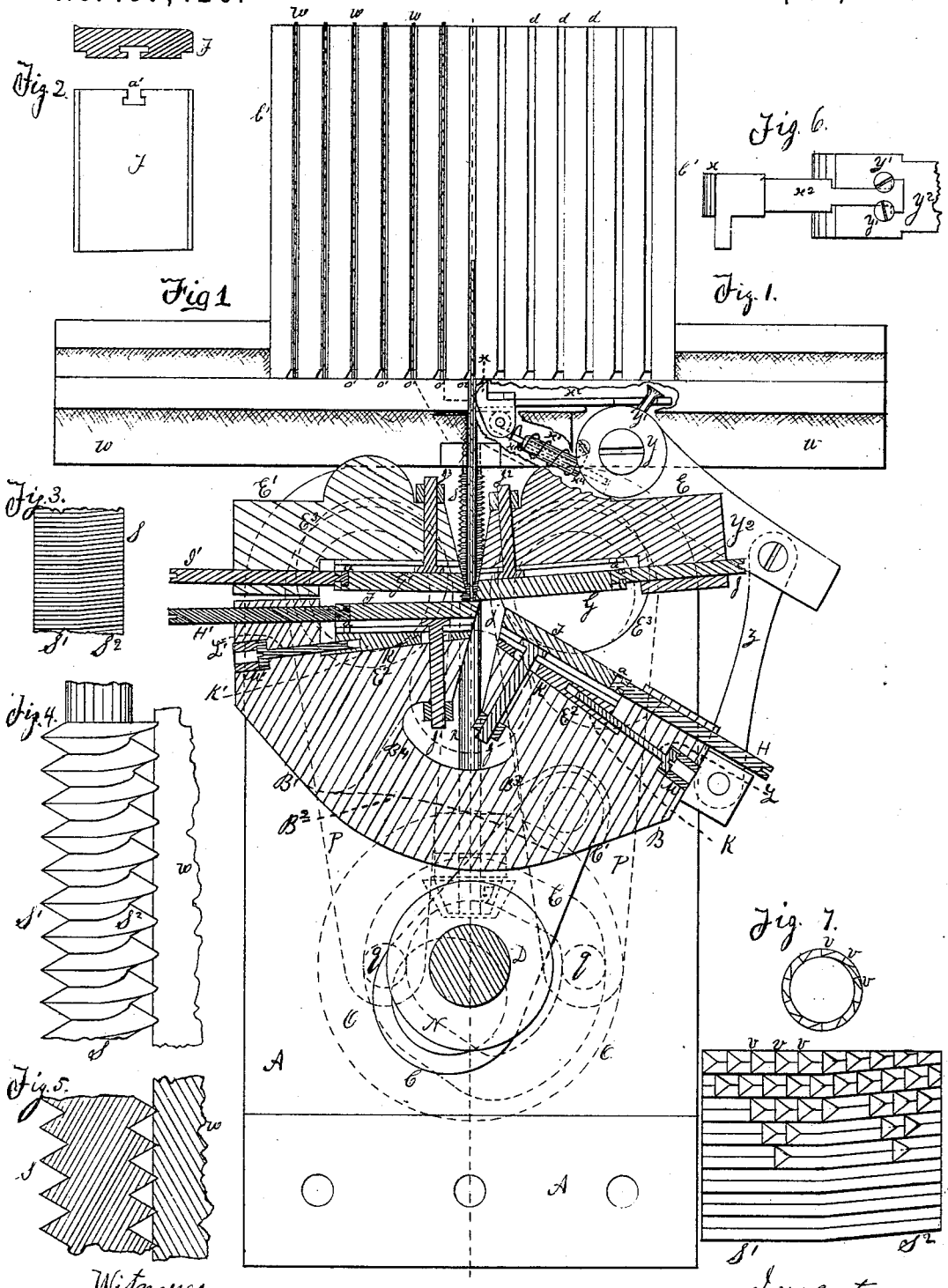
3 Sheets--Sheet 1.

W. WICKERSHAM.

Nail-Cutting Machine.

No. 167,420. Patented Sept. 7, 1875.



Witnesses.
Charles M. Keaton
Danl. McCarty.

Inventor.
William Wickersham

3 Sheets--Sheet 2.

W. WICKERSHAM.

Nail-Cutting Machine.

No. 167,420. Patented Sept. 7, 1875.

Fig. 8.

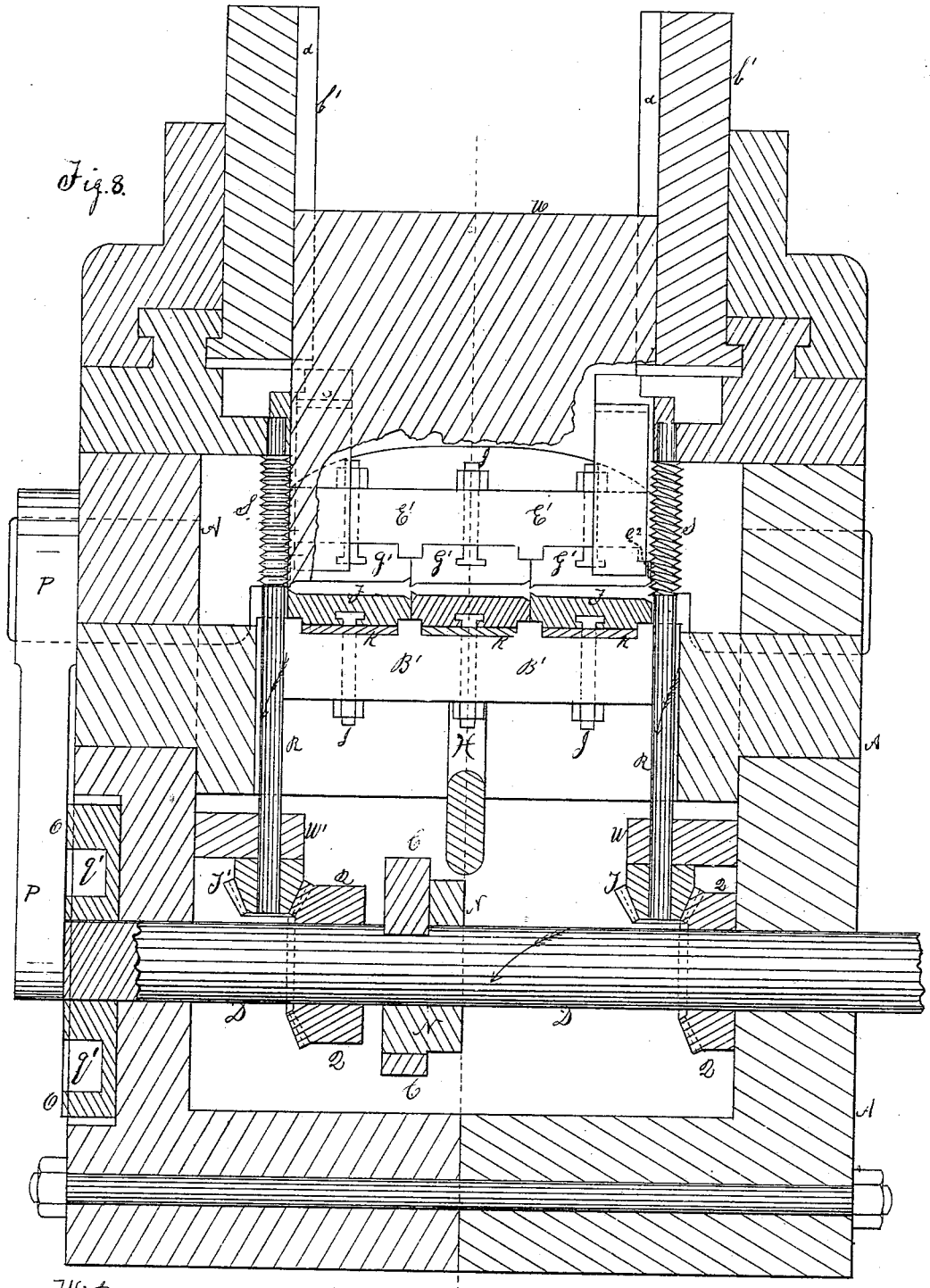


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Fig. 9.

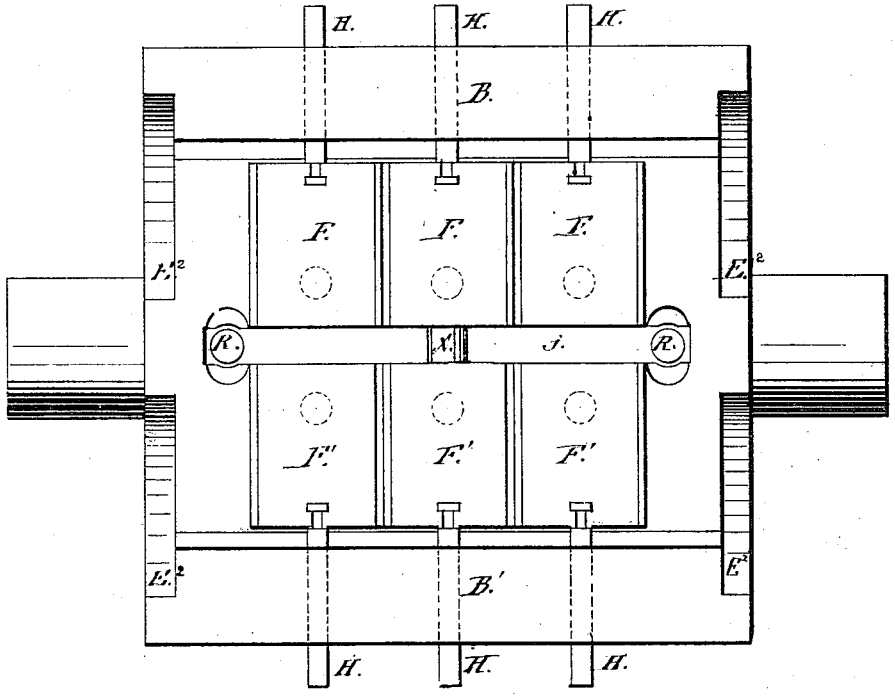
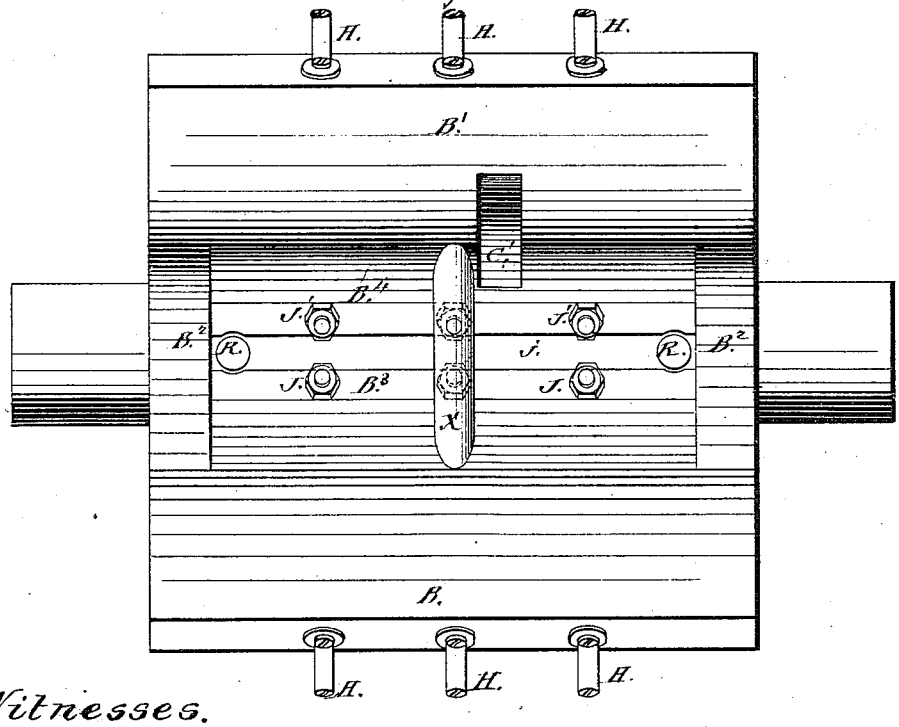


Fig. 10



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UNITED STATES PATENT OFFICE.

WILLIAM WICKERSHAM, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN NAIL-CUTTING MACHINES.

Specification forming part of Letters Patent No. **167,420**, dated September 7, 1875; application filed July 28, 1873.

To all whom it may concern:

Be it known that I, WILLIAM WICKERSHAM, of Boston, in the county of Suffolk and Commonwealth of Massachusetts, have invented certain Improvements in Nail-Cutting Machines, of which the following is a specification:

The first feature of my invention relates to construction, and consists in a double cutter-stock made of one single casting, having a space for the nails to fall through, and one or more ribs to connect the two sides together, and so constructed and arranged to receive two series of cutters that these two series shall work alternately with two other series of cutters in single cutter-stocks.

The second feature of my invention relates also to construction, and in a nail-cutting machine consists of two single cutter-stocks, so constructed and arranged that each will alternately cut a series of nails in connection with one series of cutters of the double cutter-stock, and each one oscillate alternately up out of the way with an upward motion, while the other is, in connection with the double cutter-stock, cutting a series of nails.

The third feature of my invention relates to construction and arrangement, and consists of a single cutter-stock with a series of cutters thereon, in combination with a double cutter-stock with two series of cutters thereon, with mechanism for holding the single cutter-stock in a state of rest and in a position to co-operate with one side of the double cutter-stock while the nails are being cut, and to move it up out of the way at other times.

The fourth feature of my invention relates to the feeding apparatus, and consists of a screw constructed with threads inclined part of the way round, and with the other parts of said threads straight round, so that when said screw-threads are in the notches in the edge of the nail-sheet, and the screw revolves, it will move the said sheet toward the cutters during the time that the inclined parts of said threads are in said notches, while, during the other part of its revolution, it will hold said sheet permanently at rest, the straight parts being in the notches.

The fifth feature of my invention relates also to the feed, and consists in so forming the outer edges of the cutters at the extremities of the series in the single cutter-stock as to co-operate with the feed-screws in feeding the nail-sheet entirely to the cutting-edges of the cutters, by taking off to a small depth the outer edges of said cutters, except a small portion at their lower sides, leaving or forming a small spur at their lower outside corners.

The sixth feature of my invention relates also to the feeding apparatus, and consists (in nail-cutting machines) in the construction of the feed-screw with teeth, by means of which they can cut notches in the edges of the nail-sheet, and at the same time feed the sheet toward the cutters by means of the same screws which cut the said notches.

The seventh feature of my invention relates to the supply-rack, and consists of a rack having grooves on its sides to hold the nail-sheets, and spaces through the bottom for the sheets to pass arranged on a support over the machine, with a space or slot in the support through which the nail-sheets can pass from the rack to the cutters, and all so arranged that the rack can be moved along, successively delivering the nail-sheets therein contained to the cutters, through the slot in the support, as each is successively cut into nails.

The eighth feature of my invention relates also to the supply-rack, and the movement of the same, to deliver the nail-sheets successively to the cutters, and consists of a hook, a vibrating arm, and spring, so constructed and arranged that the hook will be moved with a positive motion in the direction the rack is to move; but by a yielding motion in the opposite direction, so that when a sheet is passing down it will limit the motion of said hook in the direction of the sheet, and so that when the sheet has passed down out of the way, said hook will pass back to another notch, and at next forward movement will move the rack far enough for the delivery of another sheet to the cutters, and so successively until all the sheets in the rack are delivered and cut into nails. The said spring presses said hook both in the direction of the nail-sheet and upward, so as to insure the hooks pressing up against another notch, when it can pass back

far enough for the purpose, and also to force the hook back to another notch, when the nail-sheet is out of the way.

The ninth feature of my invention relates to the adjustment of the cutters, and consists of a thimble-screw, in combination with a wedge-screw, cutters, and the cutter-stock, all so arranged that the thimble-screw shall be screwed into the cutter-stock against the head of the wedge-screw, or against a shoulder on said head, holding said wedge-screw in position, while the body of said wedge-screw extends into the wedge, in such manner that by turning the wedge-screw in one way the wedge will be advanced, thereby elevating the cutter which rests upon said wedge, and by turning said screw in the reverse direction, said cutter will in like manner be depressed.

Figure 1 shows a vertical section of my machine at right angles to the axis of the main shaft and cutter-stocks; also showing an inside end elevation of the supply rack with its operative mechanism. Fig. 2 is a front view and a cross-section of the cutter. Fig. 3 is a surface view of the feed-screw. Fig. 4 shows the feed-screw in connection with the nail-sheet. Fig. 5 is a section of the same. Fig. 6 is a detail view of part of the mechanism for progressing the rack. Fig. 7 is a surface view of the feed-screw, showing the teeth for cutting the notches in the edges of the nail-sheet. Fig. 8, Sheet 2, is a vertical section of the machine parallel to the axis of the main shaft, with the supply-rack shown in Fig. 1. Fig. 9 shows a top plan view of the double cutter-stock, and Fig. 10 shows a bottom view of the same.

A is the frame, to which the various parts are fitted. B B^1 is the double cutter-stock, into which two series of cutters are fitted. C is the connection-rod, connecting the crank or eccentric on the main shaft with the double cutter-stock. D is the main shaft. E E^1 are two single cutter-stocks. F F′ are the cutters in the double cutter-stock. G G′ are the cutters in the two single cutter-stocks. H H′ are screws operating and holding the cutters F F′. I I′ are screws operating and holding the cutters G G′. J J^1 J^2 J^3 are bolts holding the cutters in their places in the cutter-stocks. K K′ are wedges for adjusting the cutters in the double cutter-stock. L L′ are adjusting-screws to move the wedges in or out. M M′ are thimble-screws to hold the screws L L′ in their places. The thimble-screws M M′ are short hollow cylindrical screws screwed into the cutter-stock B against the outer ends of the heads of the wedge-screws L L′, or against shoulders shown at M′, Sheet 1, on said heads, and the inner shoulders of said heads are secured by corresponding shoulders in the cutter-stocks, the holes in said stock below the heads being only large enough for the shanks, the screw-heads being thus secured so that they can turn on their axes, but cannot move in the direction of their length, and the body of the screws extending into the screw-holes in the wedges K K′, which are fitted into the cutter-stock, while the cutters F and F′ rest upon their upper sides, and all so constructed and arranged that the cutters can be adjusted as to proper height by turning the screws L L′ with the screw-driver. For instance, if the cutters are to be brought to a lower position the screw is to be turned in a direction to carry it farther into the wedge, and if the cutter is to be elevated the screw is to be turned in a contrary direction, so that by turning the screw L it is easy for the operator to adjust the cutter F to the same elevation as the one in the single cutter-stock, with which it co-operates in cutting nails. N is an eccentric on the main shaft to operate the connection-rod. O is a cam to give a proper movement, and hold in a state of rest, when needful, the single cutter-stocks through the arms P, which are fastened onto the journals of said cutter-stocks. Q is a gear on the main shaft to work the screw-shaft R and the feed-screw S through the pinion T. S^1 S^2 show the straight and inclined portions of the thread of the feed-screw in a surface view. U is the nail-sheet. U′, Figs. 4 and 5, are portions of nail-sheets, showing their connection with the feed-screw while being fed toward the cutters. W W′ are two stands to support the feed-shaft. X is a rib to connect the two parts of the double cutter-stock. *a a*, Fig. 1, are buttons or heads on the inner ends of the screws H I, &c., to work in the cross-grooves *a′* in the outer end of the cutter. (Shown in Fig. 2.)

My machine operates as follows: I have in the frame A, not far from the bottom, a main shaft, D, on which is placed an eccentric, N, which gives the oscillating movement to the double cutter-stock B through the connection-rod C. This double cutter-stock is cast of one piece of iron, and has its middle portion, nearly to the journal, separated into two parts by a slot, *j*, which extends from its middle toward the ends as far as the two series of cutters in it, and underneath is one or more ribs from one side to the other, to give strength and stiffness to the two sides, and in this double cutter stock, on each side of said slot, is fitted a series of cutters or cutting-dies, with wedges K K′ under them to adjust them by, and when these cutters are properly adjusted, and the main shaft is caused to revolve, each series of cutters in the double cutter-stock moves alternately toward, to, and a little past the center of the machine, and then recedes, giving place to the other series in turn to approach and pass a little by the center of the machine in the opposite direction, and when each series of these cutters is approaching the center of the machine, it passes close by the edges of a series of cutters in one of the single cutter-stocks E E^1, on the opposite side of the machine, (from the series which is approaching the center,) and which are moved down into their lower position to meet those of the double

cutter-stock, which is approaching the center—that is, when the series B^1 in the double cutter-stock approaches the center, the series E in the single cutter-stock is moved down to its lower position, and held there permanently until the series B^1 has passed by its edges, and thereby cut a series of nails. Then, the series E is raised to its upper position and the series B^1 recedes, and the series B in turn approaches the center, and the series E^1 in the single cutter-stock moves to its lower position to meet it, when another series of nails is cut, completing the revolution of the main shaft, the series E^1 rising to its upper position as the series E above described, cutting two series of nails for each revolution of the machine. The alternate movement of the two series of cutters E E^1 to their lower position to cut nails, and to their upper position again, out of the way of the others, is caused by a cam, O, on the main shaft D, through the arms P P′, fastened onto the journals of the cutter-stocks E E^1 by pins or studs *q q* in the arms P P′, passing in the cam-groove *q′ q′*.

I have a great advantage by placing the double cutter-stock under the single cutters. Both can work together, having the nails fall between the two series of cutters as well when one series cuts as the other, while in any other position it would be difficult, if not impossible, to dispose of the nails from both series. Also, by having the cutters placed in this position it enables me to establish a supply-rack on the top of the machine, which I could not otherwise do, as the weight of the sheet facilitates the automatic supply of the nail-sheets. This is of great importance, as with this rack one hand can tend twenty machines, when without it one hand can tend only two machines; and as this position of the machine increases its usefulness so much, and is new, I think it a patentable feature.

Fig. 9, Sheet 3, is a top plan view of my double cutter-stock, showing two series of cutters, F F′, thereon, and the slot *j* in the middle for the nails to fall through; also showing four cavities, E^2, one on each side at each end for the projection E^3 on the single cutter-stock to pass into as the double cutter-stock oscillates. These cavities are shown in dotted circular lines in Sheet 1 at E^2. The use of these cavities E^2 is to prevent the single cutter-stocks from interfering with the motion of double cutter-stock, as each side alternately passes up to its highest position, as the projecting portions of the single cutter-stocks can occupy these spaces or cavities E^2 without contact with the stock. In this figure the rib X appears through the slot from beneath, and the journals at the ends.

Fig. 10 is a bottom view of the said cutter-stock, showing the journals at the ends, and showing two flanges, B^2 B^2, which, though concave on the under side, project down much lower than the middle part of the cutter-stock. The curved edges of these flanges are shown at B^2 in Sheet 1, and the concave and curved form of the middle portion of the double cutter-stock at B^3 and B^4 is shown in Fig. 1. The rib X is also shown in Fig. 9, and a cross-sectional view of the same is shown in Fig. 1. The cavity C′ for the connection-rod is shown at Fig. 10. At each edge of the nail-sheet I have a screw, S, on a vertical shaft, as shown at Figs. 1 and 8, arranged to act on the sheet at or near the part being cut by the cutters, and for some distance above. These screw-threads project into small notches in the edges of the sheet, (shown at Figs. 4 and 5) in such manner that when the screws are caused to revolve in the right direction they will feed or move the nail-sheet downward, and all that remains to complete this feed is to have the downward movement continue only when the sheet is disengaged from the cutters, and have the sheet remain at rest while the cutters are doing their work. This I accomplish by having the screw-threads on the feed-screws inclined only part of the way round the thread, the other part being straight, as seen at S^1 S^2, Figs. 3 and 4, in a plan view of the surface at Fig. 3, so that when the two screws at the two edges of the sheet are properly adjusted, and their threads project into the notches in the edges of the said sheet, and these screws are caused to revolve, they will move the sheet downward only while the inclined parts of their threads are in the said notches in the sheet, and at the same time hold said sheets at rest while the straight part of said threads is in said notches, thereby feeding the sheet when it is disengaged from the cutters, and holding it at rest while the nails are being cut. The shafts on which these screws are placed have gears or pinions T T on their lower ends, which receive their motion from gears Q Q on the main shaft D. In the upper part of the feed-screw S I have small notches or teeth, as shown at *v v v*, Fig. 7, in the screw-thread, so that as the sheet is fed down through the groove *d* as it passes from the rack and comes down below the upper end of the feed-screw the screw-thread strikes into the sheet close to the lower part of the edge, and makes one notch, which passes onto the thread and follows it down, and when the screw has revolved one round another notch is cut a distance from the first equal to the distance of one thread from the other, or, what is the same thing, equal to the width of one nail, (for these feed-screws have threads just equal to the width of the nail the machine is to cut,) and this second notch, as the first, and all others, follow the screw-thread downward; and as I have the sheet pass into a narrow space as it moves downward it becomes straighter, and the edges recede a little from each other, and hence the teeth formed on the screw-thread some distance from the top to make the notches deeper, if required, so that they will not bind on the screw below as the sheet passes down.

In Fig. 1 I have shown an inside elevation with the operative mechanism of my supply-

rack; and in Fig. 8 is shown a vertical section of the same, in which b' is the rack proper, of a trough-like form, having a bottom somewhat wider than the nail-sheet, which rests and slides on the bed-piece or support w, which support is fastened onto the top of the frame A of the machine. The sides of this rack b' extend up from the bottom sufficient to support the nail-sheets, as shown in the drawing, and are grooved on their inner surfaces suitably for the nail-sheets to slide down in; and corresponding to these grooves are spaces formed in the bottom, and so constructed that a nail-sheet can slide down through the grooves and through the bottom, with their lower edges resting on the support w, which prevents their leaving the rack, except as they are brought successively to the slot at o^2 in the bed-piece w in the center of the machine, where one of the said sheets is represented as passing down into position for feed-screws to feed it down to the cutters, as before described. Now, each one of these nail-sheets in the rack is brought to its place of exit from the rack to the machine to be cut into nails in the following manner: The spaces through the bottom of this rack (through which the nail-sheets pass) are widened a little at their lower extremity, as shown at o^1 o^1 o^1, &c., to make room for the hook x to pass in, and thereby become attached to and draw it along far enough to admit of another sheet passing through the slot at o^2 into the machine. This hook x has a shank, x^2, which passes through the upper end of the arm y^1, having a head on the opposite end from the hook, so that when the arm y^1 moves in a direction from said hook it will give to said hook a positive motion, as the head cannot pass through, the hole in said arm being only large enough for the shank x^2; yet the motion of this hook x is not so positive when the arm y^1 moves in the direction toward the hook, as said shank can slip through the arm y^1 in that direction; yet, to give motion to the hook in this direction, when required to move the rack for the delivery of another sheet, and to throw the hook into one of the notches o^1 o^1, I have a spring, x^1, around a slide, x^4, and between the end of the arm y^2 and the under side of the hook x, and arranged in such an inclined position as at the same time to give an upward and backward yielding force to the said hook.

Now, it is clear that if a vibratory motion be given to the arm y^1 equal to the distance between the notches o^1 o^1 the hook will be moved thereby back to another notch, o^1, in the bottom of the rack b', will be thrown into it, and then will be moved with a positive motion forward, carrying the said rack along with it, and at each successive vibration of the arm y^1 said rack will be moved forward a like distance, and the effect of the continued vibratory movement of the arm y^1 while the nail-machine is at work, and the rack being filled with nail-sheets, will be as follows: The hook x will, at each vibration of the arm y^1, be carried forward to the same point by a positive motion, and it will be carried back until it abuts against the sheet U as it is passing down through the slot in the bed-piece at o^2, when the spring x^1 will yield, allowing the motion of said hook to terminate at the sheet, the whole movement of the arm producing no effect except a limited movement of the hook; but when the sheet at o^2 has passed down into the machine, so as not to restrain and limit the movement of the hook, then the said hook passes back into the space before occupied by the sheet at o^2, and is thrown into it by the spring x^1, and at the next forward movement of the arm y^1 the rack is carried forward far enough for another sheet to pass through the slot at o^2, which again limits the backward movement of the hook x, as described, until this second sheet is fed down out of the way, when another like forward movement of the rack will take place, and another sheet will pass out of it, and this operation will be repeated until all the sheets in the rack will have successively passed down into the machine and have been cut into nails.

I have a horizontal arm, y^2, on the shaft or stud y, which is connected to the outer end of the cutter-stock B by a link, z, all constructed and arranged so that by every upward and downward movement of the cutter-stock B, as before described, a lateral or back and forward movement is given to the arm y^1. There is a space cut out of the bed-piece w for the hook x and the arm y^1 to work in.

The method just described of supplying nail-sheets to the nail-machine appears to me the most obvious and best, yet there are other ways which I deem it unnecessary to describe, and it is, perhaps, needless to say that an invention is useful which will save six-tenths of the hands needed to tend my former machines, which this supply-rack cannot fail to do.

Thus describing my invention, I will state my claims as follows:

1. In nail-cutting machines, the double cutter-stock herein described, made of one single casting, having a space for the nails to fall through, with one or more ribs connecting the two sides to each other, and constructed to hold a series of cutters on each side, substantially as and for the purpose set forth.

2. In nail-cutting machines, the two single cutter-stocks, each holding a series of cutters, in combination with the double cutter-stock holding two series of cutters, substantially as and for the purpose set forth.

3. In nail-cutting machines, the combination of a single cutter-stock and a series of cutters thereon, and a double cutter-stock and two series of cutters thereon, with mechanism for holding the single cutter-stock in a state of rest while the cutting is done, and to raise it up out of the way at other times, substantially as described, and for the purpose set forth.

4. In nail-cutting machines, a feed-screw, constructed to work in notches in the edge of the nail-sheet, with threads inclined part of

the way round, and the other part of said threads straight, to feed the sheet down by the inclined part of the threads while the sheet is disengaged from the cutters, and by the straight part of the threads to hold the sheet at rest while the cutters are doing their work, substantially as described, and for the purpose set forth.

5. In nail-cutting-machines, the cutters G G′, having space e^2 and adjoining spur, in combination with the feed-screw S, by means of which the nail-sheet can be and is fed down to the operative cutting-edges of the said cutter, thereby preventing waste at the last edge of the sheet, as and for the purpose set forth.

6. In nail-cutting machines, a feed-screw, constructed with teeth, by means of which notches are cut in the edge of the nail-sheet, the screw at the same time feeding the sheet toward the cutter by means of the notches thus cut, as and for the purpose set forth.

7. In nail-cutting machines, a supply-rack, b', having grooves in its sides and spaces through the bottom for the nail-sheets to pass, arranged on a support, w, over the machine, with a space or slot, o^2, through which the nail-sheets can pass from the rack to the cutters, combined with mechanism by which said rack can be intermittingly moved along, successively delivering the nail-sheets therein contained to the cutters through the slot o^2, substantially as described, and for the purpose set forth.

8. The device for moving the rack in such manner as to deliver each sheet in it successively into the nail-machine as it is cut into nails, consisting of the hook x and the vibrating arm y^1, in combination with the spring x^1, all constructed and arranged, as described, so that the hook will be moved with a positive motion in the direction the rack is to move, but by a yielding motion in the opposite direction, so that when a sheet is passing down it will limit the motion of said hook in the direction of the sheet, and so that when the sheet has passed down out of the way said hook will pass back to another notch, o^1, and at next forward movement will move the rack far enough for the delivery of another sheet, as and for the purpose set forth.

9. The thimble-screw M, in combination with the screw L, the wedge K, the cutters F, and the cutter-stock B therewith connected, as and for the purpose set forth.

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