W. N. HUNTER.

BRUSH MACHINE.

APPLICATION FILED FEB. 15, 1904.

995,788. Patented June 20, 1911.

3 SHEETS—SHEET 1.

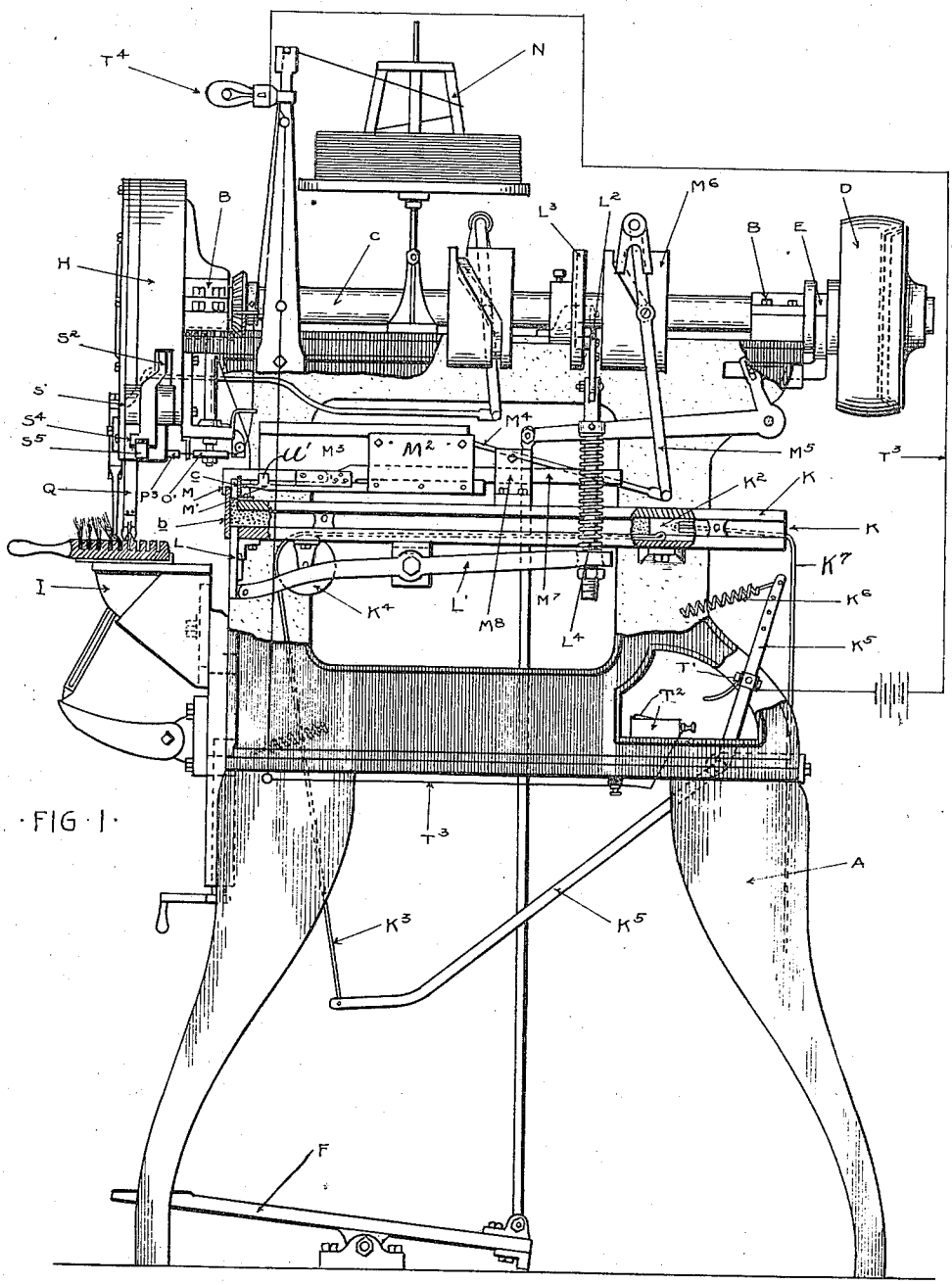

FIG. 1.

WITNESSES

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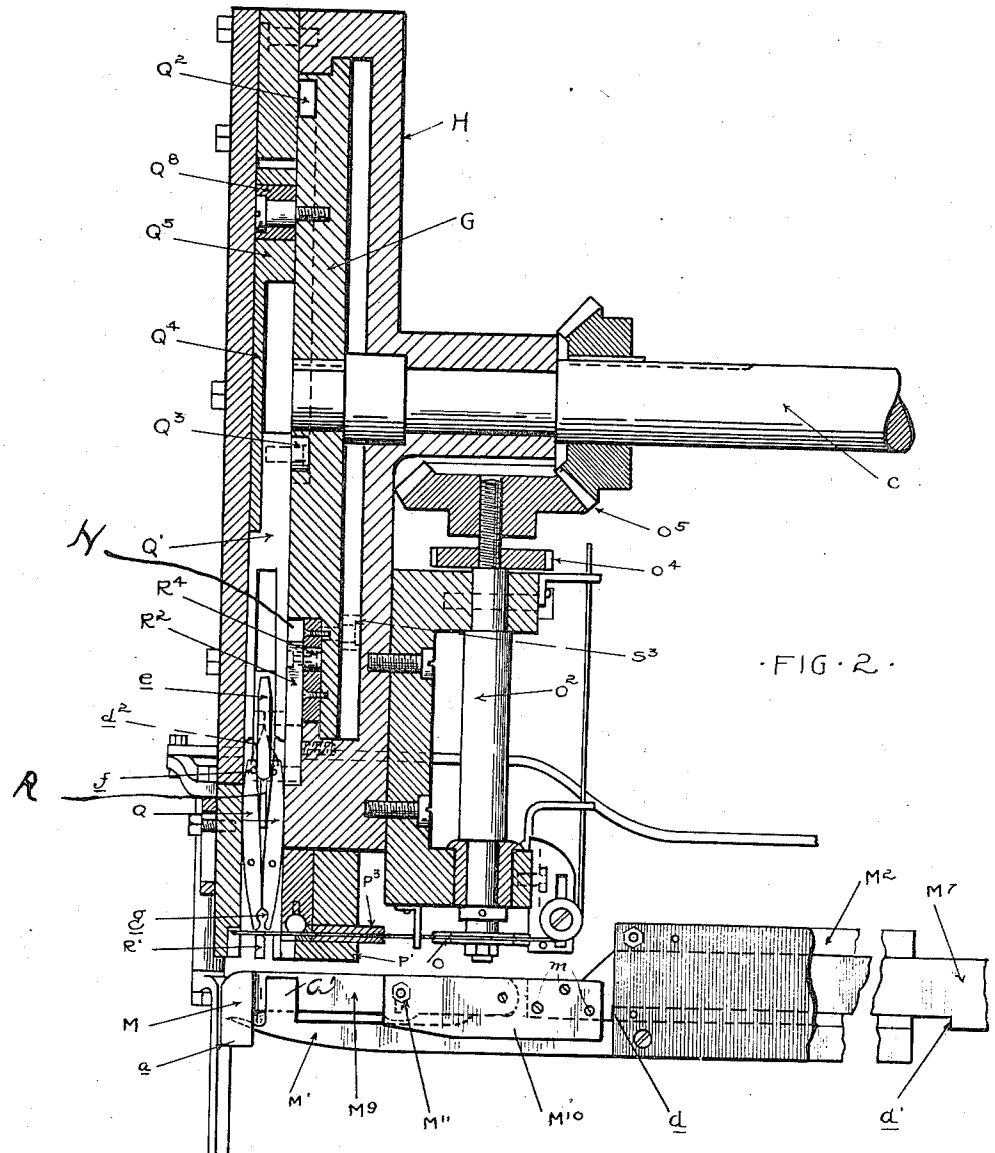

FIG. 2.

WITNESSES

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3 SHEETS-SHEET 3.

Fig. 3.

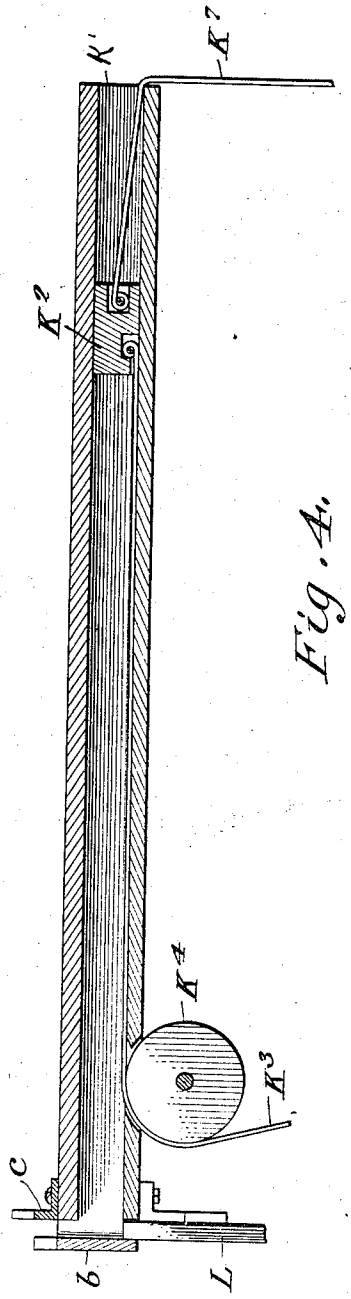
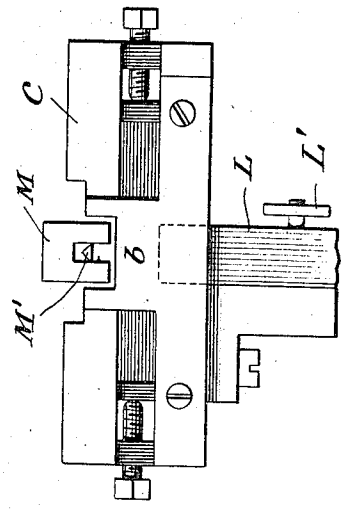


Fig. 4.



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UNITED STATES PATENT OFFICE.

WILLIAM N. HUNTER, OF DETROIT, MICHIGAN.

BRUSH-MACHINE.

995,788. Specification of Letters Patent. Patented June 20, 1911.

Application filed February 15, 1904. Serial No. 193,615.

To all whom it may concern:

Be it known that I, WILLIAM N. HUNTER, residing at Detroit, in the county of Wayne and State of Michigan, a citizen of the United States, have invented certain new and useful Improvements in Brush-Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

The invention relates to improvements in brush machines and consists in certain novel features of construction as will hereinafter be set forth.

In the drawings, Figure 1 is a sectional side elevation of the machine, Fig. 2 is a longitudinal section through the staple forming and driving mechanism, with the bunch grouping and separating mechanism in operative relation thereto, Fig. 3 is a longitudinal sectional view of the conduit, and Fig. 4 is a detail view showing the connection between the picking needle and grabber.

The machine comprises an improvement for feeding the stock or bristles to be applied to the brush block, together with means for successively feeding bunches or "knots" from the stock and transferring the same into registration with the aperture in the brush block and in position to be acted upon by the stapling mechanism, whereby the "knot" will be driven into the aperture in the brush block and secured in position.

A is a suitable frame work upon which is mounted in bearings B a rotary shaft C. This shaft is provided with a drive pulley D for imparting rotary motion which is adapted to intermittently actuate the shaft through the operation of the clutch E controlled by the foot lever F. Upon the shaft C are mounted a plurality of cams for controlling the various operating parts of the mechanism and at the forward end of the shaft is mounted a rotary head G which also controls the operating parts of the mechanism. This head is preferably housed in the casing H which is mounted upon suitable supports on the frame. Beneath the housing H is arranged upon the frame a table or shelf I for supporting the brush block, this being preferably provided with an attachment to the frame, which permits of adjusting it to different inclinations.

K is a bed or plate mounted upon the frame below the shaft C and above the level of the shelf I. This bed carries the stock conduit, which is preferably in the form of an adjustable channel or tunnel K′ extending longitudinally through the bed plate K from the rear end thereof to near the forward edge, and from the latter point having a vertical upward extension so positioned as to form an opening at the upper forward edge of the channel. The bristles or stock are cut off a suitable length to be placed in the tunnel K′ transversely thereof, and the feeding of the stock is effected by the follower K^2 which is actuated preferably through the medium of the flexible connections K^3 attached at one end to said follower and passing over a sheave K^4 and thence to one end of the lever K^5. This lever exerts a constant pull on the connection K^3 by means of a suitable tension device, such as one or more springs K^6. The tension may be varied to suit the requirements of the work either by changing the number of springs or by adjusting their points of attachment to the lever K^5. Furthermore, the tension of the spring diminishes as the follower is drawn toward the discharge end of the tunnel and the friction of the stock sliding in said tunnel is reduced. Thus the pressure on the stock at the discharge end is substantially uniform at all times, and is just sufficient to feed the stock without injury by over compression.

K^7 is the strap or band for returning the follower and may be secured to any suitable operating means (not shown).

As illustrated in Fig. 1, the flexible strap K^3, which draws the follower through the stock tunnel, forms a traveling bottom for supporting and assisting in propelling the stock during its feeding movement. This further reduces the pressure necessary for feeding the stock and also prevents undue friction between the stock and channel bottom.

At the forward end of the channel the stock is fed upward by means of the reciprocating plunger or pusher L, which is actuated by the lever L′ connected by the link L^2 with the cam L^3 upon the shaft C. The variable stroke of the pusher is obtained by inserting a yielding connection between the link L^2 and the lever L′, consisting of a spring L^4. This permits the plunger L to be moved either a sufficient distance to carry the stock from the bottom of the tunnel to the discharge end thereof, or where that

portion of the tunnel is filled with the stock to effect a feeding sufficient to engage one bunch with the grabbing mechanism.

The timing of the movement of the plunger L, in relation to the movement of the grabber, is such that the stock is pressed into engagement with the grabber, while the latter is in registration with the discharge end of the conduit, and the plunger is maintained in this relation during the picking of the bunch, but is withdrawn before a further movement of the grabber. Thus the stock in the conduit beneath the picked bunch is freed from pressure and is not injured by the movement of the picker thereover. The grabber or bunch separating mechanism comprises an adjustable bunch receiving jaw M and a bunch grabbing or picking finger or needle M′ which coöperate to separate the bunch from the stock in the tunnel and transfer the same into the path of the stapling mechanism. The jaw M is preferably a right angle shaped member and is normally in registration with the upper face of the stock tunnel K′. The downwardly projecting portion *a* of the jaw is bifurcated to permit of the finger M′ passing between the furcations thereof. This portion is normally in alinement with the outer wall *b* of the vertical extension of the tunnel which is slotted to receive the downwardly projecting portions *a* of the jaw M. The opposite wall of the vertical extension of the tunnel consists of a bifurcated upward extension *c*, the furcations of which pass upon opposite sides of the jaw M and picking finger M′ (see Fig. 4) and serve to retain the stock and guide the same into the bunch receiving pocket. The bunch receiving pocket is formed by the member *a* of the jaw M and the member *a′* of the finger M′ (see Fig. 2), the member *a′* being bifurcated to engage the rearwardly extending portion M^9 of the jaw.

The jaw M is adapted to be moved longitudinally by a rectilinear movement from its position in registration with the stock tunnel to a position in alinement with the staple driving mechanism. This longitudinal movement is preferably effected by attaching the finger M′ to the head M^2 which is slidingly secured in a bearing M^3 upon the frame. The opposite end of this head is connected by a link M^4 to the lever or rock arm M^5, which is actuated by a cam M^6 on the shaft C, the arrangement being such that the rotation of the cam will impart an intermittent reciprocatory movement to the head M^2 and the finger. The jaw M is also actuated by the same connection, but in order to permit of the initial movement of the finger M′ while the jaw is still in registration with the stock tunnel, a limited lost motion is provided in the jaw actuating connection. As shown this is effected by forming the head M^2 with a recess extending longitudinally therethrough, through which the shank M^7 of the jaw extends. This shank is provided with shoulders *d* and *d′*, which are adapted to engage with opposite ends of the bar M^2 and are separated sufficiently to provide the required lost motion. The bar M^7 is temporarily held during the initial movement of the needle preferably by the friction device M^8 which is attached to the frame and embraces the bar M^7. Thus when the finger M′ is actuated by the mechanism described it will first be projected across the stock tunnel, separating the bunch in the angle of the jaw, from the stock in the tunnel and subsequently the continued movement of the finger will carry with it the jaw M thereby separating the bunch by the lateral movement from the stock in the tunnel, and carrying it directly into the path of the stapling mechanism. This separation of the bunch from the stock by a movement transverse of the tunnel prevents the entanglement of the stock in the bunch with that remaining in the tunnel, which sometimes occurs where the separation is by a vertical movement.

In order to adapt the grabber to receive different sized bunches of stock the jaw M is preferably adjustably secured to the shank M^7 as shown more particularly in Fig. 2. This is accomplished by providing the jaw M with a rearward extending portion M^9 pivotally attached to a plate M^{10} which is secured to the shank M^7 at *m*, said rearwardly extended portion M^9 being also adjustably clamped to said plate M^{10} at M^{11}, thus by loosening the clamp M^{11} the jaw M may be raised or lowered in relation to the needle M′ to enlarge or diminish the pocket for receiving the bunch.

The stapling mechanism comprises means for feeding the wire which is held upon a suitable reel N, mounted on the frame and means for cutting said wire into the required lengths for the staples and also for forming pointed ends thereon. The feeding mechanism comprises a pair of rolls or rotary feeding disks O and O′ between which wire is fed. These disks O and O′ are mounted upon shafts O^2, secured in bearings upon the casing H. At their upper ends they are connected together by gears O^4 and are driven through the shaft C through the medium of beveled gears O^5. From the feeding disks O and O′ the wire is passed horizontally into the cutter P^2 of any desired construction.

From the cutter P^2 the wire passes into engagement with a staple forming mechanism. This comprises a pair of jaws Q which are pivotally attached to the vertical reciprocating bar Q′. This bar is actuated by a cam groove Q^2 in the rotary head G with which the roller Q^3 on the bar Q′ engages. The bar Q′ is slidingly secured in the bar Q^4 which is provided with a T

shaped head Q^5 and is slidingly secured in bearings in the casing H. This bar Q^4 has attached to its lower end a punch which is adapted to cooperate with the jaws Q in the manner to be hereinafter set forth. The head Q^5 is provided with a cam slot Q^7 with which the crank roller Q^8 on the head G engages. Thus in the rotation of the head G the bar Q^4 will be reciprocated through the actuation of the roller Q^8 and during this reciprocating movement an independent movement will be imparted to the bar Q′ through the medium of the roller Q^3 engaging the cam slot Q^2.

Pivotally attached to the casing H is a bell crank lever R at the lower end of which is carried the anvil R′. The other arm R^2 of the bell crank engages with the cam slot H^3 in the head G through the medium of the roller R^4. This cam slot is so shaped that during the rotation of the head G the bell crank lever R will be actuated to move the anvil R′ in the path of the jaws Q and retain it in that position for an interval, after which the bell crank is again actuated to withdraw said anvil. The timing of the parts is such that during the feeding movement of the wire the jaws Q and their actuating bar Q′ will remain stationary. Furthermore the jaws Q are held in closed relation to each other by means of a spring hinge member d^2 engaging (see Fig. 2) their upper ends so as to diminish the danger of the end of the wire catching in between the jaws when fed across the same.

When the wire has been fed the required distance movement will be imparted to the bell crank lever R carrying the lug or anvil R′ upward and simultaneously the jaws Q are separated so as to permit said lug to press on said wire between the jaws. This will form a clamp for firmly holding the wire during the severing operation. In order that the severed portion of the wire may be held from accidental disengagement from the jaws, it is desirable that the anvil shall press against the wire with a uniform pressure, this pressure being just sufficient to clamp the wire without bending it. I have therefore provided the actuating connection for the anvil with a slight lost motion and have arranged a spring (not shown) which when the anvil is moved upward will yieldingly press the same against the wire in engagement with the jaws. As soon as this section is severed movement is imparted to the bar Q′ which will press the jaws downward and around the anvil lug R′, thereby bending the severed section of the wire into staple form. The anvil R′ is then withdrawn out of the path of the jaws and the latter will continue their downward movement until the staple is engaged with the bunch which latter has been moved by the grabber mechanism previously described into the path of the staple. As soon as the staple has been engaged with the bunch the jaws Q are moved toward each other so as to bend the ends of the staple together and around the bunch. This movement is effected preferably by a projecting lug *e* on the bar Q^4 which is adapted to pass between pins *f* on the jaws Q and acts as a cam to separate said jaws at their upper ends, thereby closing them together at their lower ends, and pinching the staple. Moreover this movement of the jaws will cause them to tightly grab the bunch, holding the same in the recess *g* at the lower end of the jaws. Simultaneously the grabber actuating mechanism will be actuated to return the grabber but before the bunch holding jaw is moved the needle M′ will be returned sufficiently to disengage from the lower edge of the bunch and permit the latter to be carried by the jaws Q out of engagement with the jaw M.

After the movement just described the jaws Q will be carried downward by the movement of the bar Q′ until they contact with the upper face of the brush block, which is located on the table L and is arranged by the operator with one of its apertures in alinement with the jaws Q. As soon as this point is reached further movement of the jaws is arrested but the bar Q^4 will continue its movement carrying the punch at its lower end downward between the jaws until its lower end contacts with the upper end of the staple. Before contacting with the staple the lug *e* passes from engagement with the pins *f* on the jaws Q permitting the holding portions of the jaws to move apart by the actuation of the spring d^2 so as to disengage from the staple and allow the latter to be forced by the punch at the lower end of the bar Q^4 downward in the aperture in the brush block.

During the continued movement of the punch in driving the staple downward and driving the same into the wood, the jaws Q remain stationary and also remain in this position during the initial upward movement of the punch, thereby operating as a presser foot which retains the block from being drawn upward by frictional engagement with the punch. As soon as the punch has been disengaged from the aperture in the brush head the jaws Q will again be moved upward by the actuation of the bar Q′ and the parts will be returned to their initial positions.

The cutter P^2 is actuated in its operation by the lever S which is fulcrumed at S′ on the casing H and has one arm S^2 extending into the path of the roller S^3 on the rotary head G. The opposite end of this lever is provided with a lug S^4 which engages a slot in the head S^5 upon the cutter P^2. Thus in the rotation of the head G the lever S will

be actuated to reciprocate the cutter P^2 at the proper time and the return movement of said cutter may be effected by a spring of any desired construction. The engagement of the lug S^4 with the slotted head S^5 is such that the punch P^2 is permitted a rotary adjustment in the die, and thus the cutting of the wire will not always be effected by the same portion of the punch.

For indicating to the operator that the stock tunnel is nearly empty an electric switch is preferably arranged with one of its contacts T′ carried by the lever K^5 and the other contact T^2 stationary. The arrangement is such that when the follower is moved near to the forward end of the tunnel the lever K^5 will assume a position where the contact T′ is against the contact T^2. These coöperating contacts close an electric circuit T^3 in which is included an electric light T^4 so that whenever the tunnel is nearly empty of stock but still containing enough for a number of bunches, the light will be flashed which will indicate to the operator its condition. This will avoid entirely emptying the tunnel of stock and as a consequence there will always be a sufficient amount of the stock in the tunnel to avoid the formation of incomplete or light bunches. If the tunnel were entirely empty of stock there would be danger of the last few bunches being imperfectly formed, which would necessitate extracting them from the brush back and replacing them by full bunches, thus by reason of the indicator the time as well as the material wasted in such imperfect operation is avoided.

What I claim as my invention is:

1. In a brush machine, the combination with a stock feeding conduit having a transversely extending discharge end, of means for separating a bunch from the stock and a grabber adapted to engage the discharge end of said conduit and movable in a plane parallel to said conduit for picking the separated bunch and for directly transferring said bunch by a rectilinear movement in the same direction to the point of delivery.

2. In a brush machine, the combination with a stock feeding conduit having a transversely extending discharge end, of a reciprocatory bunch grabber adapted to register with the discharge end of said conduit, means moving longitudinally of the conduit for pressing the stock into engagement with said grabber while the latter is in registration with the discharge end of the conduit and for releasing the pressure before the transfer movement of the grabber.

3. In a brush machine, the combination with a stock feeding conduit, of a grabber movable longitudinally thereof, comprising a bunch receiving jaw and a bunch picking needle movable longitudinally relatively to one another and connected for simultaneous movement laterally of the discharge end of the conduit, means for causing the initial movement of the picking needle and means for temporarily preventing the movement of said jaw, both of said means coöperating to move said jaw and needle together to separate and transfer the bunch, said conduit having upwardly extending portions constituting guides upon opposite sides of the needle and jaw.

4. In a brush machine, the combination with a stock feeding conduit, of means for separating a bunch from the stock, a jaw and bunch picking needle, said members coöperating to grab the bunch and separate it from the stock by a movement laterally of the conduit, a shank for the jaw, and an adjustable connection between the shank and jaw.

5. In a brush machine, the combination with the stock conduit and means for yieldingly pressing the stock toward the discharge end thereof, of a grabber comprising a bunch holding jaw and a coöperating picker, means for actuating said picker while the jaw is stationary and while the stock is subject to yielding pressure, means for first relieving said yielding pressure, and means for then moving said grabber laterally of said conduit to separate the bunch.

6. In a brush machine, the combination with a stock feeding conduit, of means for separating a bunch from the stock, a jaw and a bunch picking needle, said members cooperating to grab the bunch and separate it from the stock by a movement laterally of the conduit, a shank for the jaw, said jaw being adjustable relative to said shank and means for retaining the same in adjusted position.

7. In a brush machine, the combination with a stock feeding conduit, of means for separating a bunch from the stock, a jaw and bunch picking needle, said members cooperating to grab the bunch and separate it from the stock by a movement laterally of the conduit, a shank for the jaw, said jaw being pivotally connected to the shank for vertical adjustment, and means for retaining the same in adjusted position.

8. In a brush machine, the combination with a stock feeding conduit having a transversely extended bifurcated discharge end, of means reciprocating between the furcations thereof for grabbing the bunch and separating it from the stock.

9. In a brush machine, the combination with a stock feeding conduit having a laterally extended discharge end, of a grabber adapted for reciprocation laterally of said discharge, comprising a bunch receiving jaw having an offset bifurcated end, and a bunch picking needle reciprocatory through said bifurcated end, and having means thereon adapted to engage the bunch against said offset end of the jaw.

10. In a brush machine, the combination with a stock feeding conduit having a laterally-extending discharge end, of a grabber adapted for reciprocation laterally of the discharge end, comprising a bunch receiving jaw having a downwardly extended end normally resting upon said discharge end, and a bunch picking needle adapted to engage the bunch against said downwardly extended end.

11. In a brush machine, the combination with a stock feeding conduit, of means for separating a bunch from the stock, and an intermittently reciprocating grabber jaw and a coöperating picking needle adapted to pick the bunch from the stock while the jaw is stationary and in engagement with the discharge end of said conduit and to release said bunch while the jaw is at the opposite end of its movement, said grabber jaw being adapted to directly transfer said bunch to the point of delivery by a rectilinear movement in a plane parallel to said conduit.

12. In a brush machine, a bunch separating and delivery means comprising a grabber jaw, a coöperating picking needle, means for reciprocating said picking needle and jaw by a rectilinear movement between the points for receiving and delivering the bunch, and a lost motion connection between said picking needle and grabbing jaw, for the purpose described.

13. In a brush machine, the combination with a stock feeding conduit, of means for separating a bunch from the stock, a staple forming mechanism, means movable in a rectilinear path in a plane parallel to said conduit for picking the bunch and, in a further movement in the same direction, transferring the bunch into the path of the staple.

14. In a brush machine, the combination with a stock feeding conduit having a transversely extending discharge end, of means moving transversely of the discharge end and longitudinally of the conduit for separating a bunch from the stock, a staple driving mechanism having a rectilinear reciprocatory movement and a grabber movable in a rectilinear path in a plane parallel to said conduit for picking the bunch and, in a further movement in the same direction, transferring said bunch into the path of the staple.

15. In a brush machine, the combination with a stock feeding conduit, of means for separating a bunch from the stock, a grabber jaw adapted to register with the discharge end of the conduit, said separating means being adapted to yieldably press the separated bunch into engagement with the grabber jaw, a picking needle reciprocating in a plane parallel to said conduit and having a lost motion connection with said grabber jaw, and means for reciprocating said grabber jaw and the picking needle to directly transfer said bunch to the point of delivery.

16. In a brush machine, the combination with a stock feeding conduit, having a laterally extending discharge end, of a grabber adapted for reciprocation laterally of said discharge, means for separating a bunch from the stock and feeding the same to the grabber, and guides in said discharge end with which the grabber engages.

17. In a brush machine, the combination with a stock feeding conduit having a transversely extended bifurcated discharge end, of grabbing instrumentalities adapted to move in a plane parallel with the conduit and transversely of the laterally extending end thereof between the furcations of said discharge end, said instrumentalities being adapted to grab the bunch and separate it from the stock.

18. In a brush machine, the combination with a stock-feeding conduit having a laterally extending discharge end, of a grabber jaw adapted for reciprocation laterally of said discharge, a picking needle adapted to move laterally of said discharge and having a lost motion connection with said grabber jaw, and means for reciprocating said grabber jaw and picking needle to directly transfer said bunch to the point of delivery.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM N. HUNTER.

Witnesses:
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H. C. SMITH