F. J. Ayres,

Making Cut Nails,

No. 7,792. Patented Nov. 26, 1850.

Fig. 5.

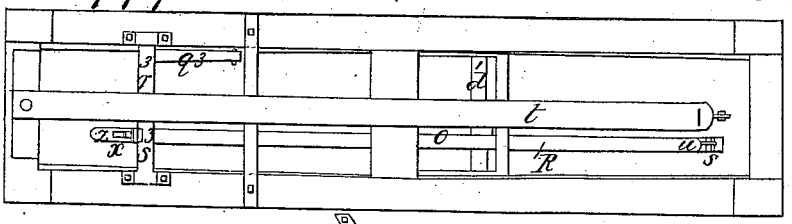

Fig. 10.

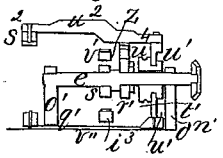

Fig. 4.

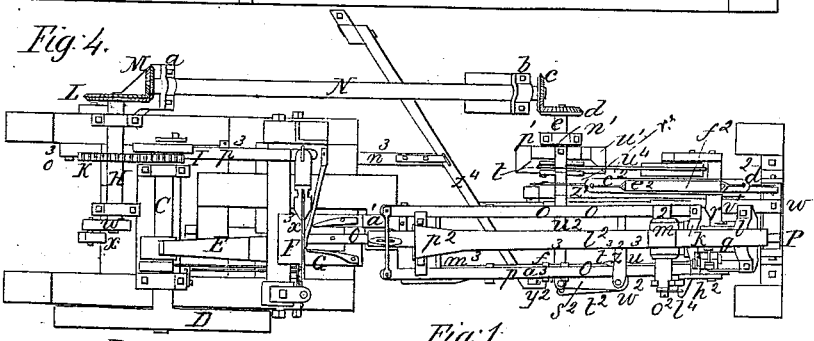

Fig. 7.

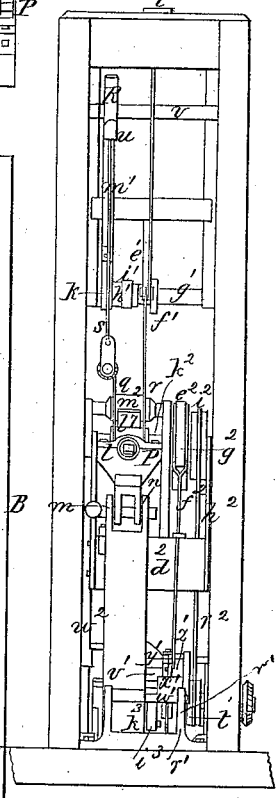

Fig. 1.

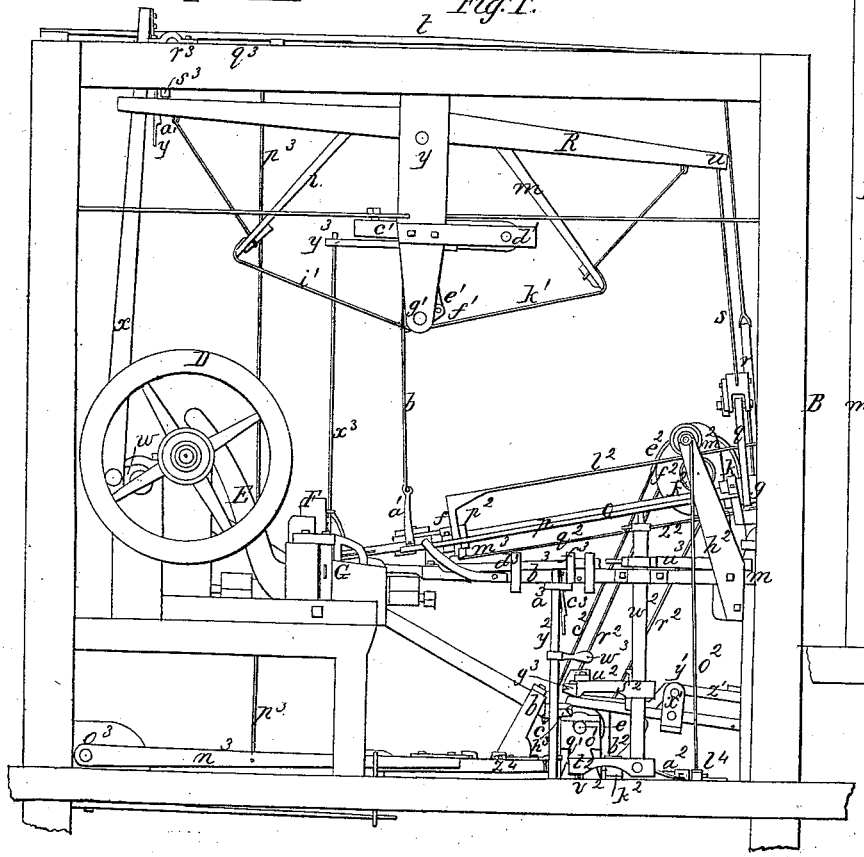

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Fig. 6.

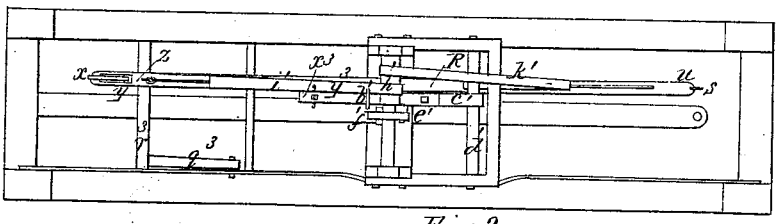

Fig. 2.

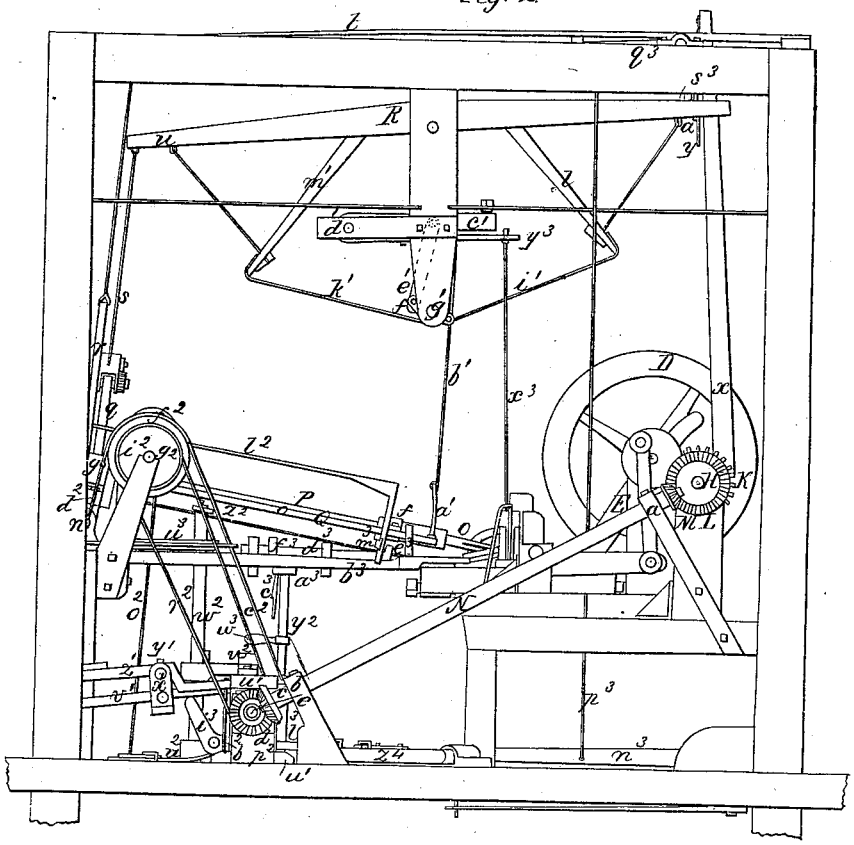

Fig. 8.

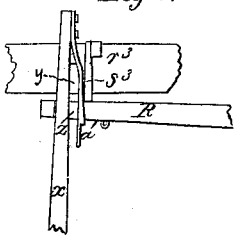

Fig. 15.

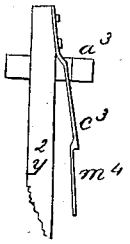

Fig. 13.

Sheet 3 - 3 Sheets.

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Fig. 9.

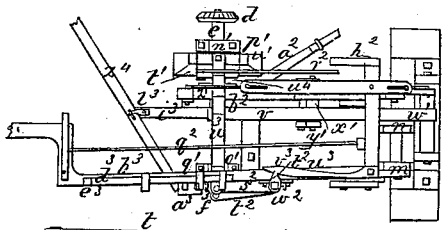


Fig. 10.

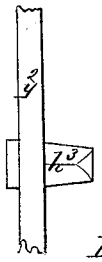


Fig. 12.

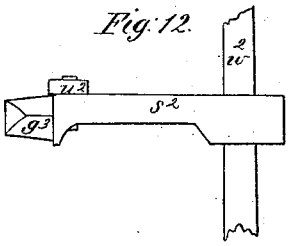


Fig. 11.

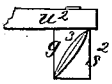
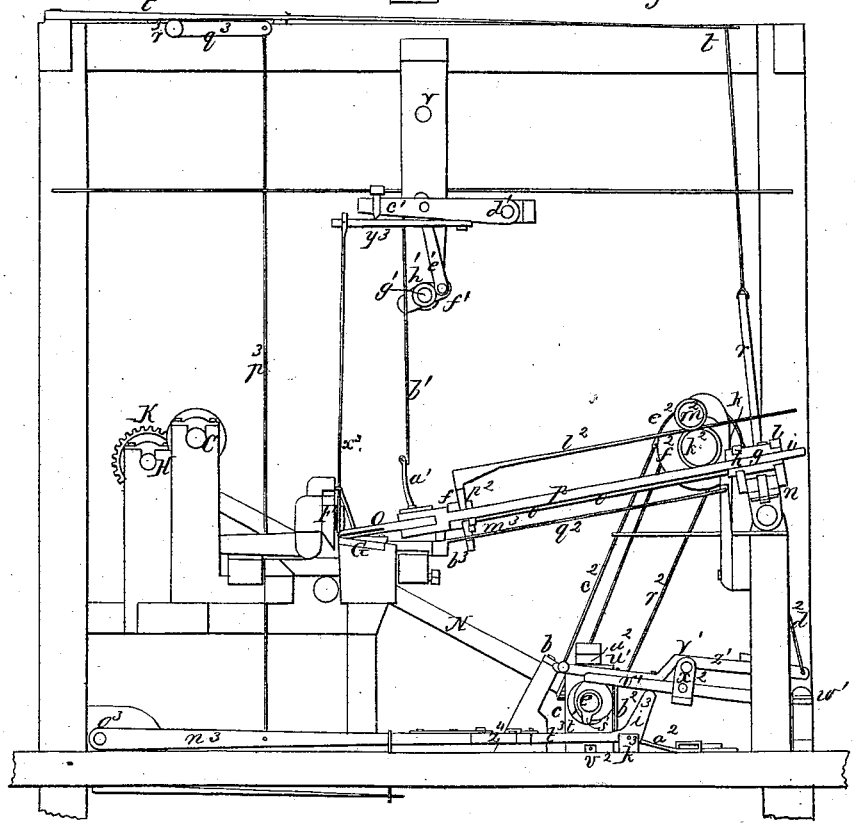


Fig. 3.



UNITED STATES PATENT OFFICE.

F. J. AYERS, OF ST. JOHN, NEW BRUNSWICK, CANADA.

MACHINE FOR FEEDING NAIL-PLATE.

Specification of Letters Patent No. 7,792, dated November 26, 1850.

To all whom it may concern:

Be it known that I, FREDERICK J. AYERS, a citizen of the United States of America, but now residing in the city of St. John and Province of New Brunswick, Canada, have invented certain new and useful Improvements in the Feeding Apparatus of Nail-Cutting Machines; and I do hereby declare that the same are fully described and represented in the following specification and accompanying drawings, letters, figures, and references thereof.

Of the said drawings Figure 1, denotes a front elevation of a nail cutting machine, and my improved feeding apparatus applied to it. Fig. 2 is a rear elevation of the same. Fig. 3, is a vertical and longitudinal section of the same. Fig. 4, is a top view of the mechanism situated below the horizontal plane extending from A, to B, in Fig. 1. Fig. 5, is a top view of the mechanism situated above such horizontal plane. Fig. 6, is an underside or bottom view of the mechanism situated above said plane. Fig. 7 is an end view of the feeding apparatus. Such other figures as may be necessary to a full explanation of the machinery of my invention will be hereinafter mentioned and described.

The nail cutting engine exhibited in the drawings, is of the kind usually termed the "Reed nail machine." It being well known, and extensively used, it needs little or no description from me. I shall therefore refer only to such parts with which my improved feeding apparatus is directly connected.

In the drawings, C, denotes the main or driving shaft of the nail engine. D, the fly wheel thereof. E, the main rocker head. F, the upper cutter chisel, (or die). G, the lower cutter, bed, or die. H, a secondary shaft which receives its motion from the main shaft, and by means of gears I, K, fixed on them, respectively. On the outer end of the secondary shaft H, a beveled gear L, is attached, this gear being made to engage with another beveled gear M, fixed on the upper end of a long inclined shaft N, which is supported by, and revolves in bearings at *a*, *b*.

The lower end of the inclined shaft N, carries another beveled wheel *c*, which gears into a beveled wheel *d*, affixed to one end of a horizontal shaft *e*. O, are the nippers or jaws, which carry the strip of nail plate from which the nail blanks are to be successively cut, the said strip being subjected to certain movements during the operation. First being advanced between the cutting dies, it is there held stationary while they are severing a blank from it. This being done it is immediately drawn backward a short distance, raised upward, turned transversely one hundred and eighty degrees, depressed toward the bed die, and finally advanced between the cutting dies. There it again remains stationary an instant as before, and is afterward again withdrawn, and subjected to movements similar to those above mentioned, except that the transverse movement is one hundred and eighty degrees in the opposite direction. Finally after it has been entirely cut up or reduced, the pincers or nippers which held it are retracted, or drawn entirely back, or far enough to permit another plate or strip of metal to be supplied to them. The said nippers or jaws are attached to one end of a long bar P, which is square in its cross section, except where it rests within a bearing *f*, it being there made cylindrical, so as to be capable of being revolved within the said bearing. It passes through a cylindrical pulley or drum *g*, whose journals *h*, *i*, are supported in boxes *k*, *l*, of a rocking frame Q, which has journals at one end which are supported in boxes *m*, *n*, so arranged as to allow of the long bar being lifted up, and lowered down by machinery applied to its other end. The said frame Q, is partly composed of two parallel ways or slide bars *o*, *p*, on and between which the bearing *f*, should be made to slide freely so as to permit the nippers to be either moved toward or away from the cutting dies as occasion may require. To the external surface of the drum *g*, two belts *q*, *r*, are fastened, one of the said belts, viz., *q*, being wound around or partially around the drum, and connected to one arm *n*, of a vibrating lever beam R, by a suitable connecting rod or contrivance *s*. The other belt is connected to a long spring bar or spring *t*. The lever beam turns or rocks in a vertical plane on a fulcrum at *v*, and when it is moved so as to elevate its arm *u*, the belt *q*, will be drawn upon in such manner as to rotate the drum, and thereby rotate the long bar P, and the pincers attached to it, the amount of rotation being one hundred and eighty degrees of a circle. In the meantime the other belt

r, will be wound upon the drum, and so as to draw upon the spring t. On depression of the arm n, taking place, the reaction of the spring t, will reverse the motion of the drum and cause it to move back one hundred and eighty degrees. The object of such movements of the drum, is to produce the turning of the nail plate or strip in such manner that each side of it shall be made to rest alternately upon the bed die.

The lever beam R, is vibrated or moved up and down by means of a crank w, and a connecting rod or bar x. The said crank is fixed upon the inner end of the secondary shaft H, and is jointed to the lower end of the connecting rod or bar x, the said bar being made at its upper end to extend through a mortise or slot z, made vertically through the lever beam R. There is a spring catch y, fastened to the connecting rod above the slot, and extended down through the mortise or slot, as seen in Fig. 8, which denotes a vertical section of the end of the lever beam R, the slot z, through it, and the spring catch. While the shoulder a', of the spring catch projects beyond the slot, and rests on the lever beam R, the downward movement of the connecting rod, (produced by the crank of the secondary shaft) will cause the lever to be put in motion. But if by any means the spring catch is forced and held back or toward the connecting rod far enough, and so as to carry the shoulder directly over the slot, and so that it may fall into and through the slot, no motion of the lever beam will take place. This is effected by machinery, and for a purpose which will be hereinafter described.

It may be remarked that in order to divide the nail plate into blanks, and so that each of the said blanks may have a wedge shape, it becomes necessary to arrange the axis of the long bar P, a little out of a right angle with respect to the cutting edge of the upper cutter, and in a lateral direction; that is to say, it should make a slightly acute angle to it, in a horizontal section or plane. Under such circumstances, it becomes necessary to draw back or retrograde the nail plate, a short distance immediately after each nail blank is severed from it; otherwise during the operation of turning it over it would be liable to strike against the front face of the upper cutter or die. So as was hereinbefore mentioned, before the nail plate can be turned, it has to be lifted upward a short distance, or more than one half its width above the bed die. The mechanism by which such movements of the nail plate are effected may be thus described.

The two slide bars of the frame q, are connected together at their inner ends, by means of a semielliptical bail a', which is suspended from a rod b', that depends from a lever or arm c', which projects from a horizontal and transverse shaft d', whose journals are supported on suitable bearings. A connecting rod or bar e', is jointed at its upper end, to the arm or lever c', and extends downward and is jointed at its lower end to a crank f', extended from a horizontal shaft g', the whole being arranged as seen in the drawings. There is a drum h', on the shaft g', around which drum two belts i', k', are wound in opposite directions, and extend and are fastened respectively to two arms l', m', which project from the lever beam R. From the above it will be seen that when the said lever beam is put in motion as described, a reciprocating rotary motion will be imparted to the shaft g', and in consequence thereof the arm or lever c', as well as the frame Q, will be alternately raised and depressed. While this is taking place the nippers are turned laterally, one hundred and eighty degrees as herein before mentioned.

The machinery by which the nail plate is moved forward and backward as herein before stated, may be thus described: The horizontal shaft e, herein above alluded to has its journals supported in bearings n', o', arranged in the upper ends of two shoulders p', q', which are disposed as seen in Figs. 1, 2, 4, and 9, and 10, Fig. 9 being a top view of the mechanism situated directly underneath the frame Q, while Fig. 10, is a longitudinal and vertical section of the shaft e, and the mechanism connected to it. On the shaft e, are two cams r', s', which are disposed as seen in Fig. 10, and are suitably shaped to impart to the levers directly over them their necessary motions as will be hereinafter explained. Besides the cams, the said shaft has a sliding pulley t', arranged upon it, and by the side of the cam r'. A clutch u^4, is applied to the adjacent sides of the said pulley t', and cam r', the same being for the purpose of clutching the pulley to the shaft when necessary. The pulley is connected with a movable frame u', the connection between them being such as not only to permit the free revolutions of the pulley, but, when the said frame is moved either toward or away from the cam r', to carry or move the pulley with it, and so as to either clutch or unclutch it to the cam, and of course when so clutched to so connect it to the shaft, as that it will be revolved by and with the shaft. When unclutched it is not moved by the shaft. The mechanism which produces the motions of the movable frame u', will be hereinafter explained. Directly over the cam s', is one end of a lever v', the said lever having its fulcrum at its opposite end, as seen at w', in Fig. 7, the same being so made as to permit the lever to move up and down. To

the middle of the lever v', a frame x', is attached, and is made in a manner proper to support the fulcrum or rocker shaft y', of a second lever z', whose front or inner end rests directly upon or over the cam r', and which front end is elevated by the said cam during its revolution, and is depressed by the reaction of a spring a^2, which is fastened to the floor, and connected to the lever by means of a rod b^2.

To the two ends of the lever z', two rods c^2, d^2, are respectively fastened and made to extend upward, and to connect with the two ends of a strap or belt e^2, which is arranged and made to extend over a pulley f^2, fixed upon a horizontal shaft g^2, arranged and supported by a frame h^2, as seen in the drawings. Besides the pulley f^2, there is a pulley i^2, and a feed roller k^2, fixed upon the shaft g^2, the said feed roller k^2, having a long bar l^2, resting upon it, and pressed down upon it, by a pressure roller m^2, which is borne down upon the bar l^2, by means of a spring l^4, which is fastened to the floor, and connected to one of the journals of the pressure roller by a rod o^2. The bar l^2, is made to project from a frame p^2, which slides longitudinally on a long stationary rod q^2, disposed as seen in the drawings. This frame p^2, should be so connected with the bar P, as not only to allow the bar to freely rotate, but to play upward and downward, when moved up and down by the frame Q, as herein before described. Besides this, the connection should be such as that when the frame p^2, is moved on its rod q^2, it will simultaneously, and to the same extent, move the rod P, and the pincers.

From the above it will be seen that when the shaft e, is put in revolution, the cam r', and the spring a^2, by their consecutive operations, produce a tilting movement of the lever z', on its fulcrum. When the lever is tilted in one direction, that is to say, when it is moved by the cam, the lever v', should be raised up by its cam s', and so as to elevate bodily the lever z', and the strap e^2, and to such extent as to raise the latter so entirely above the pulley f^2, as to prevent it from producing any rotative motion of the said pulley in one direction. But when the lever is tilted in the other direction, the two cams should cease to act, and permit the spring a^2, to not only produce such movement of the lever, in such opposite direction, but a depression of both levers, and a depression of the belt or strap, such as will produce a rotative motion of the pulley f^2. Such rotative motion will create a consequent rotative motion of the shaft on which the said pulley is situated, and of course produce a similar movement of the feed roller k^2, situated on the said shaft. When such motion of the feed roller occurs, the said feed roller will be made to act against the bar l^2, and to move it and the pincers.

In order to produce the trifling or small retrogradation of the pincers immediately after each nail blank has been severed from the strip by the cutters or dies, and so as to enable the front end of the strip to turn clear of the upper cutter, the cam s' should be so formed and arranged with respect to the cam r', that it may produce no elevation of the levers and belt, during a short period of time after the cam s', has commenced to tilt the lever z'. During this short period of time the strap e^2, remains close down upon the pulley f^2. Consequently during such time it will produce a retrograde movement of the pulley, thereby creating the required retrograde movement of the pincers. This having been effected the cam s', is brought into action against the lever v', the result of which will be the lifting of the strap to such extent above its pulley, that no further retrograde movement of the pulley takes place until the lever z', is tilted in the opposite direction, and by the reaction of the spring a^2, as before described.

The machinery which produces the retrogradation of the pincers after the strip of nail plate has been entirely cut up into blanks, such retrogradation being far enough to admit of the pincers being supplied with another strip, may be thus specified. This mechanism is connected with and operates the movable frame u', which during its movements, clutches its pulley t', to the shaft e, so as to cause a rotation of the said pulley.

Around the pulleys i^2, and t', an endless belt r^2, is carried. The movable frame u', by means of connecting rods u^2, v^2, is connected to two arms s^2, t^2, which project from a vertical shaft w^2, the whole being arranged as seen in the drawings. On the upper end of the shaft w^2, is another horizontal arm z^2, which is made to stand in a direction at or about at a right angle with that of the arms s^2, t^2. Near the outer end of the arm s^2, is a vertical lifting bar y^2, whose lower end is jointed at one end of a lever z^4, while its upper end works or slides freely through a projection a^3, of a stationary bar b^3, and has a spring catch c^3, applied to it, and extending down through the projection. A slide d^3, is disposed and made to slide on the bar b^3, and has a projection e^3, at one end of it. From another part of it, and over the projection a^3, and against the spring catch c^3, another projection f^3, is extended as seen in the drawings. A small inclined cam g^3, is made to extend from the outer end of the arm s^2, as seen in Figs. 1, and 11, and 12, Fig. 11, being an end view of the said cam and its arm, while Fig. 12, is a side

elevation of it, the said Figs. 11, and 12, being drawn on an enlarged scale. The said cam operates in conjunction with another, and similar cam h^3, extended from the lifting bar y^2, Fig. 13, being an end view of the said cam h^3, as applied to the lifting bar. Fig. 14, is a side elevation of it under such circumstances, both of the said figures being drawn on an enlarged scale. Directly underneath the lever v' is a bent lever i^3, which plays vertically, and has its fulcrum at k^3. The outer end of the long arm l^3, of the said lever, is jointed to the lever z^4, in such manner that the elevation and depression of the said lever z^4, will produce the elevation and depression of the said arm l^3, and of course a tilting movement of the lever i^3, on its fulcrum.

When the pincers have been advanced far enough toward the cutting dies, a projection m^3, from the frame p^2, is brought into contact with the projection e^3, and so as to cause the slide d^3, to move and carry its projection f^3, against the spring catch c^3, and produce such a movement of the said catch, as will slip its shoulder off the projection on which it rests, and allow the lifting bar y^2, to fall down by the power of gravity, it being understood that previous to this the said lifting bar had been raised upward so as to cause the shoulder of the spring catch to rest upon the projection a^3. The said shoulder is seen at m^4, in Fig. 15, which denotes a vertical section of the upper part of the lifting bar, the spring catch, and the projection a^3. From the above it will be seen that when the lifting bar descends, the short arm of the lever i^3, will be brought up against the lever v', so as to raise it upward; and it should elevate it sufficiently as not only to prevent the cam r', from tilting the lever directly over it, but at the same time should elevate the strap e^2, above its pulley so as to permit said pulley to freely rotate. It will also be seen that the cam h^3, on the lifting bar, will fall upon the cam g^3, and will move it so as to turn the arm s^2, and the upright shaft from which it projects, and thereby move the frame u', so as to clutch the pulley t', to the shaft e. During such time as the pulley is so clutched to the shaft, the rotation of the pulley will be effected. This through the endless band r^2, will produce a revolution of the pulley i^2, and the feed roller in such a direction as will cause a retrogradation of the pincers. When such retrogradation has been nearly or about completed, the frame p^2, will be carried against the arm z^2, and will move the said arm, and the shaft from which it projects, and the same in such manner as to produce a retrograde movement of the frame u', sufficient to unclutch the pulley from the shaft.

It remains now to describe the mechanism by which the spring catch y, is moved or forced back for the purpose of so disconnecting the lever beam R, and the connecting rod x. This consists of a lever n^3, (which is jointed at one end to the lever z^4, and works on a fulcrum o^3, at its other end) a connecting rod p^3, (jointed at its lower end to the lever n^3, and at its upper end to an arm q^3, projecting horizontally from a horizontal shaft r^3,) and finally another arm s^3, extended downward from the shaft, and directly in front of the spring catch y, the whole being as seen in the drawings. When the lever z^4, is depressed, or falls down, it carries with it the lever n^3, and thereby produces the back movement of the spring catch above described, and while the spring catch has its shoulder pressed back into, or directly over the slot z, the connecting rod x, will play freely up and down through the slot, and produce no movement of the lever beam R, and consequently no rotation of the pincers.

During the time the bar P, and the pincers are being run back, for the reception of another strip of metal, or the substitution of another set of pincers and a strip, (the pincers being generally so applied to the bar, as to enable them to be easily disconnected therefrom, and another set put in place of them,) the pulley t', will be kept clutched to the shaft e, by means of a cam projection t^3, and a spring u^3, the said cam projection being fixed upon the upright shaft w^2, and made to enter a curved recess v^3, made in the spring, the said spring being fixed upon the framework. This recess should be so formed as not only to be capable of keeping the pulley clutched to the shaft, during such time as the same may be requisite, but also to allow the movement of the shaft w^2, (when the lifting bar is elevated,) to take place, and readily move the cam projection out of the recess of the spring. The elevation of the lifting bar as above mentioned, which is effected by an attendant or person who applies his hand to the handle w^3, projecting from it, causes the inclined inner face of the cam h^3, thereon to come in contact with the inclined outer face of the cam g^3, and to so press against it as to cause a movement of the frame u', such as will unclutch the pulley t', from the shaft e. In order to prevent the nail plate or strip, from rising off the bed die, during the operation of severing a blank from it, a rod x^3, is used. It is placed just in front of the upright cutter, and is extended down from an arm y^3, which projects from the arm c'. The lower end of the rod x^3 is bent horizontally so as to rest on the strip when the arm y^3, is down to its lowest position, the said arm being moved by and with the arm c', to which it is attached.

Having thus described my improved feeding apparatus for a nail cutting engine of the kind above stated what I claim therein is as follows:

Although I have described the particular mechanism as applied to the frame Q for raising the strip of metal high enough above the bed die to admit of its being turned over as explained, I do not claim such mechanism in itself separate, or uncombined with the frame Q, and machinery by which the strip of metal is progressively advanced toward the die, but

What I do claim is—

1. The combination of such raising mechanism, with the machinery for imparting to the strip of metal its progressive forward movements, as specified, the mechanism so combined with the said machinery, being the bail a', the rod b', the lever arm c', the crank f', shaft g', drum h', belts i', k', and the arms l', m', of the lever beam R, the whole being arranged and made to operate together substantially as specified.

2. And I further claim in combination with the mechanism which produces the progressive advancing movements of the strip of metal, toward and between the cutters, the mechanism for producing the retrograde movement of the pincers, after the strip of metal has been entirely operated upon by the cutters; such mechanism being the pulleys i^2, and t', the endless belt r^2, the movable frame u', and clutch or their equivalent, the vertical rock shaft w^2, and its arms s^2, t^2, the cams g^3, h^3, the lifting bar y^2, and its spring catch, together with the slide d^3, and its projections, the whole being constructed and made to operate together essentially as specified.

3. And I claim the combination of the arm z^2, with the shaft w^2, and the mechanism forming the clutch, the said arm being for the purpose of creating a retrograde movement of the clutch, so as to unclutch the pulley t', from the shaft e, and this when the entire retrogradation of the nippers has been effected, the same being accomplished as herein before specified.

4. And in combination with the mechanism which produces the reciprocating rotatory movements of the nippers or strip of metal held thereby, I claim the combination of mechanism for arresting or stopping such rotary motions, immediately on the final retrogradation of the pincers taking place, such mechanism being the levers z^4 and n^3, the connecting rod p^3, arm q^3, shaft r^3, arm s^3, spring catch y, as applied together, and to the lever beam R, and lifting bar y^2, as described.

5. And I claim the combination of mechanism by which the progressive advancing and intermittent secondary retrograde movements of the strip of metal are produced, the same consisting of the long bar l^2, and its connecting frame p^2, the feed and pressure rollers f^2, and m^2, the shaft g^2, and pulley f^2, the strap or belt e^2, and its rods c^2, d^2, the levers z' and v', connected together as described, and the cams r', s', on the shaft e. And in combination therewith and the lifting bar, y^2 I claim the bent lever i^3, the same being applied to the same and used for the purpose substantially as herein before specified.

In testimony whereof I have hereto set my signature this twenty-ninth day of July A. D. 1850.

FREDERICK J. AYERS.

Witnesses:

GEORGE ROY WITNEY,

GEO. A. LOCKHART.