

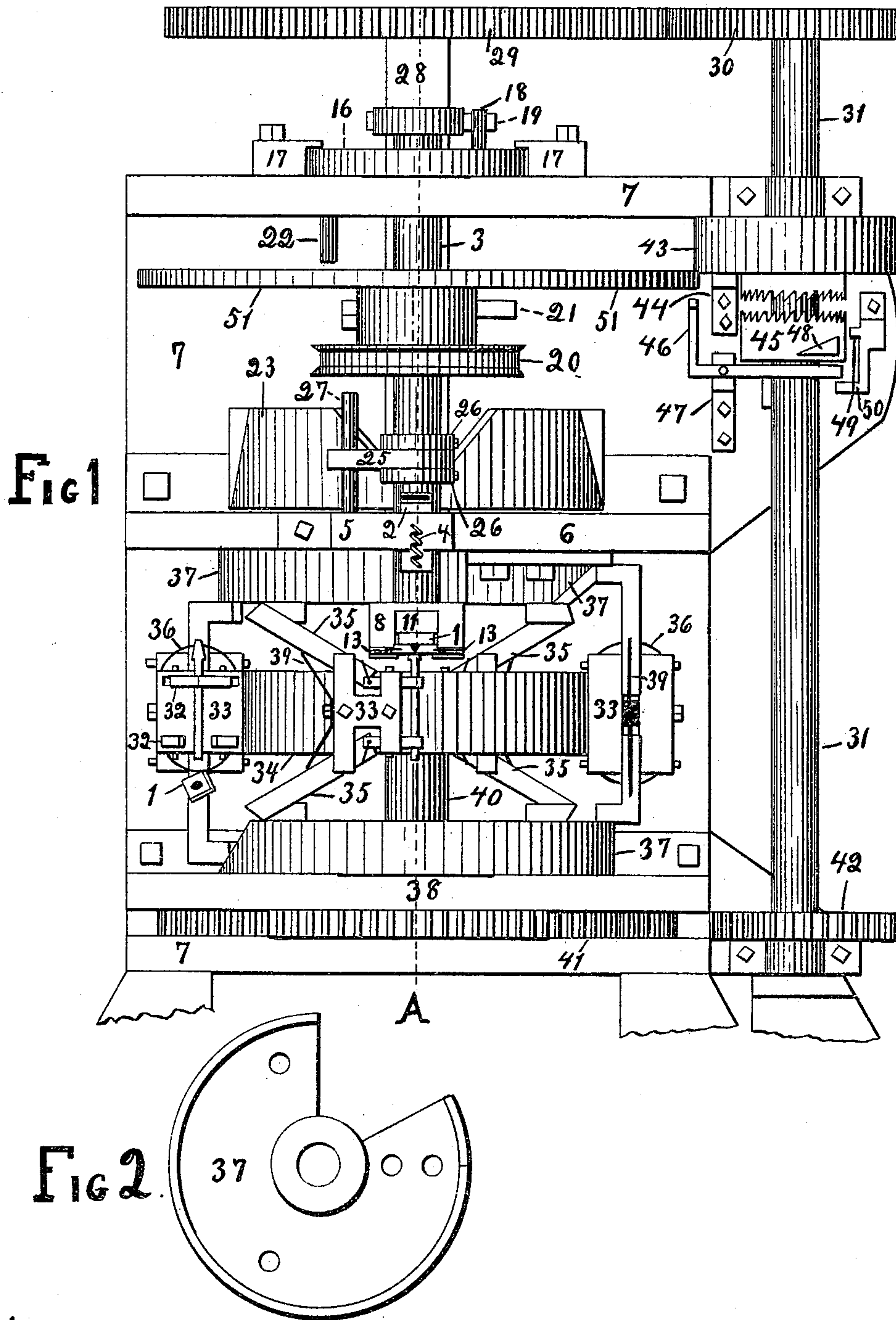
(No Model.)

3 Sheets—Sheet 1.

E. N. BEECHER.  
NUT TAPPING MACHINE.

No. 377,286.

Patented Jan. 31, 1888.



WITNESSES:

Edwin S. Todd  
Henry A. Jones

INVENTOR

Edwin N. Beecher.

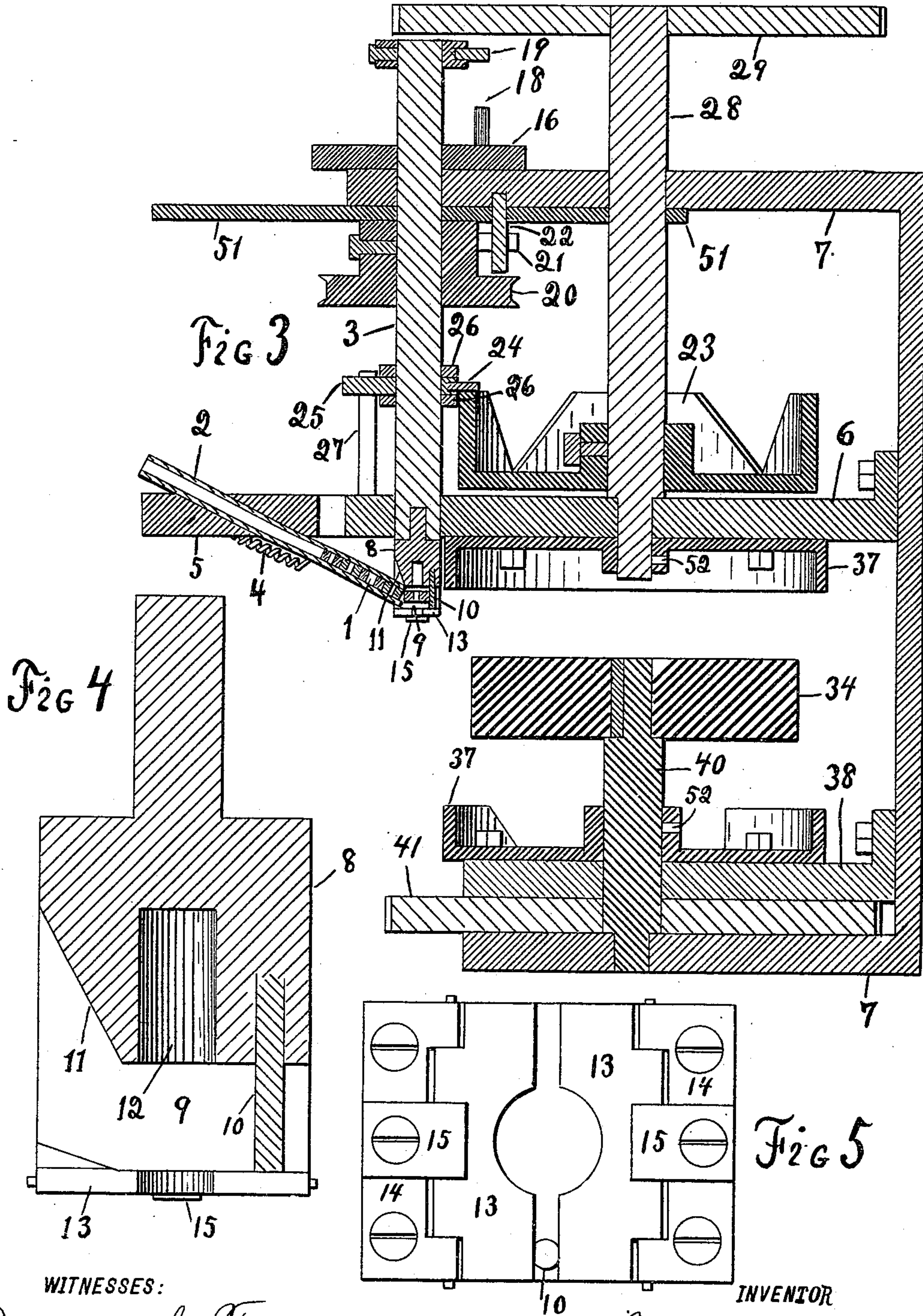
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3 Sheets—Sheet 3.

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Fig 7

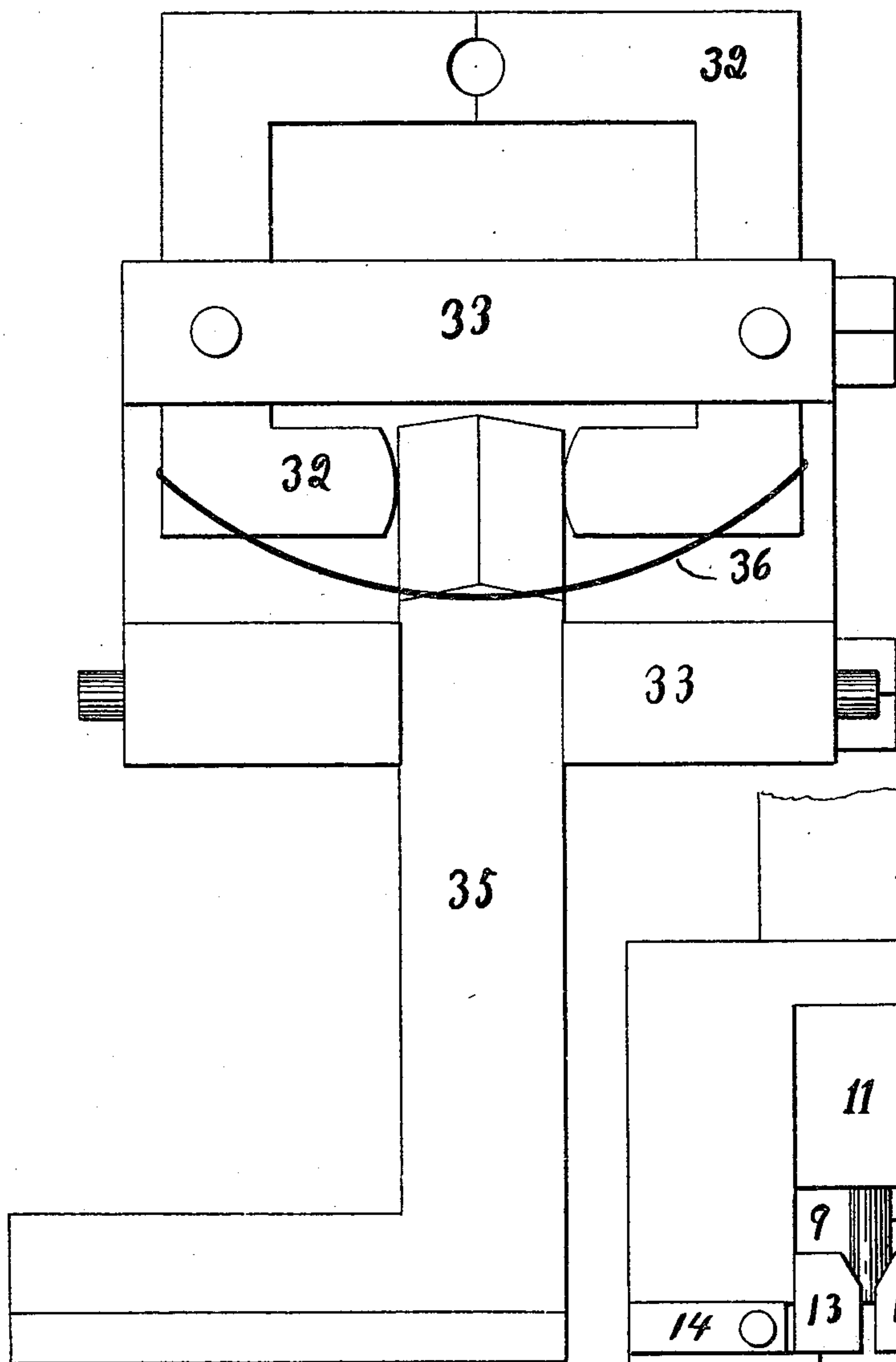
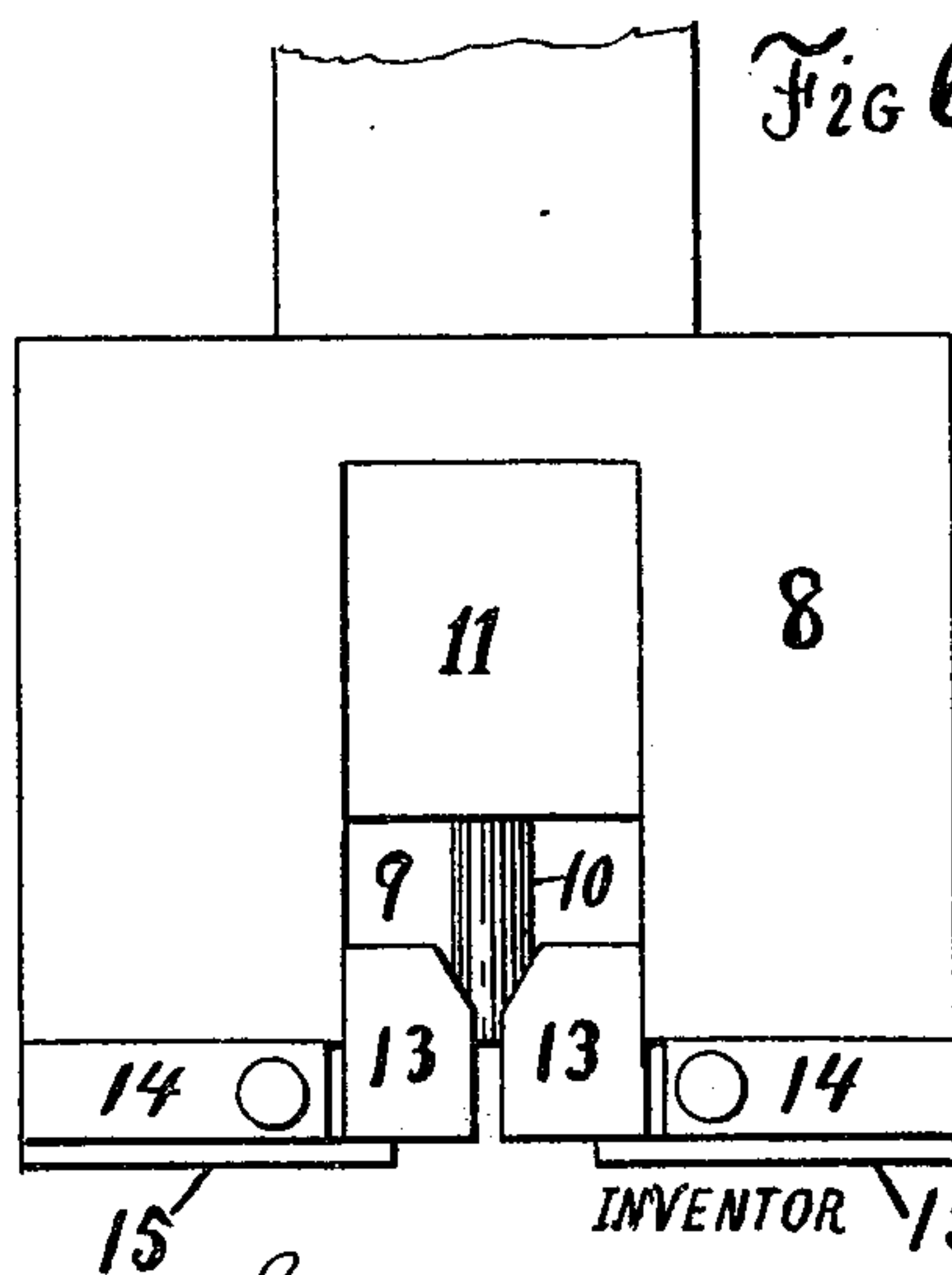


Fig 6



WITNESSES:

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INVENTOR 15

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# UNITED STATES PATENT OFFICE.

EDWIN N. BEECHER, OF MARION, CONNECTICUT, ASSIGNOR OF ONE-HALF TO  
HENRY H. NEWELL, OF SAME PLACE.

## NUT-TAPPING MACHINE.

SPECIFICATION forming part of Letters Patent No. 377,286, dated January 31, 1888.

Application filed September 23, 1887. Serial No. 250,474. (No model.)

*To all whom it may concern:*

Be it known that I, EDWIN N. BEECHER, a citizen of the United States, residing at Marion, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Machines for Tapping or Reaming Nut-Blanks or Nutting Screws; and I do declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to machines for either tapping nut-blanks, reaming the same, or revolving threaded nuts on screws of bolts or other articles of similar description, and comprehends devices and combinations necessary for performing the operation of receiving the nuts one at a time from a confined row or column, rotating such nuts onto a tool or bolt, and in case of a tool of finally discharging the finished nuts over its shank end, and in case of a bolt of automatically discharging the same nutted.

The chief characteristic feature of the machine is the employment of an automatically-supplied rotating nut-holder for revolving the nuts onto a tool or bolt, the tool or bolt being non-rotary on its axis.

Referring to the drawings, Figure 1 represents a view in elevation of the machine. Fig. 2 is a plan view of one of the cam-tracks for controlling the levers of the tool or bolt holding jaws. Fig. 3 is a view of the machine in vertical section on the line A of Fig. 1, with the tool or bolt holders removed. Fig. 4 is a view in central vertical section of the rotating reciprocating nut-holder. Fig. 5 is a plan view of the nut-outlet end of said nut-holder. Fig. 6 is a view in elevation of the nut-entrance side of such holder, and Fig. 7 is a plan view of one pair of the tool or bolt holding jaws and the lever for operating them.

As shown in Fig. 1 of the drawings, the machine is set up for tapping or reaming nut-blanks. The operation of the machine for nutting bolt-screws is the same, except that the nutted bolt is automatically discharged, whereas in the operation of tapping or reaming the tool is retained and the finished nut discharged. The detailed description will

therefore be confined for the present to the operation of the machine for tapping or reaming.

Referring to Figs. 3 and 1 of the drawings, the nuts 1 are received in an inclined quadrilateral reciprocating chute, 2, which is depressed for normal engagement of its lower end with an intermittently-revolving reciprocating shaft, 3, by a spiral spring, 4, secured to the chute and to the chute-support 5, which is provided with a slot in which the chute reciprocates, and which is fastened to an arm, 6, of the frame 7 of the machine. The said chute is adapted to enter a slotted intermittently-rotating reciprocating block, 8, and deposit a nut in the slot therein by means of its actuating-spring and gravity when the holder has reached, during its ascending stroke, the lower end of the chute, as shown in Fig. 3 of the drawings, and which will hereinafter be more clearly described. The said block 8 is rigidly secured to the shaft 3, and is formed with a slot, 9, the side walls of which form the nut-holder and engage with the nut for revolving it on the tool. Said block also has a gage-pin, 10, located in the slot for limiting the passage of the nut when entered therein, an inclined surface, 11, formed in the slot for engaging during the descent of the block with the chute and nut therein next above the one in the holder to clear them from the holder, a bore, 12, forming a tool-passage, and doors 13 13, hinged to plates 14 14, which are secured to its outer end. Said doors are normally closed by spring-plates 15 15. Each has a beveled projection entering the slot in the block, and prevents the nut therein from falling out, but allows it to be removed with force.

The shaft 3 is mounted with a capacity for reciprocity in bearings located in the frame of the machine and the frame-arm 6, and is provided near its upper end with a driving-pulley, 16, which is loosely mounted thereon and prevented from lengthwise movement thereon by the frame of the machine and armed blocks 17 17, secured to the frame. The said loosely-mounted pulley is driven by a tight belt from any convenient source of power, and operates to revolve the shaft for rotating a nut onto the tool by means of its pin 18, which engages with a similar pin, 19, carried by the shaft.



Said shaft is also provided with a driving-pulley, 20, rigidly mounted on it, and carrying a pin, 21, which engages during the upward movement of the shaft with a similar pin, 22, located in the frame of the machine. Said rigidly-mounted pulley is driven by a slack or loose belt or cord, and operates thereby to stop the rotation of the shaft through the engagement of pins 21 and 22 with the block 8, having its proper side in line with the reciprocating chute aforesaid. The descent of shaft 3 is effected by gravity and its retraction by a normally-motionless wheel, 23, having four cam-lifters in its periphery for engaging with a pin, 24, firmly driven into a collar, 25, which is loosely mounted on the shaft between rigid collars 26 26, and which is prevented from turning by being also loosely mounted on a pin, 27, which is secured to the arm 6 of the frame of the machine.

The lifting cam-wheel 23 is mounted on a shaft, 28, which has bearings in the frame of the machine and the frame-arm 6, and which is provided at its upper end with a cog-wheel, 29, which is periodically meshed by a toothed segment, 30, secured to the upper end of a vertical driving-shaft, 31, all of which will be hereinafter more fully described.

The tools are held by four sets of jaws, 32, two pair of jaws in each set, and each set is provided with a tool. The jaws are pivoted in T-shaped blocks 33, which are slotted for the reception of the jaws, and which are secured at equidistant points to the periphery of an intermittingly-revolving dial, 34. The jaws are closed and opened by levers 35 and springs 36, respectively, the springs being attached to the tails of the jaws, and the levers being fulcrumed in slots in the blocks 33, and having beveled sides for entering between the tails of the jaws and bent ends for engaging with circular stationary cam-intersected tracks 37 37, which are bolted to the arms 6 and 38 of the frame of the machine. The said levers are normally engaged by springs 39, which are secured to the T-shaped blocks, and which cause the levers to separate from the tails of the jaws when their bent portion has reached, during the rotation of said dial, a cam intersection of the tracks 37 37, which tracks are so arranged that when one pair of jaws has released its hold on the tool the other pair of the same set will remain closed. Thus the nut is allowed to first gravitate to the lower pair of jaws of a set and finally off the shank of the tool, as shown in Fig. 1 of the drawings. The said dial 34 is keyed to a shaft, 40, which is provided on its lower end with a cog-wheel, 41, which is periodically meshed by a toothed segment, 42, mounted on the driving-shaft 31.

The shaft 31 is normally inactive, and during one revolution it operates to raise the nut-holder and to turn the dial 34 one-fourth of a revolution by means of the toothed segments 30 and 42, respectively. This shaft is periodically rotated by a pulley, 43, loosely mounted on it, and prevented from descending longi-

tudinal movement thereon by an arm, 44, which is secured to the frame 7 of the machine. Said pulley is driven by a belt from any convenient source of power, and is provided on its hub with radial teeth, which are periodically clutched by similar teeth formed on a sleeve, 45, which is keyed to shaft 31, allowed sliding movement thereon, and actuated to engage with said pulley by a lever, 46, fulcrumed upon a pin secured to an extension, 47, which is bolted to the frame 7 of the machine. The sleeve 45 is disengaged from the said pulley by a cam-wedge, 48, formed on the sleeve, for engaging during the rotation of shaft 31 with a shipping-arm, 49, bolted to the frame of the machine, and having a branch, 50, for limiting the fall of the said lever and sleeve.

The lever 46 for actuating the clutch just described is engaged during the downward movement of shaft 3, after the nut-holder has rotated a nut over the cutting portion of a tool, by a circular plate, 51, which is centrally loosely mounted on said shaft and loosely mounted eccentrically on shaft 28, and which is provided with a passage-hole for the frame-pin, 22, as shown in Fig. 3 of the drawings.

Having described my machine in detail, I will now proceed to set forth the mode of its operation.

As shown in Fig. 1 of the drawings the nut-holder is revolving a nut on a tool. After it has carried the nut over the cutting part of the tool it still continues to descend, and during this descent the plate 51, carried by the shaft 3, engages with the lever 46, which now operates to couple the idle shaft 31 with the pulley 43 and the latter shaft begins to rotate. The first of this rotation causes the toothed segment 30 to gear with the cog-wheel 29, thus actuating the cam-wheel 23, which now commences to raise shaft 3. After it is raised sufficient to cause the doors of the block 8 to swing open, allowing the finished nut to remain on the shank of the tool, and sufficient to entirely clear the doors from the finished nut, the toothed segment 42 meshes with the cog-wheel 41, and now the dial 34 commences to turn. The dial's movement carries the tool-holding jaws sufficient to present a different tool in line with the nut-holder and enough to cause the just cut nut to drop down the shank of its tool to the lower jaws, which happens when the upper lever of upper jaws has arrived at a cam intersection of the upper track, 37. The shaft 3 still continuing upward, the pin of its loose pulley and its pin 19 disengage, and almost simultaneously the pin of its rigid pulley engages with the frame-pin 22 and the rotation of the shaft is stopped. The shaft still receding, the nut-holder arrives under the reciprocating chute, which slides into the slot in the block 8 as fast as it is allowed by the inclined plane 11 and deposits a nut therein, as shown in Fig. 3 of the drawings. The toothed segment 42 being now disengaged from revolving the dial, and the toothed segment 30 having revolved enough to cause the



cam-wheel 23 to disengage from shaft 3, the latter now commences its descent. The first of this descent causes the inclined surface in the block 8 to engage with the lower end of the chute and raise it and the nuts therein up out of the slot in the block, thereby causing them to rest on the shaft. The inclined plane being now clear of the chute, the pin of the rigidly-mounted pulley 20 and the frame-pin 22 are disengaged, and the nut-holder having now arrived and presented the nut therein to a tool, the pin of pulley 16 is engaged with the shaft-pin 19 and the holder commences to revolve its nut on the tool. The two toothed segments having now ceased to mesh with their respective cog-wheels, the cam-wedge 48 engages with the shipping-arm 49, thereby uncoupling the shaft 31 from its driving-pulley, and the operation of the machine is repeated. When the operation is repeated enough times to cause a lever of the lower tool-holding jaws to arrive at a cut-out part of the lower track, 37, the nut gravitates off the tool, as shown in Fig. 1 of the drawings.

The operation of the machine is precisely the same for screwing tapped nuts onto bolt-threads, with the exception that only one pair of jaws of each set need be used—say the upper—and the bolts fed thereto by hand. In this case it is obvious that during the rotation of the dial, when a lever of the upper jaws has reached a cut portion of upper track, 37, the jaws will open, allowing the escape of the bolt with the nut on its screw, and that then a new bolt may be placed in the jaws. It is to be noted that the jaws must hold the bolt so that the end of its screw will be at such distance from the limit of the descent of the nut-holder as will cause the nut, while being rotated on the screw, to be pulled out of its holder.

It is to be understood that by removing either the toothed segment 42 or the dial 34 threaded articles can be nutted on my machine while they are held simply by hand. In this case it will be advisable to plug the bore 12 in the block 8, and it is evident that then the article, after the nut is screwed thereon, will turn in the hand of the operator, when it may be removed by a quick movement of the same. The contour of cams on wheel 23 allows the nut-holder to linger while receiving a nut, and it is therefore to be remarked that the screw end of a bolt may be placed by hand for nutting in such holder when it is at the limit of its ascending stroke, and as it is retracted after it has reached the limit of its descent the operation may be repeated. It is evident that for nutting threaded articles in any of the described operations the loose pulley 16 may be discarded and only the rigid pulley 20 used, provided that the fit required is not too tight. It is to be also further understood that on my machine one tool for tapping or reaming may be used to the exclusion of the others. Referring to Fig. 1 of the drawings, it will be found that if all the tools but one are dispensed with

the operation of the machine will be as follows: The nut-holder, after doing its work, will retract and the dial will advance a set of tool-less jaws under it, which will descend and retract, and will continue doing thus until the set of jaws holding the tool have arrived under it. As this involves a waste of time, it will be necessary to unkey the dial from its shaft, leaving the latter free to revolve, while the dial, which may be blocked in any suitable manner, (such as bolting its periphery to the frame 7 of the machine,) remains stationary with a set of jaws in line with the nut-holder. Supplementary to this, it will be necessary to unbolt the cam-tracks 37 37, releasing them from the situations shown in drawings, Figs. 1 and 3, and to rigidly mount them on the shafts 28 and 40, which have bearings in their hubs, by means of screws in holes 52 52 in their hubs. As a further proceeding, it will be necessary, as it makes no difference which way wheel 23 revolves, to reverse the rotation of pulley 43, accompanied with suitable adjustment of the cam-wedge 48, (which may be adjustably bolted to its sleeve,) and the machine started in operation. The cam-tracks 37 37 being now rotary and having been properly adjusted, the operation of the machine will be substantially as has been heretofore described, and will be exactly the same in every particular, excepting only as regards the fact that in this instance the tool-holders are stationary and the cam-tracks rotary, whereas in the previous description of tapping or reaming the said tracks were stationary and the tool-holders rotary. It is obvious that the principles involved are the same, and also that the parts 37 37 may be intersected with cams and spaces, so as to allow the nuts to escape from the tool one at a time, or so as to allow more than one nut to accumulate on the tool-shank before being discharged when used as rotary.

Referring to Fig. 1 of the drawings, it will be noted that the toothed segment 42 may be removed and only the lower jaws of one set used to hold a tool, which will, after the machine is started in operation, accumulate full of nuts, which may be removed by hand.

It is to be further understood that by properly arranging the parts shown and described any suitable number of sets of tool-holders and nut-holders may be constructed in a combined machine. In this case the stationary cam-tracks may be arranged to allow a finished nut to escape during the rotation of the dial; or the latter may be caused to stop by a proper toothed segment identical with 42 after it has carried a just cut nut half-way to the line of the next nut-holder, and then, with the tracks properly arranged, the upper jaws will hold the tool, while, the lower ones being open, the nut will be discharged. In a combined machine the tools may be allowed during their circuit to accumulate full of nuts, which nuts may be discharged at any convenient spot. It is obvious that the just-noted oper-



ations may be accomplished by placing the desirable number of nut-holder shafts in a circular line, using a sufficient number of sets of tool-holders, adjusting the toothed segments 5 30 and 42, supplying the proper number of lifting-cams to wheel 23, and properly intersecting the tracks 37 37 with cams and spaces. In a combined construction it will be advisable to centrally mount plate 51 on shaft 28 10 and eccentrically on all the nut-holder shafts, and such being the case, if one nut-holder refused to do its work, none would be retracted.

It may be noted that the mechanism for retracting the nut-holder, as described, has a 15 safety function, inasmuch as it is not set in operation until the holder has revolved a nut over all the cutting portion of a tool.

I would have it understood that I do not confine and limit myself to the precise construction and combination of parts shown and 20 described, but hold myself at liberty to make any and all alterations which fairly fall within the spirit and scope of my invention, and to accomplish the same results with justly-deserving mechanical equivalents.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a machine for tapping or reaming nut-blanks and in a machine for nutting screws, 30 the combination, with an intermittently-rotating reciprocating shaft, of a nut-holder carried by such shaft, substantially as set forth.

2. In a machine for tapping or reaming nut-blanks and in a machine for nutting screws, 35 the combination, with an intermittently-rotating reciprocating shaft, of a nut-holder carried by such shaft and means for feeding a nut to the holder, substantially as set forth.

3. In a machine for tapping or reaming nut-blanks, the combination, with a rotating nut-holder, of jaws for holding the tool while said 40 holder rotates a nut thereon and jaws for holding the tool while a finished nut is being discharged over the shank end thereof, substantially as set forth.

4. In a machine for tapping or reaming nut-blanks, the combination, with a rotating reciprocating nut-holder, of jaws for holding the 50 tool while a nut is being revolved thereon by said holder and jaws for holding the tool while a finished nut is being discharged over its shank end, substantially as set forth.

5. In a machine for tapping or reaming nut-blanks, the combination, with an intermittently-rotating reciprocating nut-holder, of a 55 holder for holding the tool while said nut-holder rotates a nut thereon, a holder for holding the tool while a finished nut is being discharged over its shank end, and a chute for feeding the nut-holder aforesaid, substantially as set forth.

6. In a machine for tapping or reaming nut-blanks and in a machine for nutting screws, 65 the combination, with an intermittently-rotating reciprocating nut-holder, of a reciprocating chute for feeding the nuts to such holder

and means for stopping the rotation of the holder with its nut-entrance in line with the chute aforesaid, substantially as set forth. 70

7. In a machine for tapping or reaming nut-blanks and in a machine for nutting screws, the combination, with a revolving nut-holder carried by a block, 8, such block having a gage, an inclined plane, and a normally-closed 75 nut-outlet, of a nut-guide chute for feeding said holder, substantially as described.

8. In a machine for nutting bolts, the combination, with an intermittently-rotating reciprocating nut-holder, of an intermittently-revolving dial and devices carried by the dial 80 for holding the bolts, substantially as set forth.

9. In a machine for tapping or reaming nut-blanks, the combination, with an intermittently-rotating reciprocating nut-holder, of an 85 intermittently-revolving dial, devices carried by the dial for holding the tools, and means for operating the tool-holding devices for discharging the finished nuts over the shank of the tools, substantially as set forth. 90

10. In a machine for tapping or reaming nut-blanks, the combination, with a revolving reciprocating nut-holder, of an intermittently-revolving dial, jaws carried by such dial for 95 holding the tools, and means for operating the jaws for discharging the cut nuts over the shank end of the tools, substantially as set forth.

11. In a machine for tapping or reaming nut-blanks and in a machine for nutting bolts, the 100 combination, with a rotating reciprocating nut-holder, of an intermittently-revolving dial, means carried by such dial for holding tools or bolts, and mechanism governed by the nut-holder aforesaid for effecting its retraction and 105 the moving of the dial, substantially as set forth.

12. In a machine for tapping or reaming nut-blanks, the combination, with a rotating reciprocating nut-holder, of means for holding a 110 tool while a nut is rotated thereon by said holder, and mechanism controlled by the holder for retracting it after it has rotated a nut on the tool, substantially as set forth.

13. In a machine for tapping or reaming nut-blanks and in a machine for nutting bolts, the 115 combination, with a rotating reciprocating nut-holder, of means for feeding a nut to such holder, an intermittently-revolving dial provided with lever-actuated tool or bolt holding 120 jaws, and cam-tracks adjacent to the dial for controlling the levers, substantially as set forth.

14. In a machine for tapping or reaming nut-blanks, the combination, with a rotating reciprocating nut-holder, of a pair of jaws for holding 125 the tool while said holder rotates a nut thereon, a pair of jaws for holding the tool while the nut is being discharged over its shank end, levers for operating both pairs of 130 jaws, and rotary cams 37 37 for controlling the levers, substantially as set forth.

15. In a machine for tapping or reaming nut-blanks and in a machine for nutting screws,



the combination, with a nut-holder, of the jaws 32, levers 35, and cams 37 37, substantially as set forth.

16. In a machine for tapping or reaming nut-blanks and in a machine for nutting screws, the combination, with a nut-holder, of the guide-chute 2, shaft 3, and cam-wheel 23, substantially as described.

17. In a machine for tapping or reaming nut-blanks and in a machine for nutting screws, the combination, with the shaft 3, of a nut-holder carried thereby, cam-wheel 23, shaft 31, pulley 43, and sleeve 45, substantially as set forth.

18. In a machine for tapping or reaming nut-blanks and in a machine for nutting bolts, the combination, with the dial 34, of the jaws 32, shaft 31, pulley 43, and sleeve 45, substantially as set forth.

19. In a machine for tapping or reaming nut-blanks and in a machine for nutting bolts, the combination, with the dial 34, of the jaws 32, levers 35, and tracks 37 37, substantially as set forth.

20. In a machine for tapping or reaming nut-blanks and in a machine for nutting bolts, the combination, with the jaws 32, of the levers 35, tracks 37 37, shaft 31, pulley 43, and sleeve 45, substantially as set forth.

21. In a machine for tapping or reaming nut-blanks and in a machine for nutting bolts, the combination, with the jaws 32, of the levers 35, tracks 37 37, dial 34, shaft 40, cog-wheel 41 and toothed segment 42, and shaft 31, substantially as set forth.

22. In a machine for tapping or reaming nut-blanks and in a machine for nutting screws, the combination, with the shaft 3, provided with a nut-holder, of the cam-wheel 23, shaft 28, cog-wheel 29, toothed segment 30, and shaft 31, substantially as set forth.

23. In a machine for tapping or reaming nut-blanks and in a machine for nutting screws, the combination, with the shaft 3, provided with a nut-holder, of the pulley 16, pulley 20, and pins 18, 19, 21, and 22, substantially as described.

24. In a machine for tapping or reaming nut-blanks, the combination, with a rotating reciprocating nut-holder, of an intermittently-revolving dial provided with one or more sets of tool-holding jaws and means for operating such jaws for discharging the finished nuts over the shank end of the tool, substantially as set forth.

25. In a machine for tapping or reaming nut-blanks and in a machine for nutting screws, the combination, with an intermittently-rotating reciprocating shaft, of a nut-holder car-

ried thereby, a driving-pulley loosely mounted on said shaft, and means for coupling and uncoupling the pulley and shaft, substantially as set forth.

26. In a machine for tapping or reaming nut-blanks and in a machine for nutting screws, the combination, with an intermittently-revolving nut-holder, of means for conducting the nuts to such holder and mechanism for stopping it to receive a nut, substantially as set forth.

27. In a machine for tapping or reaming nut-blanks and in a machine for nutting screws, the combination, with a revolving reciprocating nut-holder, of means for stopping it to be fed, substantially as set forth.

28. In a machine for tapping or reaming nut-blanks and in a machine for nutting bolts, the combination, with a revolving nut-holder, of means for retracting such holder after it has done its work, devices for holding either tools or bolts, and mechanism controlled by said nut-holder for operating the tool or bolt-holding devices, substantially as set forth.

29. In a machine for tapping or reaming nut-blanks and in a machine for nutting screws, the combination, with a rotating reciprocating nut-holder, of mechanism for retracting such holder, such mechanism being normally idle and actuated to operate by means controlled by the nut-holder, substantially as set forth.

30. In a machine for nutting bolts, the combination, with a revolving reciprocating nut-holder, of means for feeding a nut to such holder and a device for holding the bolts, substantially as set forth.

31. In a machine for tapping or reaming nut-blanks and in a machine for nutting screws, the combination, with a rotating nut-holder, of a gage for limiting the passage of the nuts when entered therein and means for stopping the rotation of the holder for feeding a nut thereto, substantially as set forth.

32. In a machine for tapping or reaming nut-blanks, the combination, with a revolving reciprocating nut-holder, of a normally-idle cam, operating when actuated to retract the said holder, two pairs of jaws for holding the tool, each independent of the other, and mechanism for periodically actuating said jaws and the idle cam aforesaid, substantially as set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

EDWIN N. BEECHER.

Witnesses:

MARTIN A. POND,

AUGUSTINE M. LEWIS.