(No Model.) 2 Sheets—Sheet 1.

W. N. SEVERANCE.

MACHINE FOR CUTTING NAILS.

No. 500,959. Patented July 4, 1893.

Fig. 1

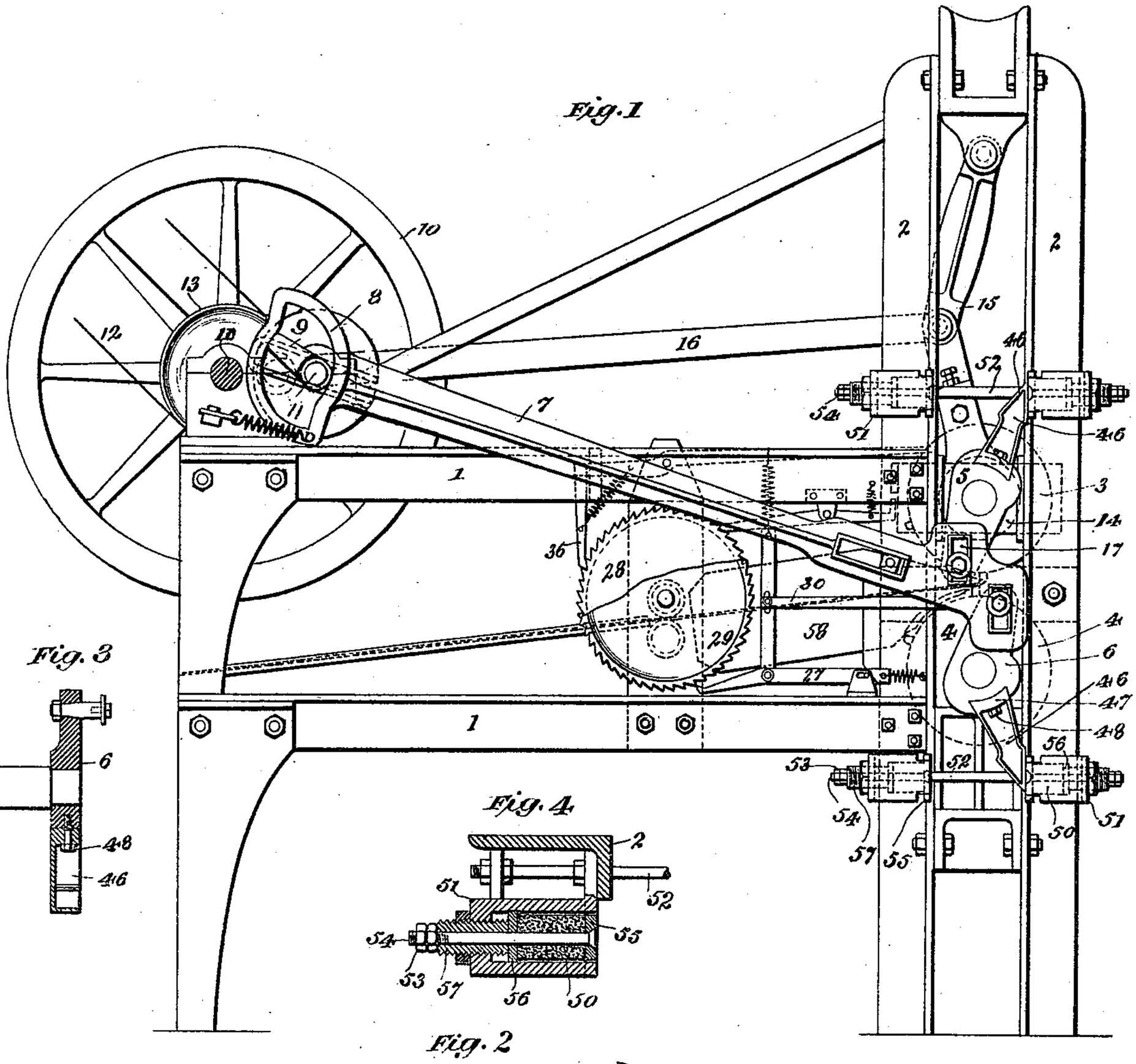


Fig. 3

Fig. 4

Fig. 2

Fig. 5

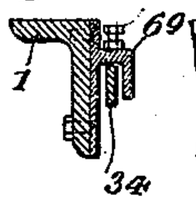
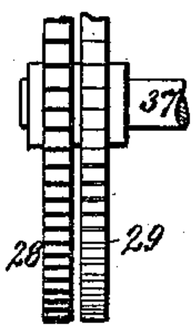


Fig. 6



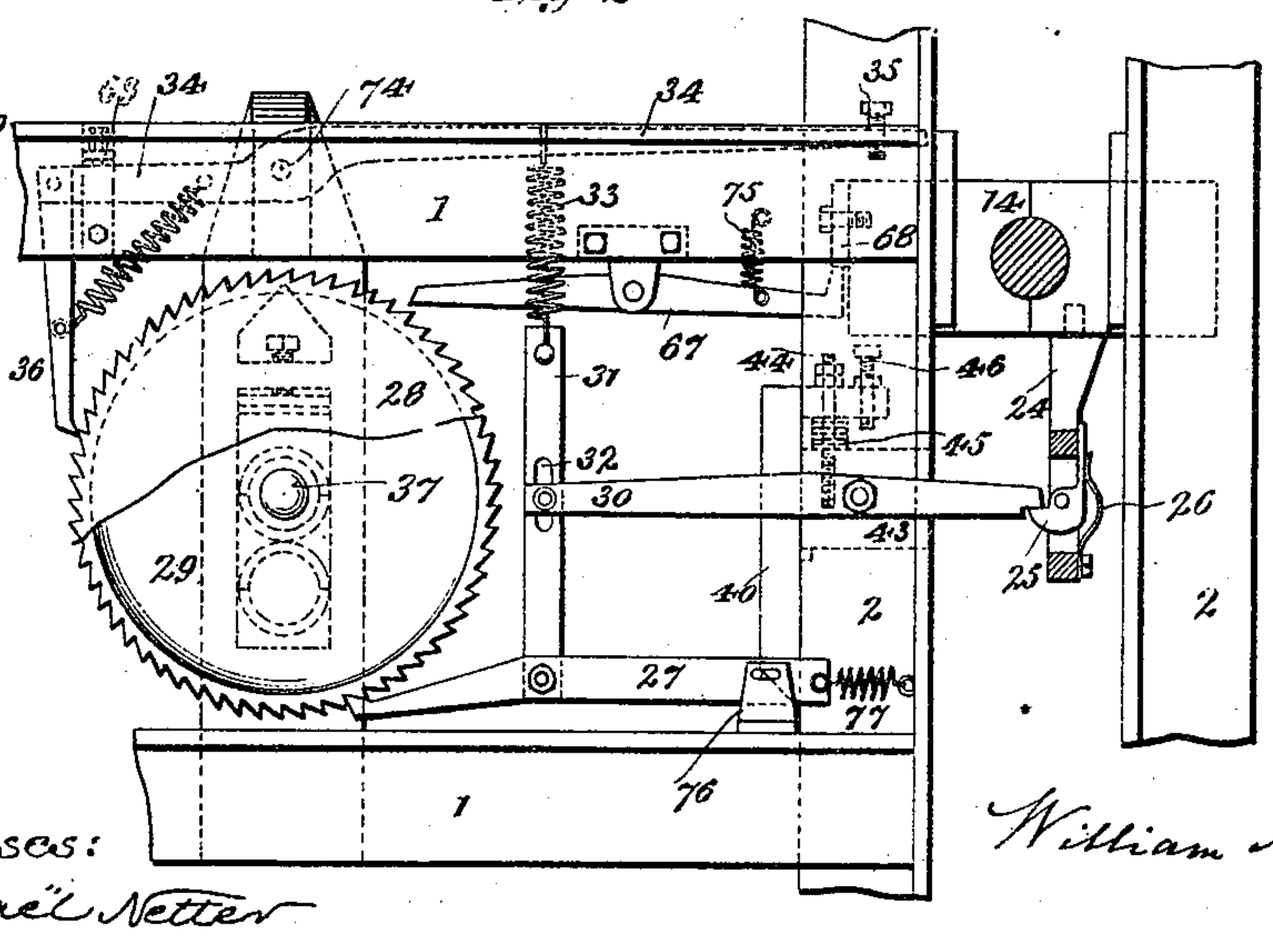


Fig. 7

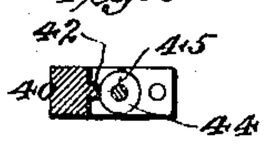
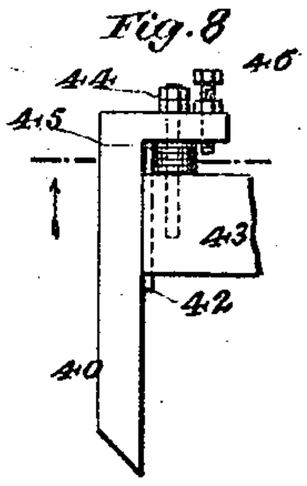


Fig. 8



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(No Model.) 2 Sheets—Sheet 2.

W. N. SEVERANCE.

MACHINE FOR CUTTING NAILS.

No. 500,959. Patented July 4, 1893.

Fig. 9

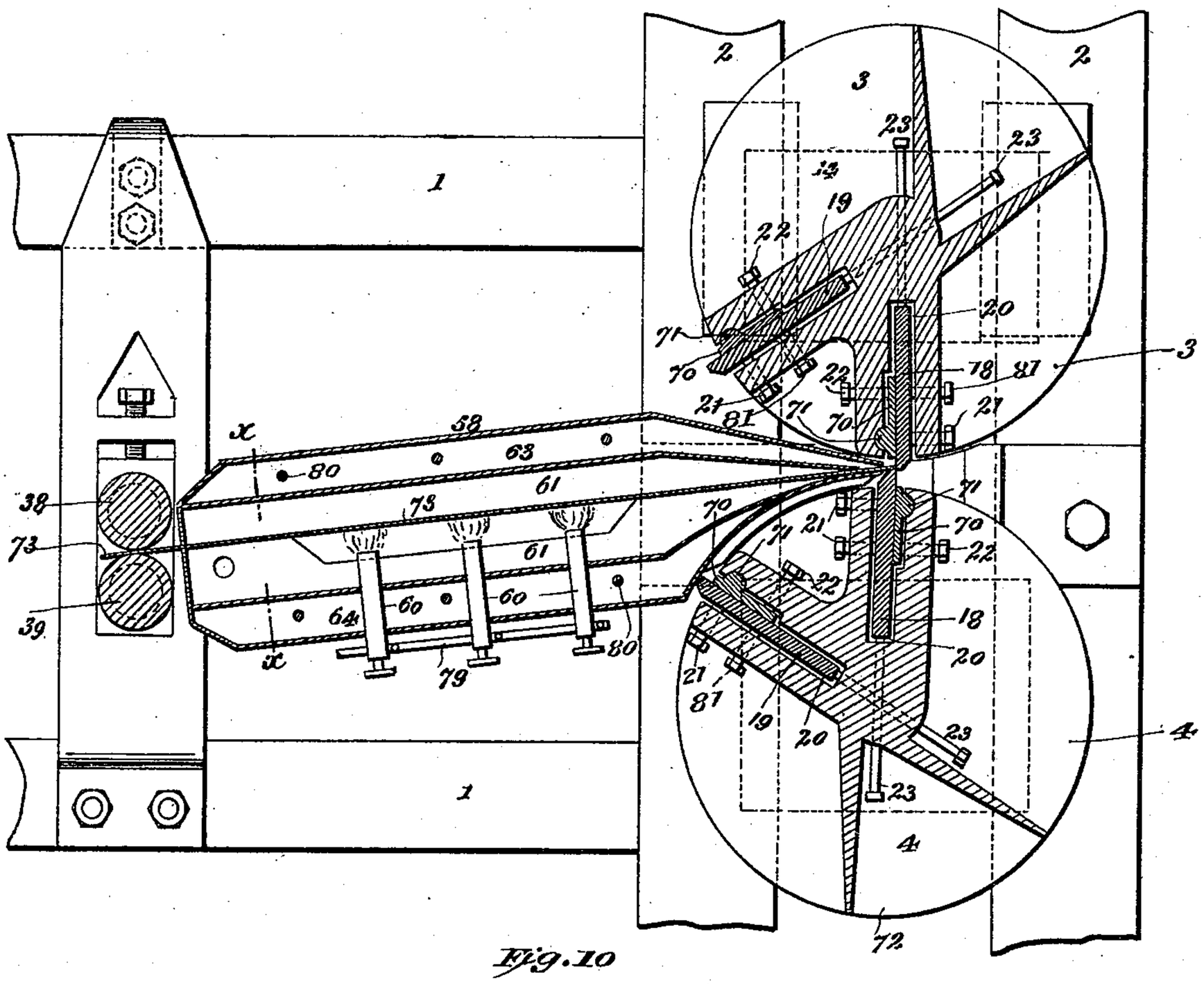


Fig. 10

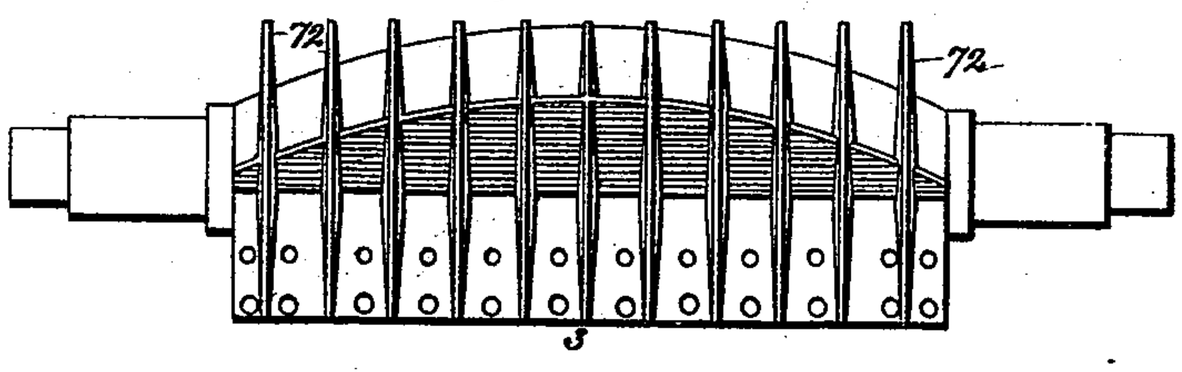


Fig. 11

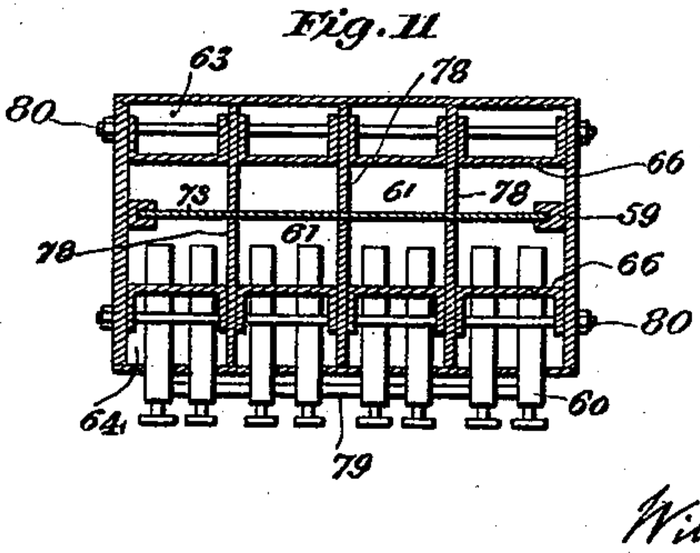
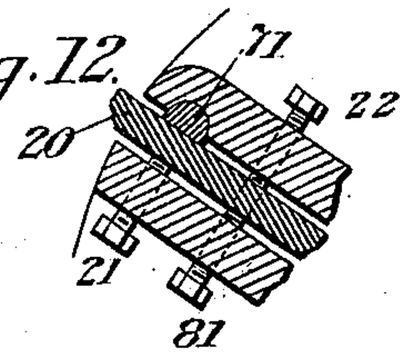


Fig. 12.



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UNITED STATES PATENT OFFICE.

WILLIAM N. SEVERANCE, OF APPLETON, ASSIGNOR TO THE SEVERANCE NAIL MACHINE COMPANY, OF ST. PAUL, MINNESOTA.

MACHINE FOR CUTTING NAILS.

SPECIFICATION forming part of Letters Patent No. 500,959, dated July 4, 1893.

Application filed November 20, 1890. Serial No. 372,038. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM N. SEVERANCE, a citizen of the United States, residing at Appleton, in the county of Swift and State of Minnesota, have invented a new and useful Improvement in Machines for Cutting Nails, of which the following is a specification.

My present invention consists in certain improvements in the machine for cutting nails shown by Letters Patent of the United States No. 191,477, granted to me on May 29, 1877, and by the application Serial No. 372,037, which I have executed simultaneously herewith.

The improved machine may be described generally as consisting of two oscillating cutter stocks, each provided with two gangs of cutting knives, one of which has a vertical reciprocating motion whereby when they are oscillated into the proper position the reciprocating cutter stock is caused to approach the other and cut a series of nails therefrom and then recede to permit the second gang of knives to be brought into position and the sheet to be fed forward to be again acted upon at the return stroke. In this machine the nails are cut from a continuous sheet which is fed intermittently to the cutters by feeding mechanism which feeds and holds the sheet in the same transverse plane during its entire passage through the machine, and the moving cutter operates uniformly on one and the same side of the sheet.

To enable others skilled in the art to make and use my invention I will now describe it with reference to the accompanying two sheets of drawings, in which—

Figure 1 is a side elevation of my improved machine. Fig. 2 is an enlarged side elevation partly in section of a portion of the machine. Fig. 3 is a section through the crank and buffer-arm of the lower cutter stock. Fig. 4 is a longitudinal section of the elastic buffer which receives the impact of the buffer-arm. Fig. 5 is a section of the frame showing the adjustable stop which limits the backward movement of the feed lever. Fig. 6 is an edge view of the feed wheels. Fig. 7 is a cross sectional view, and Fig. 8 a detached side elevation of the plunger which operates the feed retracting devices. Fig. 9 is a vertical longitudinal section of a part of the machine showing the oscillating cutters and the feeding and heating devices. Fig. 10 is a front elevation of one of the cutter stocks, and Fig. 11 is a cross section of the heating furnace on the line X—X of Fig. 9. Fig. 12 is a view of a modified way of securing the cutting knives in place.

Like figures of reference indicate like parts in each figure.

Referring now to Fig. 1, the machine is provided with a frame 1 preferably made of flanged iron or steel, having housings 2, in which the oscillating cutter stocks 3, 4 are mounted. The cutter stocks 3, 4 are provided with cranks 5, 6 at each end and are oscillated by means of shift bars 7, such bars being provided at their other ends with cam yokes 8, whereby they are reciprocated by means of cams 9 mounted on the ends of the shaft 11, the latter being operated from a main shaft 10 which is driven by a belt 12 and pulleys 13, or other suitable connection with a prime motor. The upper cutter stock 3 is mounted in reciprocating or sliding boxes 14, and is caused to reciprocate by means of a toggle 15 operated by a connecting rod 16 from the shaft 11 by means of a crank or other suitable device mounted thereon, as will be understood. The reciprocation of the cutter stock 3 and the revolution of cutter stocks 3 and 4 are permitted by the use of the slotted connections 17 between the cranks 5 and 6 and the shift bars 7. The cutter stocks 3, 4, are each provided with two longitudinal grooves or channels 20, one containing a gang of cutting knives 18, and the other a similar gang of cutting knives 19. The knives 18 in one stock operate in conjunction with the knives 18 in the other stock and the knives 19 in one with the knives 19 in the other. The cutter stocks are also provided with circular strengthening flanges 72 (Figs. 9 and 10).

My present improvements are directed more especially to the feeding apparatus, to appliances for heating the sheet as it is fed to the cutting knives, to devices for cushioning the oscillating cutter stocks so that the machine shall not be injured by the concussion of the parts, and to means for attaching and adjusting the cutting knives.

The feeding apparatus is shown in Fig. 2.

It consists of two feeding rolls 38, 39, (Fig. 9) which bear by an elastic pressure upon the nail plate or sheet 73 and feed it forward intermittently to the cutting knives. The feed motion takes place as the cutter stock 3 rises, and is caused by a lever 34 (Fig. 2) pivoted at 74, operating a driving pawl 36 which engages a ratchet wheel 28 mounted rigidly on the extended journal 37 of one of the feed rolls, and at each forward movement of the lever turns the feed rolls the desired distance to make the proper feed movement of the nail sheet. The rear end of the lever 34 extends across the path of the journal box 14 so that it is operated by the return movement of the same, the extent of its throw being determined by the adjusting screw 35, which impinges on the top of the box 14, and by the adjustable stop 69 (Figs. 2 and 5) mounted on the frame 1 and engaging the outer end of the lever 34. The stop 69 is adjusted to limit the return motion of the lever 34 so that its pawl 36 shall engage the desired tooth of the wheel 28. It is returned to its normal position against the stop 69 and the pawl 36 drawn backward by the retracting spring 33 upon the descent of the box 14. The feed lever 34 is made of steel and while strong enough to drive the feed ratchet wheel and hold it firmly against the stop and retracting pawl 27 and thereby give a positive stop feed, it is sufficiently elastic to yield to accidental and abnormal strains and thereby avoid breakage. A holding pawl 67 is pivoted to the frame 1 of the machine to prevent the backward movement of the feed rolls. The pawl 67 is held normally in engagement with the ratchet wheel 28 by a spring 75 and is disengaged by an adjustable lug or trip 68 on the inner flange of the box 14, which as the box descends strikes its rear end and raises it out of the ratchet just at the time the cutters have engaged the nail plate in the act of cutting.

Rigidly attached to the box 14 is a slotted arm 24, in the slot of which is a pivoted dog or hook 25 held normally in a projected position by a spring 26. On the upward motion of the box this hook engages the rear end of a lever 30 which is pivoted to the housing 2 and at the other end is connected by a slotted connection 32 (to permit accurate adjustment) with a vertical bar 31 which is suspended from the lever 34 by the retracting spring 33.

Pivoted to the lower end of the bar 31 is a horizontal pawl 27 which engages a ratchet wheel 29 mounted rigidly on the journal 37 of the feed roll 38 alongside of the ratchet wheel 28 but with its teeth extending in the opposite direction. The rear end of the pawl 27 rests in a guide 76 with which it is connected by a pin extending through slots permitting it to have a horizontal movement but acting as a pivot upon which it turns. It is also provided with a retracting spring 77.

The function of the pawl 27 and the ratchet wheel 29 is to afford first a positive stop to the feeding devices, and then a retractive motion to the same, whereby the feed of the nail sheet is stopped at the exact moment required and the sheet held absolutely still, and then after a cut is made the feeding devices are turned backward to retract the sheet so that the knives shall not drag or rub over its edge as they are raised by the upward movement of the cutter-stock 3. This retraction of the sheet is slight and is effected by a slight downward movement of the box 14 after the knives have completed the cut.

The backward movement is communicated to the feed rolls as follows: Supported on the rear housing 2 is a plunger 40 which is connected with the supporting block 43 by the bolt 44 and tongue and groove 42 (Figs. 7 and 8). The plunger 40 is provided with a rubber or other suitable spring for returning it to a raised position when released by the raising of the box 14, and for maintaining it in that position except when forced downward by the box, and at its upper end it has an adjusting screw 41, which enables its movements to be timed or adjusted with exactness. Its lower end is beveled, preferably to an angle of forty-five degrees, to work in a slot in the pawl 27 against a corresponding bevel. As the box 14 continues to descend after the knives have completed the cut, it encounters the screw 41 and forces the plunger 40 downward, causing its beveled or wedge-shaped end to act on the corresponding surface of the pawl 27 and force it forward, and as the pawl 67 has been raised from the tooth of the ratchet wheel 28 by the lug 68 and as the pawl 27 is at this instant in contact with the ratchet-wheel 29 it causes the wheel to turn backward and reverse the feed-rolls and thereby retract the nail sheet slightly. The descent of the box 14 also causes the hook 25 to turn backward and slip past the end of the lever 30, but as the box rises the hook catches the end of the lever and raises it, causing the other end to move downward and force the pawl 27 out of the ratchet 29, and hold it out of the same until the upward motion of the box 14 has operated the feed pawl 36 by means of the lever 34 and driven the ratchet wheels forward the proper distance, when it (27) will engage the desired oncoming tooth of the wheel 29. The farther upward movement of the box 14 causes the hook 25 to slip past the end of the lever 30 releasing the latter, and then the spring 33 immediately draws the pawl 27 up into contact with the ratchet-wheel 29. The upward movement of the box 14 also withdraws the stop 68 from the end of the pawl 67 and its spring 75 immediately throws the pawl into engagement with the ratchet-wheel 28. The farther upward movement of the box 14 then causes the feed lever 34 to turn the ratchet-wheel 28, by means of the pawl 36, forward one tooth, thereby feeding the nail sheet to the cutters and forcing the ratchet-wheel 29 firmly against the pawl

27 at which instant the pawl 67 drops into its succeeding ratchet tooth. When the parts are in this position the feed mechanism is held firmly against movement in one direction by the pawl 27 acting on the ratchet-wheel 29, and against movement in the other direction by the pawl 67 acting against the ratchet-wheel 28, and it is so held until the knives engage the sheet which they hold firmly during the act of cutting. At this point the lug 68 raises the pawl 67 out of its ratchet so as to permit the reverse or retractive motion of the feed rollers. The screw 41 is so adjusted as to be engaged by the box 14 on its downward movement the instant the cut is completed. The movement of the parts is so timed by the adjustable devices I have described that the proper feed of the sheet to the cutters is completed when the feed-pawl 36 forces the ratchet wheel 29 firmly against the pawl 27, at which instant the pawl 67 drops behind the proper tooth on the wheel 28, and then the two pawls 27 and 67 hold the feeding mechanism rigidly against movement in either direction. This part of my invention is of very great importance, as it enables me to secure not only a positive feed motion but also a positive stop motion and a rigid holding of the feed mechanism from turning in either direction after the sheet has been fed until the knives descend and complete the cut, thereby obviating the danger of the slipping or misplacement of the sheet by the jarring of the machine or other cause, after it has been fed forward into position for the cut.

The improvement I have made whereby the nail sheet is drawn back from the knives after a cut is made so that the knives may be raised without rubbing or dragging over the edge of the plate conduces greatly to the durability of the cutting edges of the knives and obviates the necessity of grinding them as frequently as heretofore. It also insures greater precision in feeding the sheet as it prevents it from being displaced by catching on the cutters.

In the practical operation of my machine I find it desirable to heat the nail sheet as it makes a cut easier, reduces the strain on the machine and the wear of the knives and produces a smoother nail which is already blued for the market. It is necessary that the heat should be applied between the feed rolls and the cutting knives and unless adjacent parts of the machine are protected against the same they are liable to be injuriously affected thereby. I secure the advantage of heating the sheet and avoid danger to the machine by my improved heating furnace 58 (Figs. 1, 9, 11,) which is located between the feeding rolls and the cutting knives. This furnace, in addition to heating the nail plate as it passes to the cutters also serves the purpose of a sheet guide and clamp for guiding the sheet to the knives. It is a rectangular shaped metal box having side pieces which are held together by cross bolts or tie rods 80 which also secure in place the longitudinal divison plates 66, the purpose of which is to form cold chambers 63, 64 along the top and bottom of the box so as to prevent the injurious radiation or conduction of heat from the furnace to the other parts of the machine. The central section or chamber 61 is the heating chamber and oil or gas burners 60 extend up through the bottom of the box and through the lower partition 66 into the chamber 61. The nail sheet 73 passes longitudinally through the chamber 61 over the burners in guides 59, and it is further guided by the vertical plates or clamps 78 which extend vertically from the top and bottom, the sheet passing between their adjacent edges. The burners 60 are supplied with oil or gas from a suitable distributing pipe 79. If desired openings may be made in the sides and clamps so that the operator may see the condition of the burners and sheet while in operation. Asbestus may be placed in the cold air spaces 63, 64, if desired or a cold air exhaust fan may be applied at the rear end with the cold air inlets at the front end near the cutting knives, to insure a safe temperature to that portion of the machine. The burners 60 should be sufficient in number and size to heat the sheet to any desired temperature. The end of the furnace 63, is tapered or pointed as shown in Fig. 9 so that it may extend between the cutter stocks 3 and 4 close to the point where the cut is made, in order that the nail sheet 73 may remain within its heated chamber and its heat may be maintained until it reaches the point where it is presented to the cutters. Here it emerges from the pointed end of the furnace and is acted upon by the cutters.

The cutter stocks 3, 4, including the knives, guides and shift bars are very heavy and as their motion is arrested and reversed at every cut of the machine the momentum is overcome with a very considerable jar to the machine, particularly in view of the fact that the movement of these parts must be arrested at a definite point. Great difficulty has been experienced to prevent injury resulting from the concussion of these heavy parts, and I have succeeded in doing so by the buffer devices, which I will now describe. Secured to the rear ends of the four shift cranks 5, 6, of the cutter stocks by means of a dove tail 47, and cap bolt 48, are removable buffer arms 46, having ends which are beveled at such an angle as will cause them to strike squarely upon elastic buffers 50 arranged on opposite sides of the housings 2 directly in the path of the buffer arms 46. These elastic buffers 50 are preferably made of rubber and are located in suitable metallic cases or frames rigidly attached to the housings by the bolts 52. A retaining and adjusting rod 54 extends through each buffer and is countersunk in a face plate 55 which receives the impact of the buffer arms 46. The rod 54 passes through

the follower plate 56 and adjusting screw 57 and is secured by means of nuts 53. The resistance of the buffer can be increased at will by compressing it by means of the rod 54 and nuts 53. The screw follower 57 enables the point of impact of the face plate 55 and buffer arm 46 to be readily and nicely adjusted. The buffer arms 46 are removable so as to permit the cutter stocks to be swung into position for grinding the knives without removing them from the stocks, the cranks 5, 6, being capable of disconnection from the shift arms 7, as will be understood. Practical experience in the use of the buffer devices just described has proved them to be durable and efficient for the purpose.

In Fig. 9 I show improved means for securing the cutting knives in position in the cutter stocks. As before stated the knives are arranged in gangs in the socket or channels 20. They are held in position against the impact of cutting by set screws 23 which extend through the body of the cutter stocks and bear against the rear end of the knives. Heretofore it has been customary to adjust them laterally in the channels by means of metallic liners placed back of them, but this method of adjustment has been found to be difficult and to be lacking in rigidity. In my improved construction I make use of the face plate 70, which fits exactly against the face of the knife and has a half-round tongue or projection 71 extending along its rear face and fitting in a corresponding seat in the inner side of the wall of the cutter stock, and a set screw 21 passes through the opposite wall of the cutter stock and bears against the knife at the point directly opposite to the half-round projection 71, forcing the knife firmly against the face plate. The contour of the projection 71 and its seat is such that the knife pivots thereon and exact and rigid adjustment can be given to it by means of the set screws 81 operating against it and a set screw 22 passing through the opposite wall of the cutter stock and bearing against the rear end of the face plate 70 at the point directly opposite to the bearing of the set screw 81. This construction enables me to adjust the knives to the exact position required to coact properly with the companion cutters in making a cut, and to secure them with great rigidity in the stock. Heretofore the back of the knife bore against the side of the cutter channel and this necessitated absolute uniformity in the thickness of the knife which caused great expense in its manufacture. By my improved construction the bearing surface of the knife is transferred to its face and the lateral adjustment of the cutting edge is secured by means of the rear set screws as described. If desired, the face of the plate 70 may be dispensed with and the half-round piece 71 made to conform exactly to the face of the cutting knife and the knife be caused to bear directly upon it, as illustrated in Fig. 12; but I prefer to use the face plate because it enables the cutters to be used up to a much shorter length, thus providing against waste.

It is obvious that the skilled mechanic can vary the construction of the devices for retracting the nail sheet slightly on the completion of the cut so as to guard against the knives dragging over its edge, the construction and attachment of the buffer devices and the construction of the heating furnace and of the devices for adjusting the knives, without departing from the spirit of my invention in these particulars. I do not therefore in the claims appended to this specification desire to limit myself to the precise construction and arrangement of the parts, except where the same is specifically pointed out in the claims.

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

1. In a machine for cutting two or more nails transversely from a sheet at each cut, the combination of a reciprocating cutter, with intermittently operative feeding rolls for feeding and holding the sheet, and retracting devices for reversing the rolls at the completion of each cut; substantially as and for the purposes described.

2. In a machine for cutting nails the combination of a reciprocating cutter with a feeding mechanism for feeding the sheet and operated by the upward movement of the cutter, and devices for reversing the feeding mechanism operated by the downward movement of the cutter upon the completion of the cutting stroke for the purpose of retracting the sheet and preventing the knives from dragging over its edge when being retracted; substantially as and for the purposes described.

3. In a machine for cutting nails the combination of the reciprocating box 14, the plunger 40, pawl 27, ratchet wheel 29, and the sheet feeding rolls; substantially as and for the purpose set forth.

4. The combination of the box 14, plunger 40, pawl 27, ratchet wheel 29, arm 24, hook 25, lever 30, and bar 31; substantially as and for the purposes described.

5. The combination of the box 14, lever 34, pawl 36, pawl 67, trip 68, and ratchet wheel 28; substantially as and for the purposes described.

6. In a machine for cutting nails the combination of feeding mechanism for feeding and holding the sheet; a stop device for intermittently engaging and holding the feeding mechanism from backward movement; and a stop device for intermittently engaging and holding the feeding mechanism against forward movement; substantially as and for the purposes described.

7. The combination of the reversely toothed ratchet wheels 28, 29, pawls 67, 27, and the feeding rolls; substantially as and for the purposes described.

8. In a machine for cutting nails in which a sheet of nail plate is fed to the cutters, the

combination of transverse feeding rolls, with oscillating cutter-stocks and cutters, a heating furnace arranged between the feeding rolls and cutters and having a tapered or pointed end which extends between the cutter-stocks, nonconducting chambers arranged outside of the heating chamber and extending the entire length of the same, whereby the operative parts of the machine are protected from the heat of the furnace, and burners extending through the sides of the furnace into the interior heating chamber; substantially as and for the purposes described.

9. In a machine for cutting nails a sheet heating furnace having a heating chamber 61, and sheet guides 59, 78; substantially as and for the purposes described.

10. In a machine for cutting nails having oscillating cutter stocks the combination of the cutter stocks with buffer arms oscillating therewith and elastic buffers mounted on the frame of the machine to receive the impact of the buffer arms; substantially as and for the purposes described.

11. The combination of the oscillating cutter stocks provided with cranks for oscillating the same, buffer arms mounted thereon and elastic buffers for receiving the impact of the buffer arms at the end of the oscillating movements of the stocks; substantially as and for the purposes described.

12. In a machine for cutting nails the combination of the oscillating cutter stocks, the cranks for operating the same, buffer arms mounted on the cranks and elastic buffers mounted on the opposite side of the housing to receive the impact of the buffer arms; substantially as and for the purposes described.

13. In a machine for cutting nails, the combination of the oscillating cutter stocks, cranks for operating the same, buffer arms 48 mounted on the cranks, and adjustable buffers 50; substantially as described.

14. The elastic buffer 50 secured in a buffer case 51 and provided with a face plate 55 and a compression rod 54; substantially as and for the purposes described.

15. The combination of the elastic buffer 50, the case 51, and the adjustable buffer follower screw 57; substantially as and for the purposes described.

16. The combination of the elastic buffer 50, the case 51, face plate 55, compression rod 54, and adjustable follower screw 57; substantially as and for the purposes described.

17. In a machine for cutting nails a cutting knife secured in its retaining socket by means of adjusting set screws and with its face bearing against or upon a detachable pivotal piece, which in turn bears upon the wall of the retaining socket; substantially as and for the purposes described.

18. In a machine for cutting nails the combination of a removable knife secured in a retaining channel or socket with a face plate having a pivotal rib bearing against the wall of the retaining channel; substantially as and for the purposes described.

19. In a machine for cutting nails, the combination of a knife adjustably secured in a recessed or channeled holder, by set screws bearing on opposite sides, having a rocking fulcrum; in combination with a seat or groove for the fulcrum in the adjacent wall of the channel; substantially as and for the purposes described.

20. In a machine for cutting nails, the face plate 70 provided with a half-round piece or fulcrum 71, in combination with the cutting knife, the set screws 21 and 22 and the walls of the channel 20, one of which is provided with a groove corresponding with the half-round piece 71; substantially as and for the purposes described.

21. In a machine for cutting nails, the stop pawl 67, engaging the teeth of the ratchet wheel, 28, in combination with the stop pawl, 27, engaging the reverse ratchet wheel 29 of the nail plate feeding device; substantially as and for the purposes set forth.

In witness whereof I affix my signature, in the presence of two witnesses, this 7th day of October, 1890.

WILLIAM N. SEVERANCE.

Witnesses:
THOMAS B. KERR,
RAPHAËL NETTER.