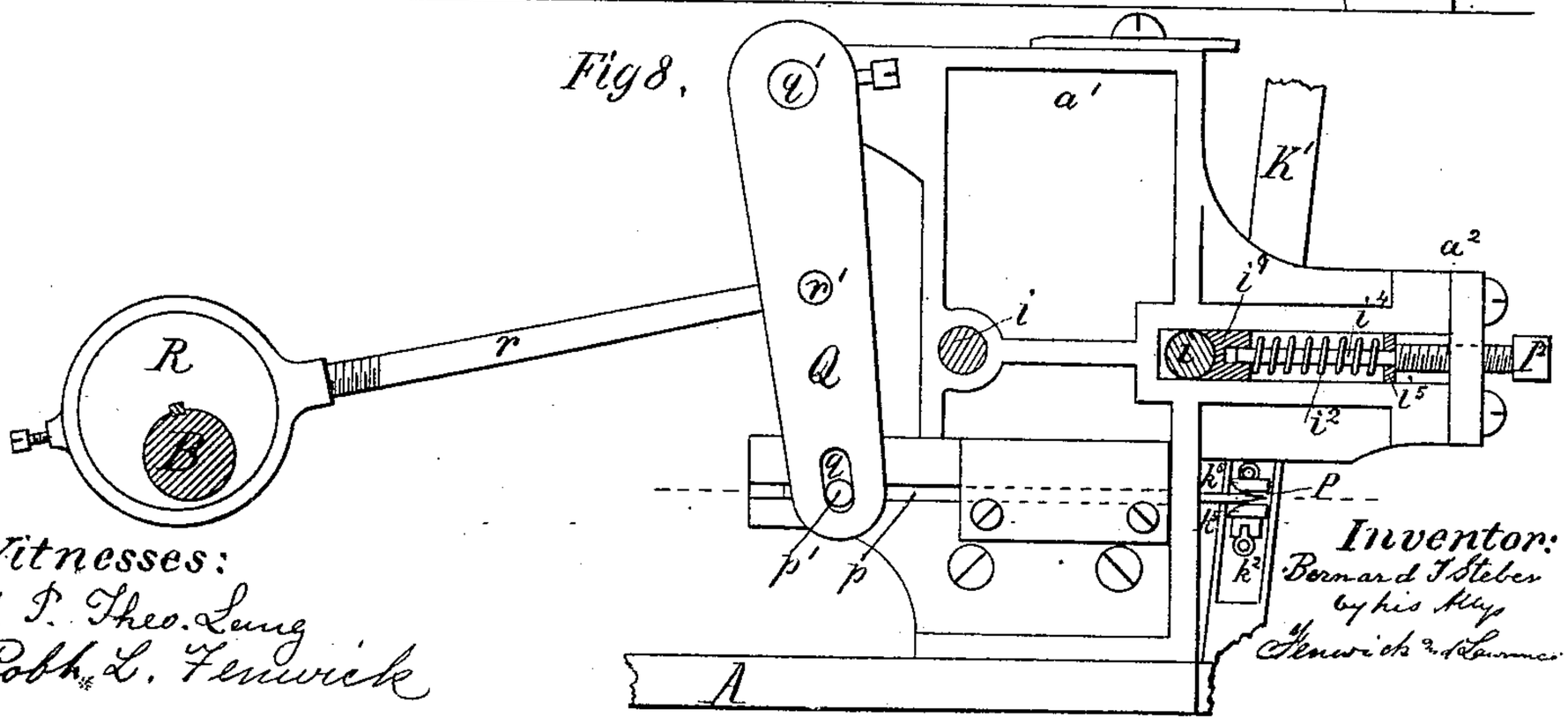


Fig 8.



Witnesses:
J. F. Theo. Lang
Robb L. Fenwick

Inventor:
Bernard T. Steber
by his Atty
Fenwick & Lawrence

(No Model.) 4 Sheets—Sheet 4.

B. T. STEBER.

MATCH SPLINT MACHINE.

No. 273,908. Patented Mar. 13, 1883.

Fig 5.

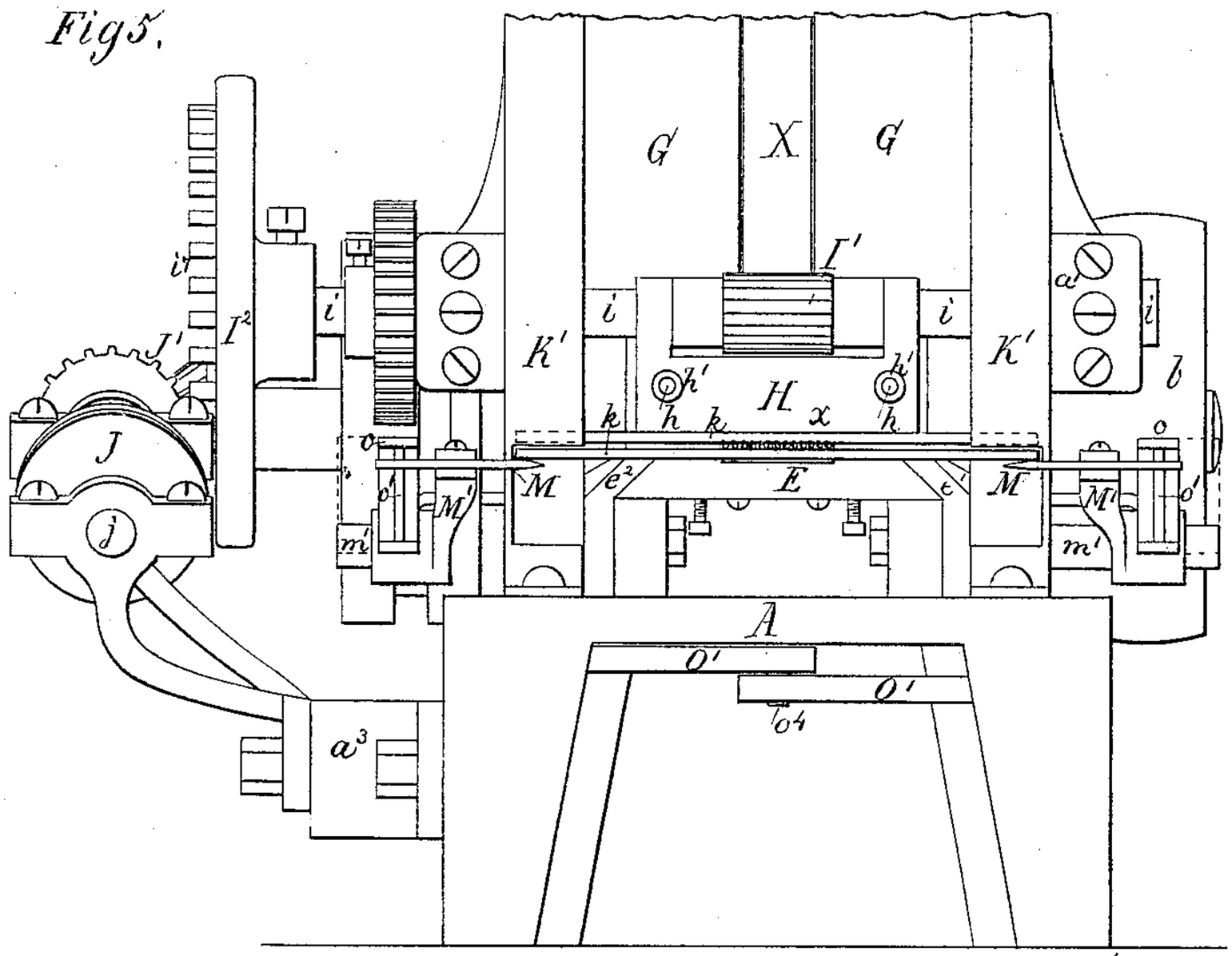
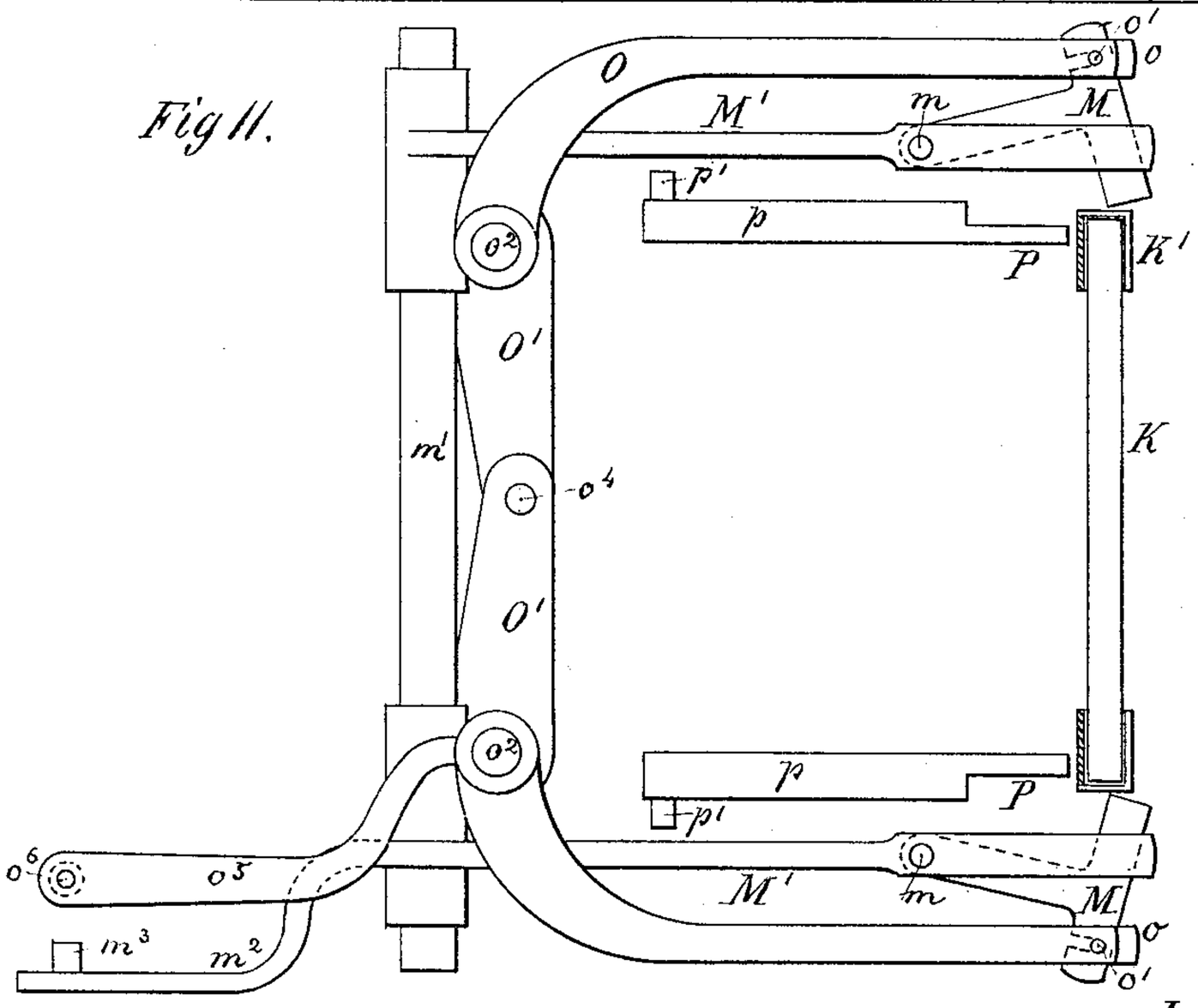


Fig 11.



Witnesses:
J. P. Theo. Lang
Robt. L. Fenwick

Inventor:
Bernard T. Steber
by his Attys
Fenwick and Laurence

UNITED STATES PATENT OFFICE.

BERNARD T. STEBER, OF UTICA, NEW YORK.

MATCH-SPLINT MACHINE.

SPECIFICATION forming part of Letters Patent No. 273,908, dated March 13, 1883.

Application filed December 23, 1882. (No model.)

To all whom it may concern:

Be it known that I, BERNARD T. STEBER, a citizen of the United States, residing at Utica, in the county of Oneida and State of New York, have invented a new and useful Improvement in Match-Splint Machines, of which the following is a specification.

My invention relates, first, to an improved feed-motion of the splint-blocks; second, to a slat-chain-feeding device; third, to a slat-opener; fourth, to an improved mode of adjusting the crank-stroke of the match-splint cutter proper; and, fifth, to an improved "take-up" of the feed-motion, and to other features of invention hereinafter described and specifically claimed.

The objects of the invention are to simplify and lessen the cost of the manufacture of splints for matches, and provide the machine with working portions and adjustments of the most simple and effective character. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a top view of a match-splint machine embodying my invention. Fig. 2 is a detail view of the crank-shaft and the thereto-attached parts, the latter being shown in section. Fig. 3 is a vertical central longitudinal section of the machine. Fig. 4 is a side elevation of the same. Fig. 5 is a rear elevation of the same. Fig. 6 is a detail view of the match-receiving slat-chain. Fig. 7 is a detail bottom view of the coupling-arms employed in the slat-chain-operating device. Fig. 8 is a detail view of the slat-chain-opening device, the same being shown partly by section and partly in elevation. Figs. 9 and 10 are perspective detail views of certain portions of the slat-chain-operating device in two different positions. Fig. 11 is a horizontal detail view of the slat-chain-operating device, the slat-chain guides being in horizontal section.

A represents a suitable frame; B, the main shaft, having a driving-pulley, *b*. Between its bearings *b'* the shaft B is provided with a crank, b^2, the wrist-pin b^3 of which has an eccentric-bearing, C, attached to it. This bearing consists of two halves, *c c'*, fastened together by bolts c^2, and fastened to the aforesaid wrist-pin b^3 by a set-screw, c^3. The outer surface of the bearing C is cylindrical, but not concentric with the cylindrical surface of the wrist-pin b^3, and by this means the stroke of the crank may be made longer or shorter to suit the requirements of the machine.

A connecting-rod, D, is suitably attached to the bearing C, and to a transverse pin, *e*, of the cutter-frame E. The connecting-rod D is divided about midway of its length, and the opposing parts are provided with a right and left screw-thread, *d d'*, respectively, and they are united by means of a coupling-sleeve, D', having corresponding inner screw-threads. This construction enables the operator to lengthen or shorten the connecting-rod by turning the coupling-sleeve forward or backward, and thus adjust the cutting-die F on the cutter-frame E in the proper relation to the position of the splint-block X. The cutter-frame E moves in horizontal guides e' e^2, of suitable construction, formed upon or fastened to the frame A. An open space, as at e^3, is provided in the cutter-frame E, in order to allow the waste of the material to fall down out of the way of the mechanism. Another opening, as at *a*, is provided in the top of the frame A for the same purpose.

The splint-block X is inserted in a guide-chute, G, suitably fastened to two parallel side extensions, *a'*, of the frame A, and having a back plate, *g*, a thrust-bar, *g'*, a take-up plate, H, and two fluted feed-rollers, I I'. The take-up H is a plate fitted upon the shaft *i* of the front feed-roller, I', and extending down toward the cutting-die F a proper distance, as shown. Two bolts, *h*, are passed through the take-up plate H, the chute G, and the thrust-bar *g'*, which bolts are provided at one end with heads or nuts *h'*, and on the other end with screw-threads h^2, thumb-nuts h^3, and washer-springs h^4. By means of the thumb-nuts h^3 the plate H is drawn upon the splint-block X, which is thus held in place during the back-stroke of the cutting-die F, while the springs h^4 will yield to extraordinary pressure or unequal thickness of the splint-block and thus save the mechanism from breaking and prevent the choking of the splint-block in the chute. The thrust-bar *g'* serves as the thrust-bearing of the lower end of the splint-block, and extends down in line with the cutting-die F, which stops at a short distance from the thrust-bar, so as not to come in contact with it. The shaft *i* of the front roller, I', passes through hori-

zontal slots a^2 in the frame-extensions a', and is pressed against the splint-block X by means of a sliding bearing, i^9, Fig. 8, and a tension-spring, i^2. The tension of the spring i^2 is regulated by means of a set-screw, I^2, in the forward end of the slot a^2, which screw has a step, i^3, and a shank, i^4, on which a plate, i^5, is placed, and whereby the spring i^2 may be more or less compressed. The shank i^4 enters the back of the sliding bearing, and thus prevents the spring i^2 from being displaced.

Outside of the extensions a' of the frame A the roller-shafts are provided with two ordinary matching gear-wheels, i', of same diameters, and which mesh into each other, and thus produce an equal motion of the feed-rollers I I'. One of the shafts, i, is provided with a pin-wheel, I^3, which gears, by means of pins i^7, into a worm or screw cam wheel, J, on a shaft, j, which is suitably hung to a side bar, a^3, of the frame A. The cam-wheel J has a number of grooves, j', the walls of which are in lines at right angles to the shaft j for a greater part of their circumference, and end in an oblique line, as at j^2, thus forming an irregular helix, which gives a short and sudden motion to the pin-wheel I^3 at every revolution, although the cam-wheel J itself moves at a uniform speed, as will be seen. The feed-motion of the feed-rollers I I' consequently takes place at the end of the forward stroke of the cutting-die F, and before its backward stroke. The shaft j receives its motion from the crank-shaft B by means of bevel-gear wheels J', as shown.

In front of the splint-block X an endless slat-chain, K, (a portion of which only is represented in the drawings,) is placed, which has a downward motion between two upright gutter-shaped guides, K', on the frame A, and which is suitably supported and guided by rollers in any of the well-known modes. The chain consists of slats k, arranged in pairs, and provided with a link, k', near each end. These links k' are provided at each end with heads k^2 and pins k^3, whereby such links can be united into a flexible chain, as seen. The lower heads of the said links serve as bearings for a spring, L. This spring has slotted ends l, which bear upon the lower heads, k^2, of the links, while the middle part of the spring is fastened to the lower slat, k, and thus the lower slat is pressed against the upper one, which bears against the upper heads, k^2, of the links k'.

Opposite the splint-block X the slats are provided with oblique surfaces k^4 k^5, forming V-shaped grooves in the slats when closed together, which grooves serve as guides to the match-splints to be received between the slats, and also to the slat-opening mechanism, as will be seen. The slat-chain K is loosely fitted between the guides K', and is at regular intervals of time moved one step downward by two T-shaped levers, M, pivoted at m to two arms, M'. These arms are fastened to a transverse shaft, m', suitably hung in the frame A, and one of them has an extension, m^2, with a friction-roller, m^3. This roller m^3 travels in a cam-groove, n, of a wheel, N, attached to the main shaft B, the cam-groove being so shaped as to cause the arms M' and levers M to move down as soon as the pair of slats k opposite the cutting-die F have received the row of match-splints delivered by the die, and to move up again after the lever M is moved out of range of the slat-chain. For this latter purpose two horizontally-swinging arms, O, are provided, having forked heads o and guide-rods o', which latter pass through slots m^4 in the levers M. The arms O are fastened to two vertical shafts, o^2, suitably hung in the frame A, and they are coupled by means of two arms, O', fastened to the shafts o^2 below the frame A, one of the arms O' having a slot, o^3, and the other a pin, o^4, passing through the slot o^3. One of the arms O has an extension, o^5, and friction-roller o^6, which latter travels in a cam-groove, n', of the wheel N. By this mechanism the levers M are moved out of range of the slat-chain after the arms M' have finished their downward motion, and are moved into the slat-chain above the next pair of slats k as soon as the arms M' have finished their upward motion. The two positions of one of the levers M, as above described, are seen in Figs. 9 and 10, from which the operation will be readily understood. When the levers M are in their upper position, as seen in Fig. 9, the slats k of the pair of slats resting upon the levers M are moved apart by means of two wedges, P, formed at the ends of two horizontal slides, p, which are suitably embedded in the frame-extensions a', and by means of pins p' are moved back and forward by rocking arms Q, the pins p' passing through slots q in said arms. The arms Q are fastened to a horizontal shaft, q', suitably hung in the frame-extensions a', and to one of these arms an eccentric-rod, r, is pivoted at r', connecting it with an eccentric, R, on the main shaft B. By this mechanism the slats k are separated while the levers M are ascending, and previous to the forward movement of the match-splint row in the die F, and they are released as soon as the forward stroke of the die is finished.

Operation: A splint-block X is inserted into the chute G and the machine set in motion in the direction of the arrow. The splint-block X is fed down by the rollers I I' toward the cutting-die F, and is then cut up into rows of match-splints x. When the first cutting-stroke of the die F is finished, the splints thus cut are separated from the splint-block X; but their rear ends remain in the die. At this time the wedges P enter the pair of slats standing opposite, and in line with them at the V-shaped grooves k^5, and separate the slats sufficiently to permit the splints in the forward-moving die to enter between them without difficulty. The levers M are now swung around directly over the said pair of slats. The wedges P thereupon withdraw, and the two slats close upon the match-splints by means of the pressure of the spring L. At the same time

the feed-rollers I I′ move the splint-block X down another step. Now, the cutting die F begins on its back-stroke to cut another row of splints, which on entering the die push out the previous row of splints, whereupon the levers M descend and lower the slat-chain until the next upper pair of slats *k* stand in line with the die F and wedges P. The wedges P then enter the said pair of slats and separate them, while the levers M swing out of range of the slat-chain, ascend again, and swing toward the slat-chain immediately over the last-mentioned pair of slats. In the meantime the slats have been charged with a row of match-splints and the wedges P have withdrawn. Thus the chain is operated by the wedges P while the levers M change their position for another pair of slats.

By employing the cam worm or screw J described, for giving an intermittent motion to the pin-wheel, gears, and feed-rollers, the machine can be run at a very high speed without endangering the feed-rollers. The motion being positive and the block held firm all the time, there is no liability of the block being suddenly thrown too far down.

In other match-splint machines, where a ratchet-and-pawl mechanism for giving motion to the rollers is employed, the speed cannot be as high, because the sudden blow given to the ratchet always causes it by its momentum to carry the block far beyond the point desired, and in case of a stop being placed upon the cross-head to prevent the block from going too far the feed-roller teeth will "strip," and the feed in consequence be stopped entirely. By employing the wedges for opening the slats and the levers for moving the slat-chain a very considerable amount of gearing (always objectionable in mechanism at high rate of speed) is dispensed with, and the machine can consequently be run at a high speed without liability of breakage or derangement.

By employing the double crank, with the throw of its wrist-pin adjustable the advantage is secured, to wit: Matches are made of various lengths, and to make a long match it requires a long throw of the crank, and to make a short match a shorter throw is required. Heretofore with these machines several cranks have been employed, and to change these cranks time is required.

My adjustable double crank obviates the necessity of providing several cranks and substituting a long one for a short one, while the necessary adjustment of the throw of the wrist-pin under my construction can be effected in a few seconds.

By using my "take-up" the objection to those take-ups which press the block against the back of the trough and hold it when below the feed-rollers, or after it has passed the feed-rollers, is avoided; and, owing to this, with these ordinary take-ups, the feed must depend upon the pressure from the next block following fed by the rollers. Therefore when a block which is a little longer than the one previously fed is fed down, the feed-rollers running upon the block will come in contact with the take-up, unless the take-up is swung in the manner shown by me from the same shaft on which the feed-roller runs, and, owing to this, the block will not go through, being stripped by the feed-roller. This necessitates the removal of the block before any more match-splints can be cut. But with my improved take-up, which swings upon the movable feed-roller shaft, a large block on entering will move the top of the take-up with the feed-roller, and will consequently clear the way below the roller, while the bottom springs will enable the take-up to hold the blocks which are of proper size or smaller than the proper-sized ones; and by providing the sliding bearing i^9 with spring-tension the feed-motion will be equally as effective, whether the blocks be of equal or unequal thickness or hardness.

In order to avoid too much wear from frictional contact between the pins of the pin-wheel and the walls of the grooves of the worm-wheel, the pins of the wheel may be, as is commonly done in various machines, sheathed with rolling sleeves, and thus an easier movement of the feed device be secured, while the wear upon the parts will be reduced.

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

1. The combination, in a match-splint machine, of the feed-rollers I I′, geared together, the wheel I^3, having pins or teeth on its face and applied directly on the shaft *i* of roller I, and the worm J, having the walls of its grooves formed with portions which are cams, and with portions which are at right angles to its shaft, and with openings in its ends or faces for the entrance and exit of the pins or teeth of wheel I^3, whereby an intermittent motion of the feed-rollers is produced with a very simple arrangement of gearing and shafting, substantially as described.

2. The combination, with the slat-chain of a match-splint machine, of the laterally and vertically moving lever, whereby the slat-chain is fed along properly during the operation of the match-splint machine, substantially as described.

3. In a machine for making match-splints, the combination, with a traveling slat-chain and a reciprocating cutter-frame and cutting-die, of a reciprocating wedge and mechanism for operating and controlling said wedge, the combination being such that the slats are opened and the match-splints received directly from the cutting-die, substantially as and for the purpose described.

4. The adjustable double crank having the throw of its crank or wrist pin b^3 adjustable by the eccentric adjustable bearing *c*, applied so as to actuate the cutter-frame and cutting-die in a match-splint machine, as described, whereby the movement of the cutter-frame and cutting-die can be adjusted to suit long and short match-splints, substantially as described.

5. The combination, with the vertically-feed-

ing rollers, chute, slat-chain, cutter-frame, and cutting-die, of the adjustable yielding take-up H, applied to the bolts *h*, which are provided with springs h^4, and swinging on the arbor of the movable feed-roller I′, substantially as described.

6. The cutting-die having a rearward movement while cutting the match-splints and a forward movement while forcing said splints into the slat-chain, and a slat-chain which receives the match-splints directly from the cutting-die, in combination with the reciprocating wedge and mechanism by which the wedge is operated and controlled, substantially as described.

7. The cutting-die having a rearward movement while cutting the match-splints and a forward movement while forcing said splints into the slat-chain, and a slat-chain which receives the match-splints directly from the cutting-die, in combination with the laterally and vertically moving levers, the reciprocating wedge, and the mechanism by which the levers and the wedge are operated and controlled, substantially as described.

8. The combination, in a slat-chain for a match-splint machine, of the following elements, viz: slats *k*, having oblique surfaces k^4 k^5, links *k′*, having heads k^2, pins k^3, and the springs L, having slotted ends *l*, whereby the opening of the slats by the wedges and the entrance of the match-splints between the slats are facilitated, substantially as and for the purpose described.

BERNARD T. STEBER.

Witnesses:
WILLIAM JAMIESON,
NICHOLAS HAIM.