3 Sheets—Sheet 1.

S. G. REYNOLDS.

Pin Machine.

No. 4,346. Patented Dec. 31, 1845.

Fig. 5

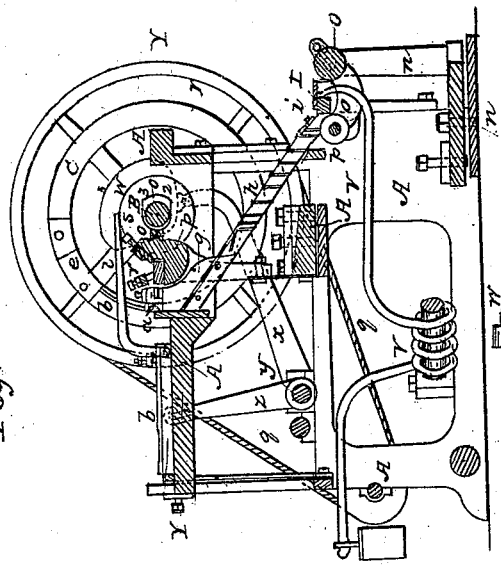
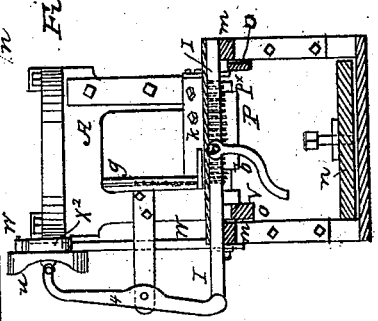


Fig. 6



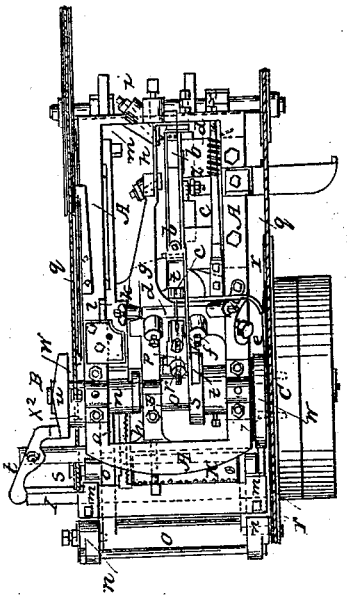
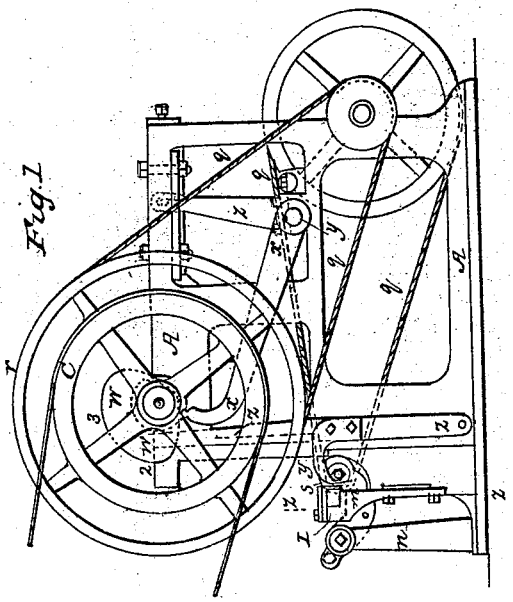


Fig. 7



3 Sheets—Sheet 2.

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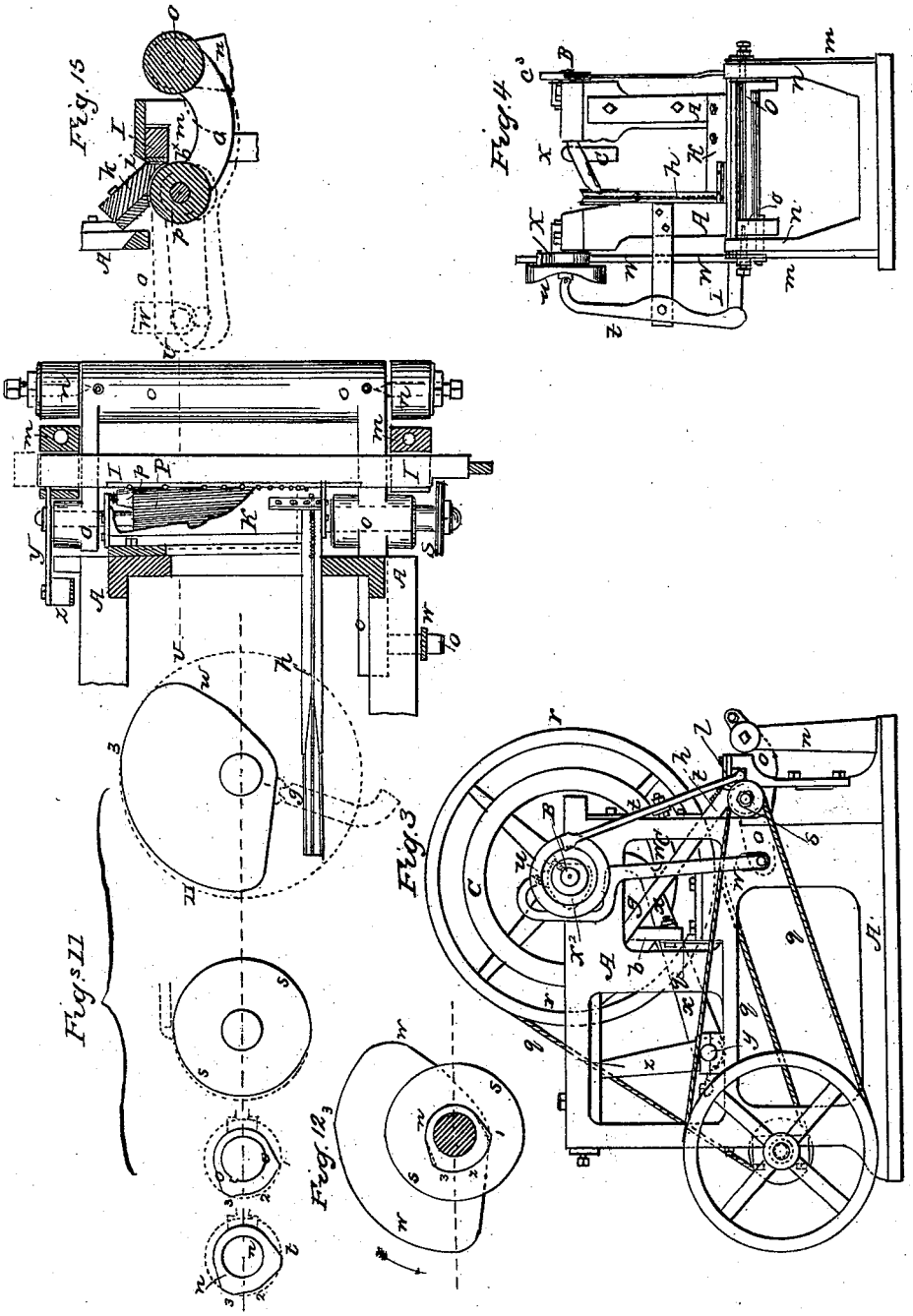

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Pin Machine.

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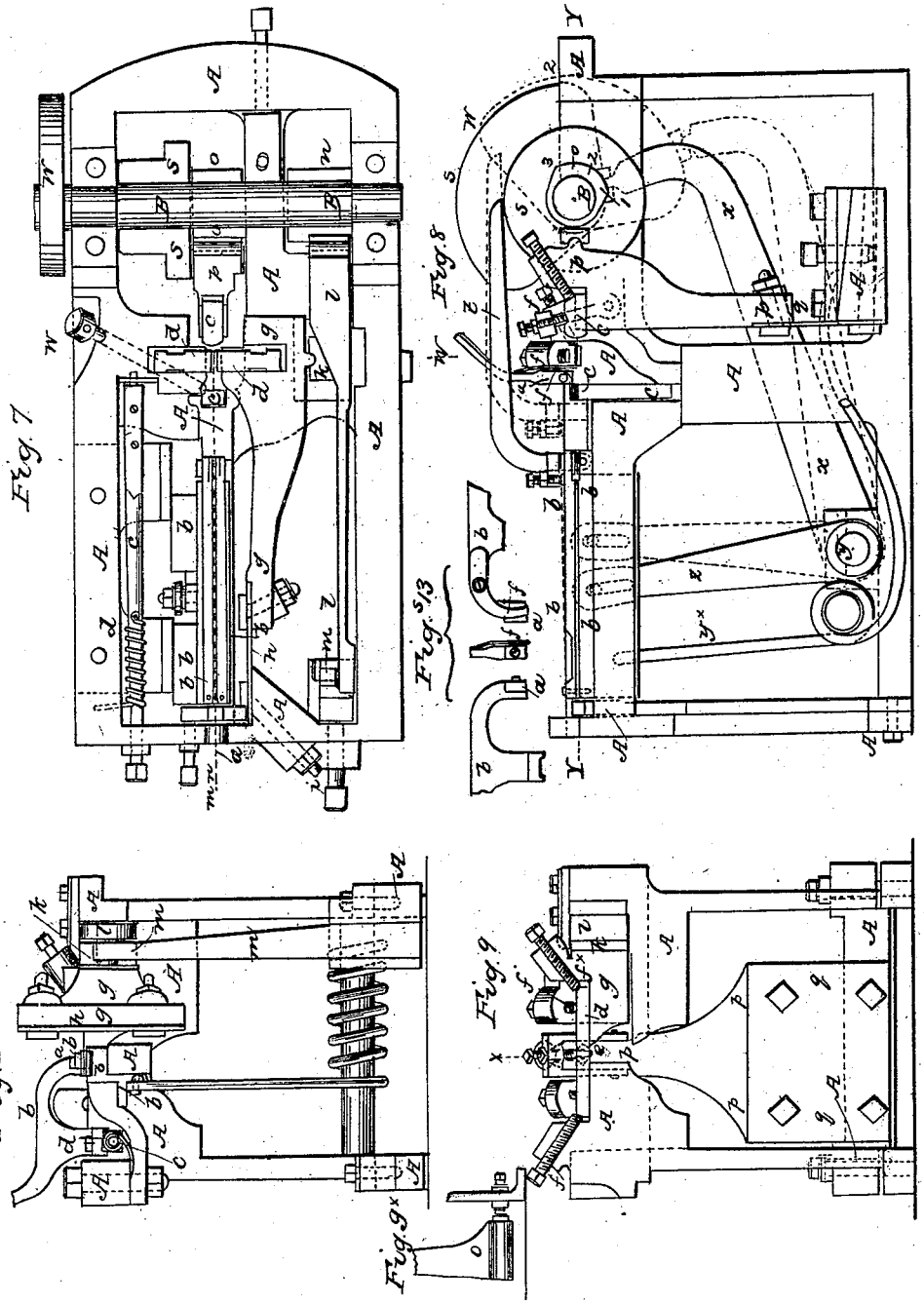

UNITED STATES PATENT OFFICE.

SAMUEL G. REYNOLDS, OF BRISTOL, RHODE ISLAND.

MACHINERY FOR HEADING AND POINTING PINS, &c.

Specification of Letters Patent No. 4,346, dated December 31, 1845.

To all whom it may concern:

Be it known that I, SAMUEL GODFREY REYNOLDS, of Bristol, Rhode Island, in the United States of America, have invented Improvements in Machinery to be Employed in the Manufacturing of Nails, Rivets, Screws, and Pins; and I do hereby declare that the following is a full and exact description of my said invention.

These improvements in machinery to be employed in the manufacture of nails, rivets, screws or pins apply firstly to the manufacture of that description of nails which are commonly used in France having round shafts with points and solid heads formed by crushing the end of each piece of metal rod or wire into a knob or boss. Secondly to forming by similar means heads upon short bolts of metal used for riveting plates together. Thirdly to producing by the like means heads upon small wire shafts for screw-blanks that is, the blank shafts of screws previously to the threads being cut around them, and fourthly to manufacturing wire pins to be used for dressing or sticking into garments.

As the leading features of this improved machinery for manufacturing dressing pins embody also the means of producing the heads of the nails, rivets, and screws mentioned as the three first objects I shall proceed to describe the improved machinery as constructed for making dressing pins.

In the accompanying drawings Figure 1 is an elevation of the complete machine for heading and pointing dressing pins. Fig. 2 is a horizontal view of the same as it would appear when seen from above. Fig. 3 represents an elevation of the opposite side of the machine to that shown at Fig. 1, and Fig. 4 is an elevation taken at the left hand end of Figs. 1 and 2. Fig. 5 represents a longitudinal section taken vertically through the middle of Fig. 2, and Fig. 6 a transverse section taken near the end of Figs. 1 and 2 in the dotted line Z, Z, in all which figures similar letters of reference indicate the same parts of the machine.

A, A, A, is the framework and standards of cast iron; B, B, the main cam shaft driven by a band and pulley C.

For the better illustration of the minute parts of the machine I have represented the following sectional and partial views upon double the scale of the preceding figures.

Fig. 7 is a horizontal section showing the principal working parts taken in the dotted line Y, Y. Fig. 8 that is, at the level in which the wire *a*, *a*, *a*, to form the pins is fed in and through the sliding guides *b*, *b*, and stationary guide *c*, the holding dies *d*, *d** and heading punch *e*, and also through the several cams fixed upon the driving shaft B within the framework. Fig. 8 is a vertical section taken also in the line in which the wire *a*, *a*, *a*, is fed into the machine coincident with the dotted line X, X, in Fig. 4. Fig. 9 is a transverse section taken vertically through the holding dies *d*, *d**, in the dotted line W W of Fig. 7, and Fig. 10 is also a transverse section taken vertically through the guides *b*, *b*, in the dotted line V V of Fig. 7.

The wire *a*, *a*, *a*, to form the pins is coiled upon a reel placed near the end of the machine and having been straightened in its progress in the usual way is introduced between the guides *b*, *b*, at the left hand end of Figs. 7 and 8, where it is passed onward in its entire length through the guide *c*, until the end of the wire reaches a little distance beyond the holding dies *d*, and *d**. The one holding die *d*, is stationary, being firmly fixed to the framework by two oblique screws *f*, *f*, which allows the die to be very accurately adjusted. The other holding die *d** is fixed by similar adjusting screws *f**, *f**, to a lever *g*, which lever is securely attached to and hangs upon a vertical plate spring *h*, fastened to the framework by oblique screws *i*, *i*, as shown in Figs. 2 and 7. By this mode of attaching the lever *g*, it hangs perfectly free and is not subject to any friction against the framework. A piece *k*, which I call a "shoe" having an inclined plane is inserted between a rib on the back of the lever *g*, and the wedge formed on the side of a slider *l*. The under side of this slider *l* bears upon the framework as shown in Fig. 9 and is confined by a cap plate at top which allows it to slide freely to and fro. A spring hook *m*, at one end of the slider (see Fig. 7) forces its reverse end up against a cam *n*, on the main shaft. Hence it will be perceived that as the main shaft revolves the larger radius of the cam *n*, coming around drives back the slider *l*, and by the wedge action of the slider against the inclined planes *k*, causes the lever *g* to force up the movable die *d** against the fixed die for the purpose of holding the pin wire fast between them. A cam *o*, on the main shaft acts against the

back of the vertical lever p, to which the heading punch e, is affixed by oblique screws r, r, as shown at Fig. 8. This lever is firmly attached as the former to a plate spring g, fastened to the framework below in order that it may vibrate or work free from the friction of any rubbing surfaces. The cam s, upon the main shaft is the agent for pinching the length of wire firmly between the upper and lower sliding guides b, b, and the larger cam w, also on the main shaft outside the framework causes the sliding guides to move to and fro for feeding in the wire after every pin has been made as will be explained.

All the cams upon the main shaft are shown detached at Fig. 11 drawn in their proper forms and proportions as well as in their relative positions one to another and Fig. 12 shows them in profile all fixed upon the shaft in the positions in which they ought to stand.

In the commencement of the evolutions of the machinery (the several parts being then situate as shown in Figs. 7 and 8 and the length of wire inserted between the guides as far as the outer edge of the stationary guide c) the cam s, upon the main shaft (see Fig. 8) raises the tail end of a bent lever t, which has a screw stud u set in it near its fulcrum. This stud u is by these means pressed down upon the upper sliding guide v, and which guide having a slight degree of elasticity as shown by dots in Fig. 8 becomes depressed under the stud whereby the length of wire between the guides is held firmly as in a pair of chaps.

In order to bring forward a length of wire sufficient to make one pin the larger radius of the cam w upon the main shaft comes around and causes a portion of its periphery from 1 to 2, (Fig. 11) to act upon the end of a bent lever x below. This bent lever x is fixed upon a fulcrum shaft y, mounted in the framework and upon the same shaft there is also fixed another lever z, nearly at a right angle to the former, the upper end of which lever z is by a joint shown dotted in Fig. 8 attached to the sliding guides b, b. It will now be seen that by the larger radius of the cam w, acting upon the lever x, that lever will be depressed and at the same time the other lever z will be advanced into the situation shown by dots carrying the sliding guides b, b, with it, by which means the wire pinched between the sliding guides b, b, as before described will be moved onward through the stationary guide c, and its forward end take the position between the dies d and d^* in front of the punch e, as shown in Fig. 7. As soon as this has taken place the die d^* closes upon the wire which is then held fast between the dies, the closing of the dies being effected as before said by the rotation of the cam n. The heading die or punch e is now to be brought forward which is effected by the rotation of the cam o upon the main shaft. The larger radius of this cam o at 1 now acts against an antifriction shoe piece intervening between the cam and the vertical lever p, (see Fig. 8,) when by the advance of the lever the die or punch e is forced up against the end of the pin wire a and the die crushes or upsets the end of the wire for the purpose of partially forming thereon the head of a pin. As this cam o continues revolving a portion of its periphery having a slightly diminished radius at 2 comes against the spring lever p and allows it and the heading die to recede a little, at which time a similar diminution in the radius of the cam n at 2, (Fig. 11,) allows the slider l to recede and consequently permits the spring lever g to move and open the holding dies by which the wire a is released. At this period an increased radius of the cam w, at 3, as it revolves will come around and act upon the lever x and depress it still more which will also cause the lever z to advance the holding guides b, b, a very short distance and thereby to project the end of the wire sufficiently forward toward the punch e to give that increased quantity of metal which is necessary to complete the head of the pin. When this has been done, that is the end of the wire advanced between the dies d, d^*, the point 3 of the cam n will cause the die d^* to close and hold the wire firmly, immediately after which the point 3 of the cam o will project the punch e against the end of the wire and by further crushing the metal complete the head of the pin, after which the header is allowed to recede as in Fig. 8 by the shorter radius of the cam o, and of the cam n coming around and the dies d, d^*, also to open.

The end of the wire having been formed into a boss or head the length of wire is now to be cut off to constitute a pin which is done by means of a steel cutter (a) attached to a lever (b) contiguous to the stationary guide. This lever (b) mounted upon a shaft (c) having a coiled spring (d) is acted upon by a lateral cam (e) upon the side of the driving pulley C, represented in Fig. 2. This cam (e) as the driving pulley revolves comes against the rail of the lever (b) see Figs. 2, 5, 8 and 10, and by depressing the opposite ends of that lever causes the steel cutter (a) to move downward and cut off the pin from the length of wire, which pin may then fall down into a receptacle below or into the channel which conducts it to the pointing apparatus about to be described.

The form of the cutter and its appendages is shown in three detached views at Fig. 13. (a) is the steel piece or cutter screwed to the nose of the lever (b,) and (f) is a guide having a notch or recess at the end which bears upon the wire and holds it steadily

while it is being cut off. While the pin is being cut off from the length of wire the smaller radius of the cam *s* coming around causes the lever (*t*) and stud *u* to release the pressure upon the upper guide *v*, which then ceases to confine the wire. The lesser radius of the cam *w* then operating upon the lever *x*, allows the coiled spring *y** to force back the guides *v*, *v*, and lever *z* a distance equal to the length of one pin where they remain until by the rotation of the main shaft all the cams are brought again into operation and the revolutions of the machine pinch and advance the wire, head its end and cut it off in the way described.

I may here state that precisely the same forms and constructions of machinery and modes of operating as above described are applicable to the making of the kind of nails first alluded to and also to the making of rivets and screw blanks the second and third objects of my invention, only it is to be observed that the machinery must be made larger and stronger in all its parts according to the articles required to be manufactured.

When I desire to point the ends of the pins without removing them from the machine in which they have been headed and cut off, I place immediately under the cutter (*a*) and dies *d*, *d** above described a conducting apparatus formed by two plates shown at (*g*) in Fig. 5 which pass through an opening made for that purpose in the heading lever *p*. The upper part of this apparatus has inclined V shaped sides within for the purpose of directing the pins into a descending groove or channel (*h*) below which channel formed by two parallel plates is just wide enough to allow the shaft of the pin to enter it but its edges prevent the head of the pin falling through. Hence the pins are compelled to take upright positions in this channel and in that way by their own gravity slide down the inclined planes (*h*) into a transverse horizontal channel (*i*). This will be best seen in the section of this part of the machine taken horizontally and upon a larger scale at Fig. 14. A transverse vertical section of this part detached is shown at Fig. 15 which is taken in the dotted line U U of Fig. 14. The groove (*i*) is formed by a stationary ledge (*k*) fixed to the framework and a horizontally sliding bar (*l*, *l*,) supported upon the brackets (*m*, *m*). The face of this bar and also of the ledge (*k*) which forms the channel (*i*) for the pins to pass along may be covered with leather or some slightly elastic material for the purpose of preventing them from slipping while they are undergoing the operation of pointing. Two upright standards (*n*, *n*,) affixed to the framework carry the centers upon which a vibrating bracket frame (*o*, *o*,) is suspended. This bracket frame supports the axle upon which the mill roller or rotary cutter (*p*) employed for grinding the points of the pins is fixed. The cutter is made to revolve by means of bands and pulleys (*q*, *q*, *q*,) leading from a large pulley (*r*) on the main shaft of the machine which band passes over a small pulley (*s*) on the axle of the mill or grinding roller (*p*) and thereby gives it a very rapid rotary movement. The shafts of the pins fed into the channel (*i*) as described are made to turn around as they pass along the channel by a reciprocating movement given to the sliding bar (*l*). This movement of the bar (*l*) is effected by a vibrating lever (*t*) hung upon a bracket extending from the framework best seen in Figs. 2, 3 and 4 which lever at its upper end is acted upon by an oblique faced cam (*u*) on the main shaft. Hence as the shaft revolves the lower end of the lever (*t*) is made to push the bar (*l*) in one direction and the bar is forced back again by a vertical spring (*v*) shown in Fig. 6.

In order that the mill roller or rotary cutter (*p*) shall be made to grind or cut the point of the pins to a conical form the roller and its axle as they revolve are caused to vibrate vertically which is effected by means of an upright rod (*w*) (of the shape as seen in Figs. 3, 4, 6, 14) the lower end of this rod being attached to the vibrating lever frame (*o*,) as shown in Figs. 3, 6 and 14, and its upper end resting on an eccentric (x^2) on the main shaft the said eccentric serving to raise and depress the rod. The means by which the pins are made to progress along the channel (*i*) and are delivered when the pointing has been completed is now to be shown. It is obvious that the merely reciprocating movements of the sliding bar (*l*) would only carry the pins to and fro without progressing them. To effect this object therefore I employ a finger (*y*) extending from a lever (*z*) by the side of the machine the fulcrum of which lever is below and this lever is acted upon above by a cam *c* on the main shaft of the machine as seen in Figs. 1 and 4. Now every time that the main shaft revolves the cam moves this lever (*z*) and causes the finger (*y*) to push the bar (*l*) a little distance back in its bearings which is allowed by a small free space behind it, the spring (*v*) keeping the bar at other times in contact with the pins. This forcing back of the bar (*l*) happens every time that the cam on the main shaft comes around, and which takes place when the sliding bar is performing its retrograde movement. In the receding movements of this bar the friction being thus relieved the pins are brought back only about two thirds of the distance that they were previously advanced, consequently by the successive advancing movements of the bar the pins are gradually carried onward

and discharged out of the channel and delivered into a receptacle at the end. When the pins have passed along the whole length of the roller (p,) they come in contact with a conical rotary cutter (p^*) which is set angularly in order that it may be driven by friction of contact with the larger cutter (p). This small cutter will also by its axle being placed lower than that of the cutter (p) give a more obtuse angle to the point of the pin and thus make it more firm than if it were a regular taper beside removing the bur which might otherwise be left after the pointing.

Having now described the construction of the improved machinery to be employed in the manufacture of nails, rivets, screws and pins I desire it to be understood that I claim in reference to the heading of metal rods or wire for the above purposes:

1. The means of effecting what I call a "double upset," viz., by crushing the end of the rod or wire for forming the boss or head of the nail, rivet, screw or pin by two or more operations of a single heading punch and pair or set of holding dies and the sliding guides, the whole in combination as above described; the rod or wire being brought forward between the holding dies a short distance by the sliding guides after the first or partial crushing of the metal has been effected in order to supply a sufficient additional quantity of metal to complete and perfect the form of the boss or head when the second pressure of the punch is brought up against it.

2. As respects the pointing of pins and discharging them from the machine I claim my improvement therein; the same consisting in imparting to the sliding bar l certain alternating lateral and back movements in its bearings as described; whereby the pins are turned in opposite directions during the action of the mill roller upon them, and discharged from the machine when the pointing of them has been completed.

In witness whereof I, the said SAMUEL GODFREY REYNOLDS, have hereunto set my hand and seal this eighteenth day of August one thousand eight hundred and forty five.

S. G. REYNOLDS. [L. S.]

Witnesses:

FRED WALKDEN,

E. J. COATES.