

(No Model.)

7 Sheets—Sheet 1.

G. DUNHAM.
NUT FINISHING MACHINE.

No. 521,233.

Patented June 12, 1894.

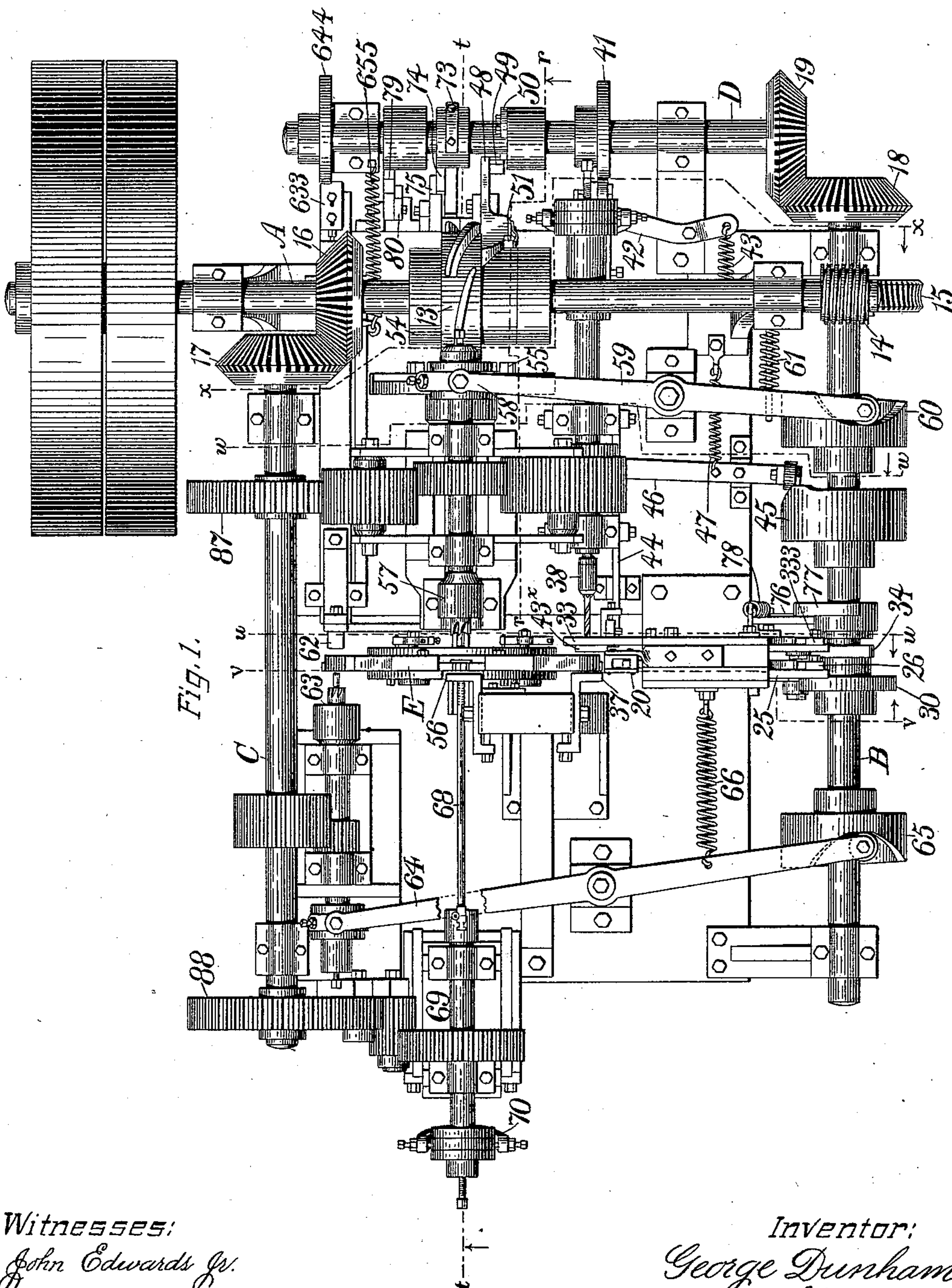


Fig. 1.

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By James Shepard.
Atty.

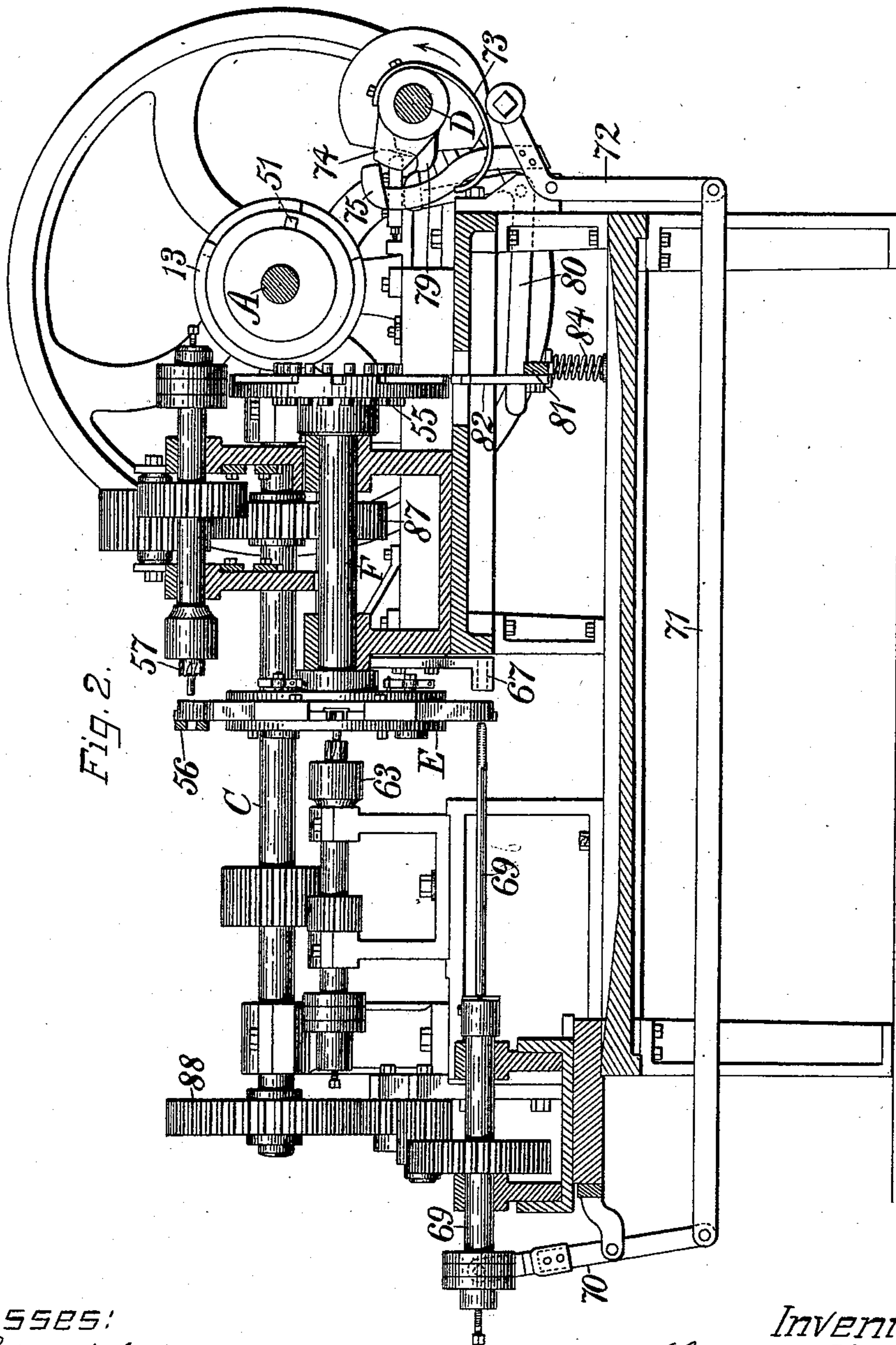
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7 Sheets—Sheet 2.

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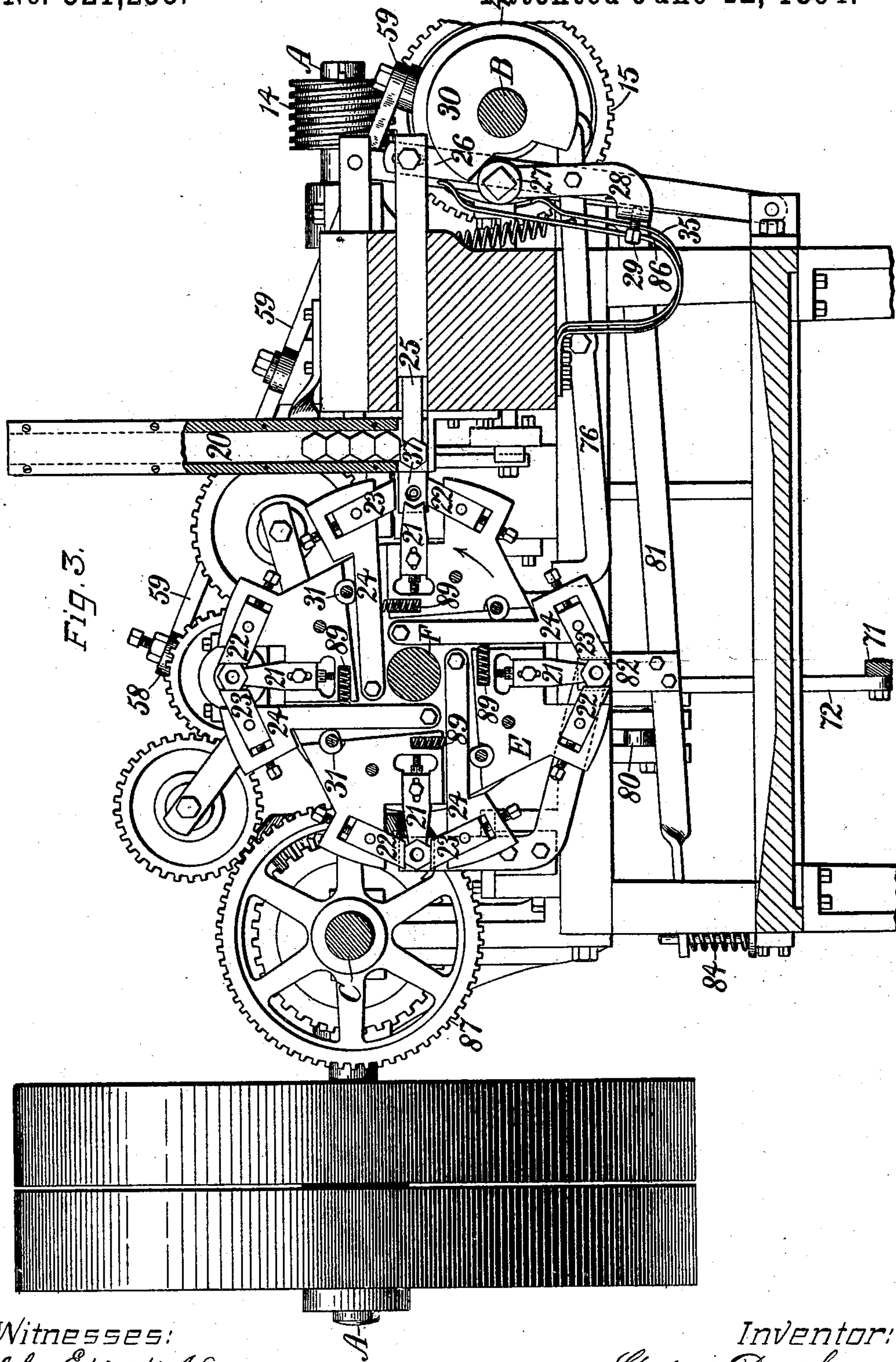
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7. Sheets—Sheet 3.

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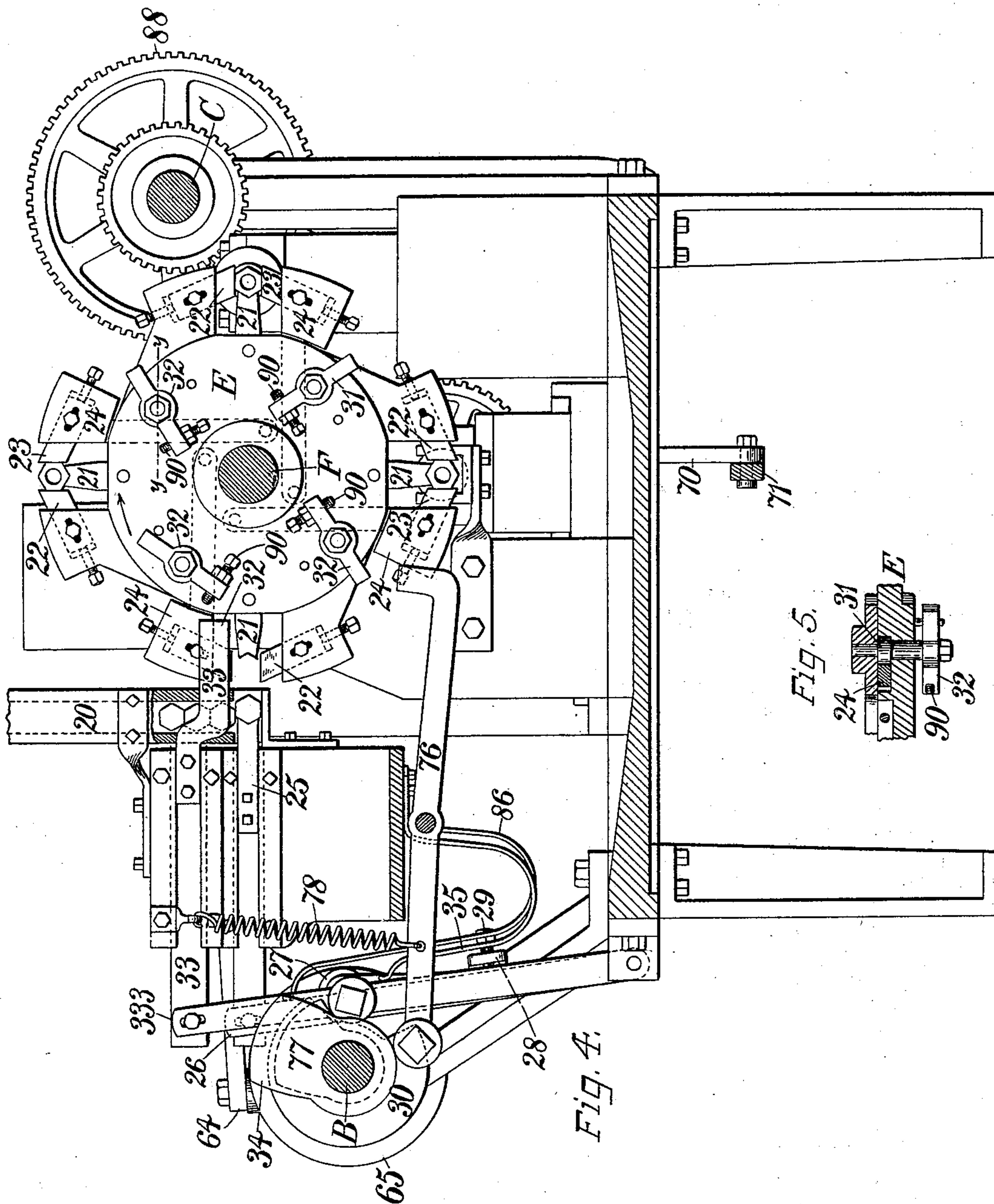
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7 Sheets—Sheet 4.

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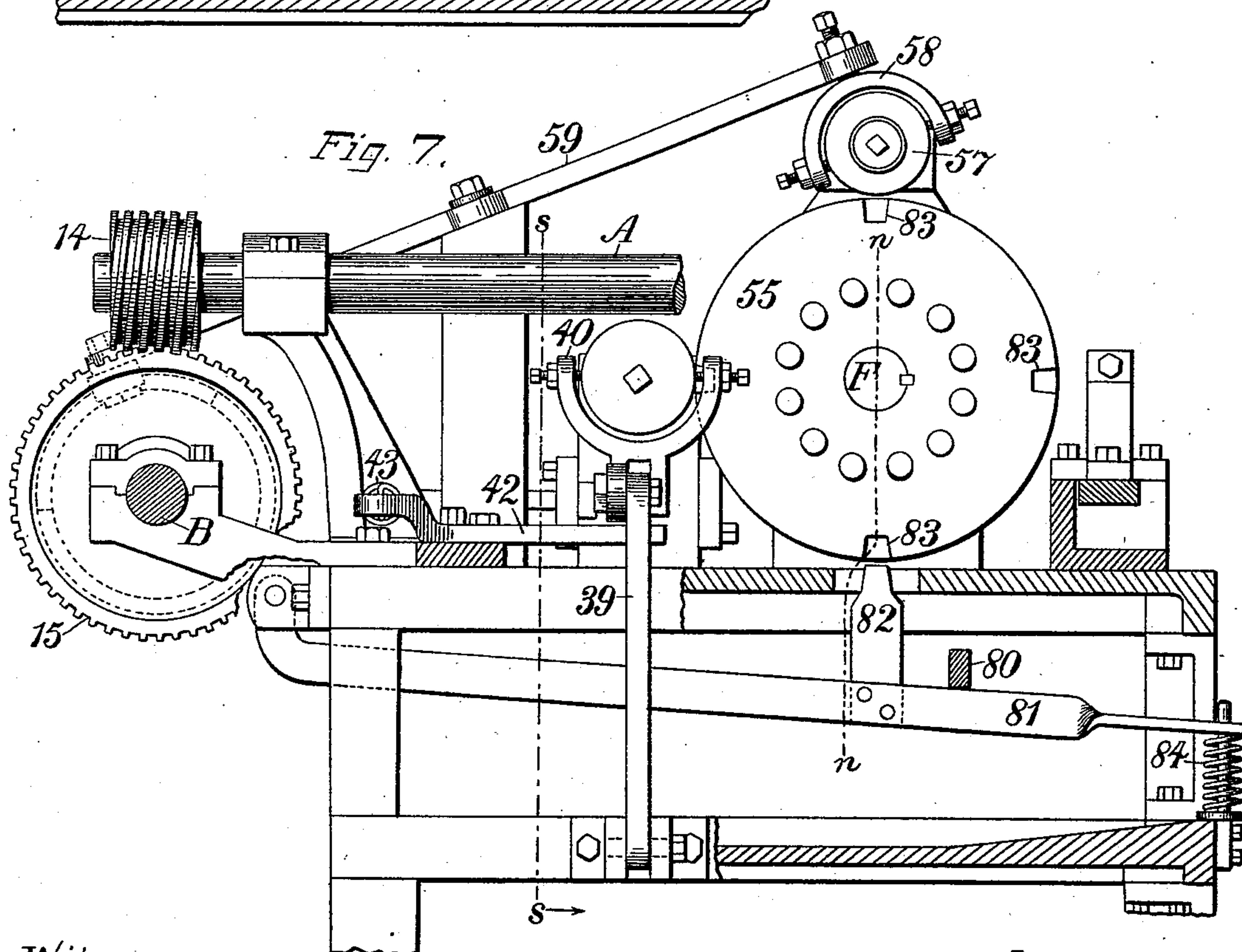
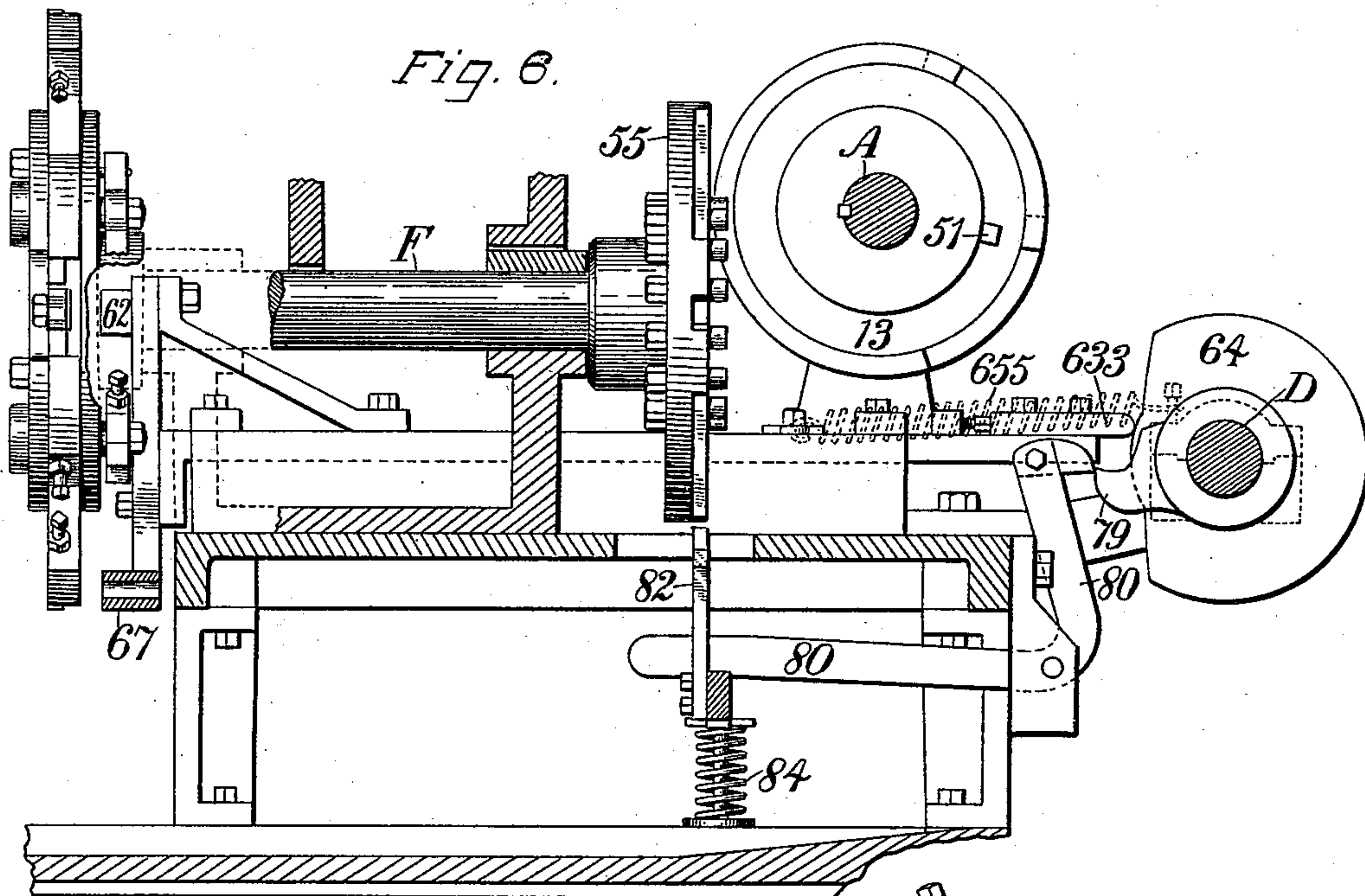
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7 Sheets—Sheet 5.

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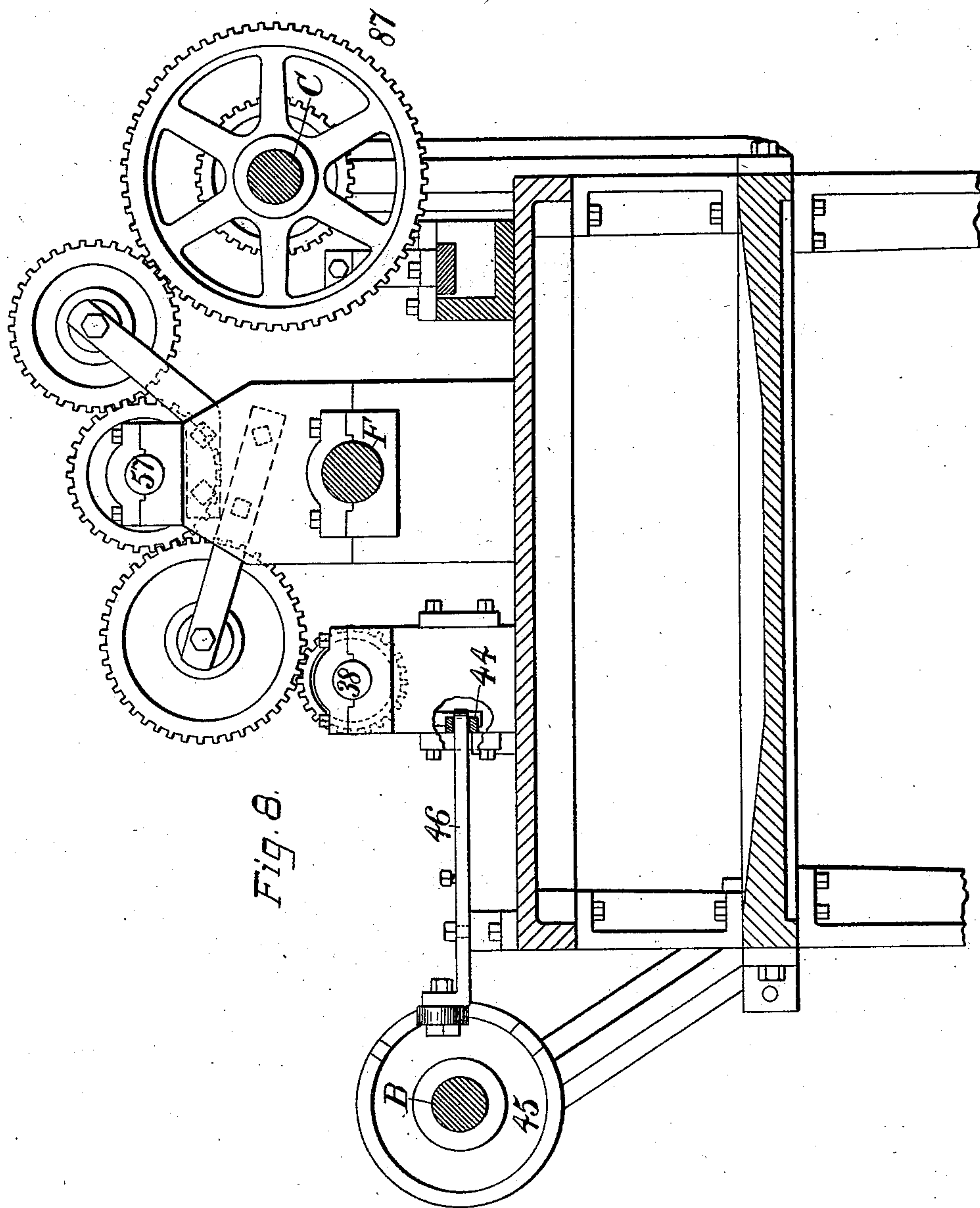
(No Model.)

7 Sheets—Sheet 6.

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7 Sheets—Sheet 7

G. DUNHAM.
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Fig. 9.

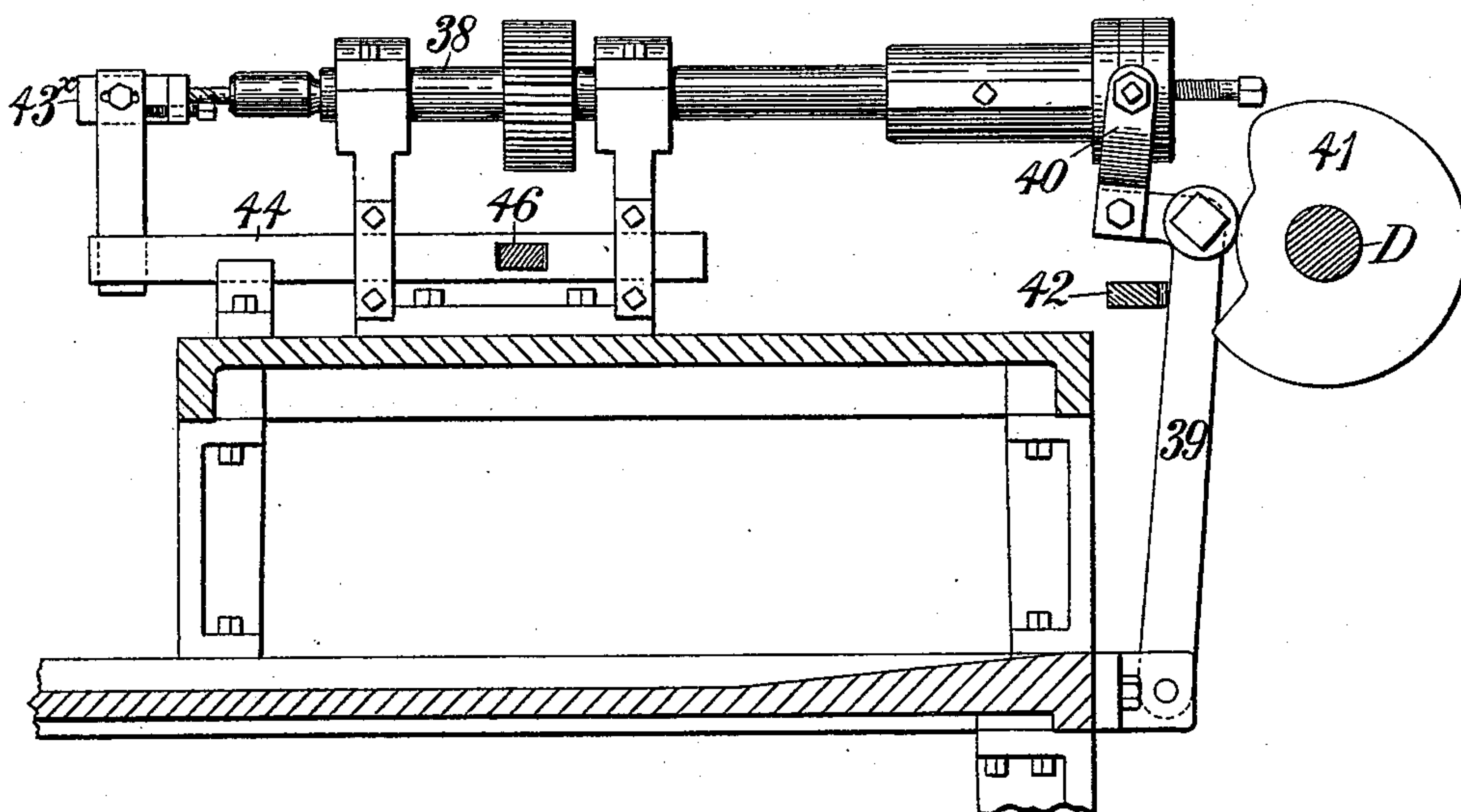


Fig. 10.

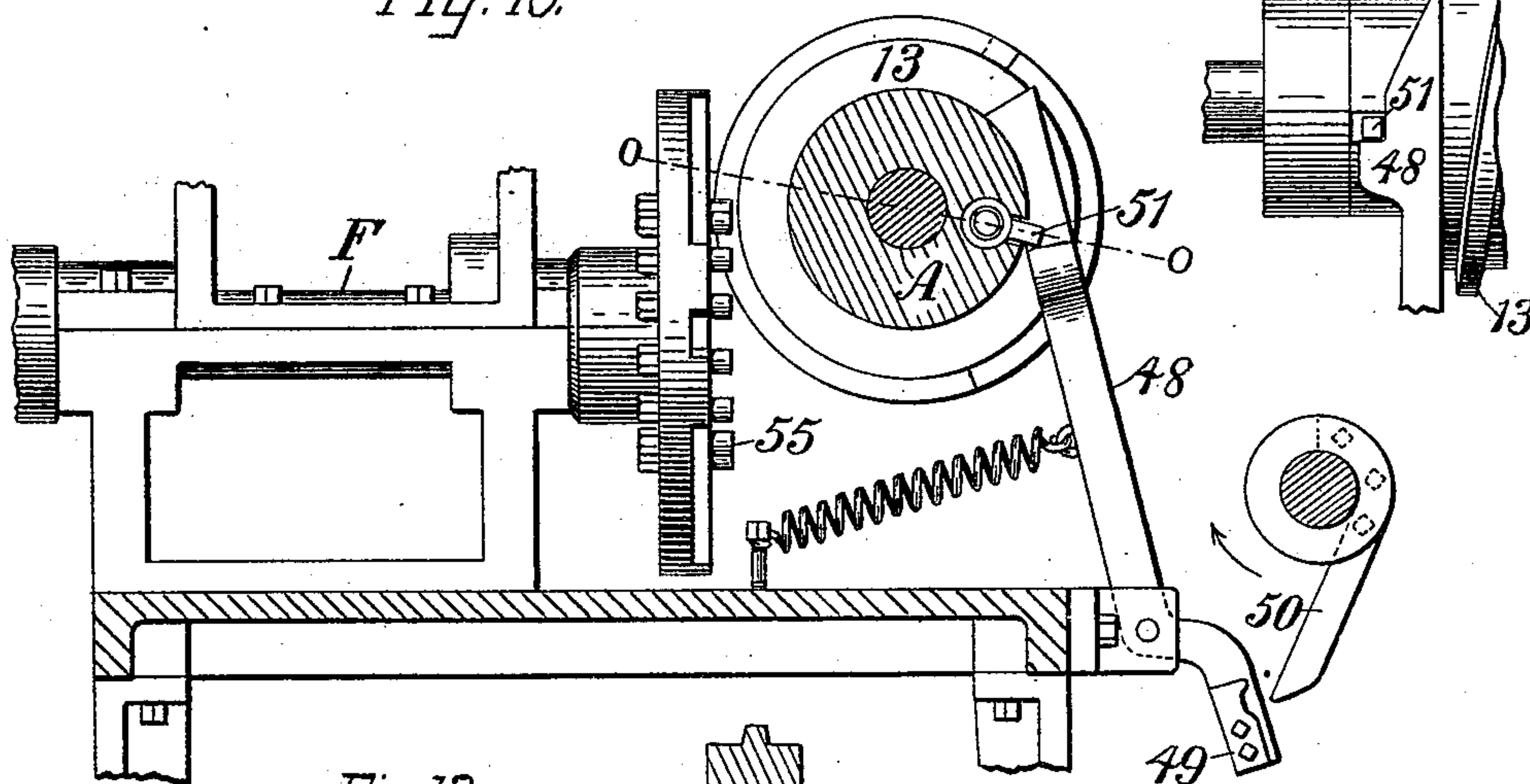


Fig. 11.

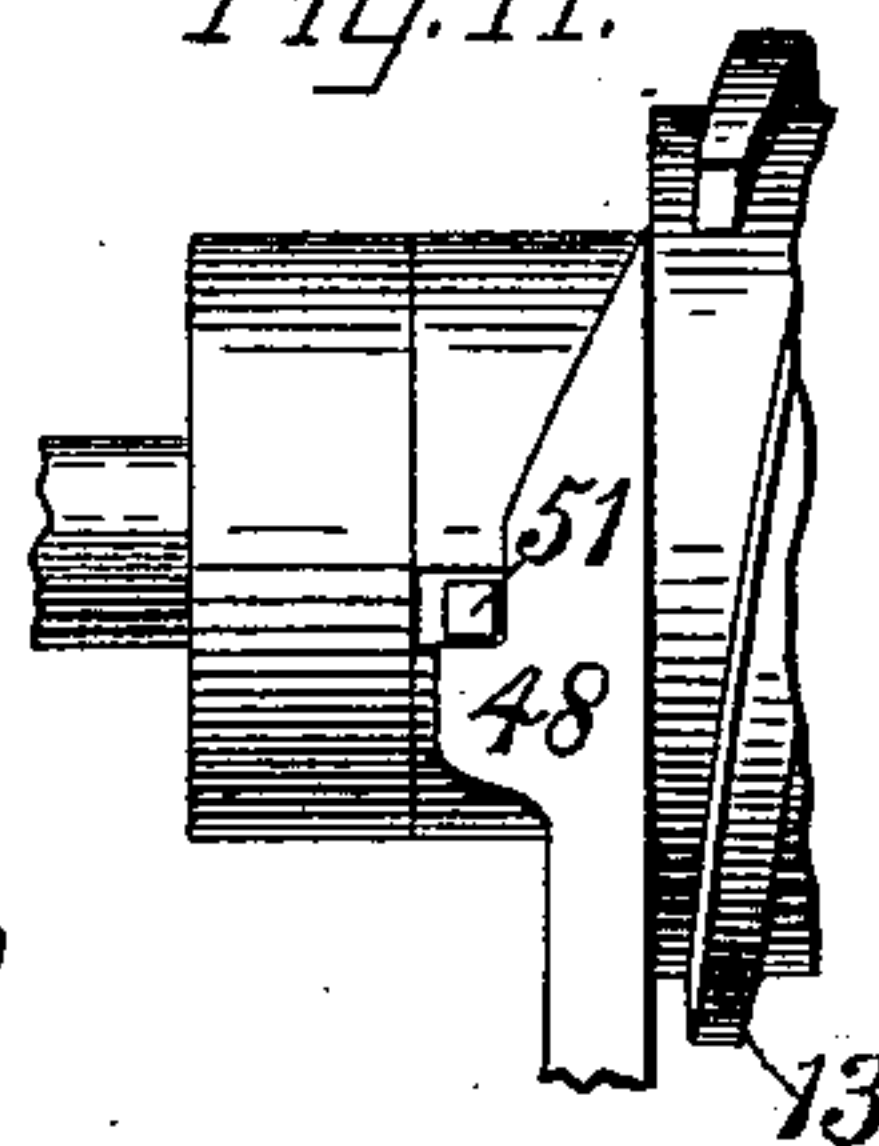
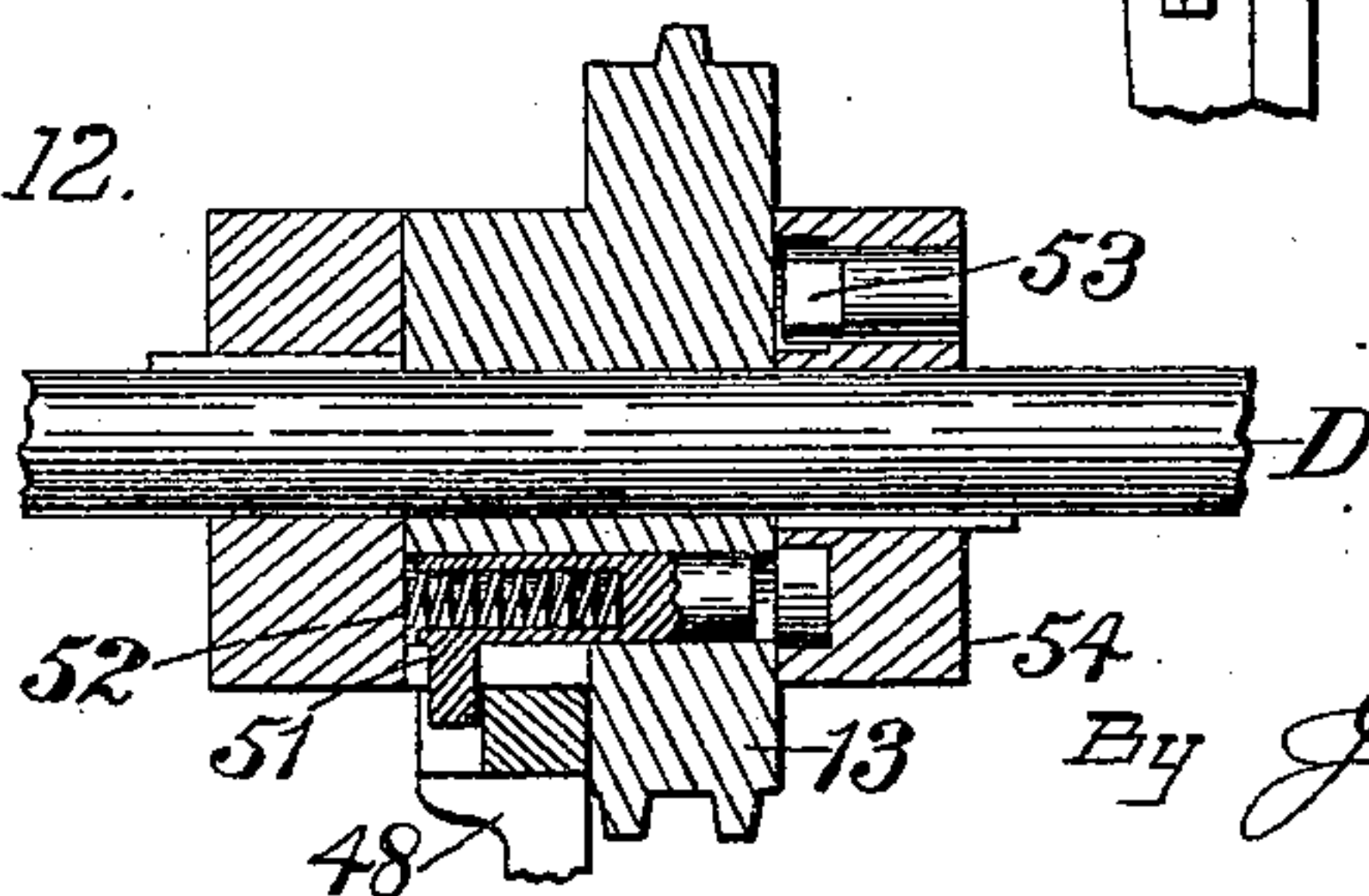


Fig. 12.



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UNITED STATES PATENT OFFICE.

GEORGE DUNHAM, OF UNIONVILLE, CONNECTICUT.

NUT-FINISHING MACHINE.

SPECIFICATION forming part of Letters Patent No. 521,233, dated June 12, 1894.

Application filed April 3, 1893. Serial No. 468,844. (No model.)

To all whom it may concern:

Be it known that I, GEORGE DUNHAM, a citizen of the United States, residing at Unionville, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Nut-Finishing Machines, of which the following is a specification.

My invention relates to improvements in nut finishing machines, and the chief object of my improvement is an automatic machine for economically finishing nuts by dressing their broad sides and if desired also drilling and tapping them.

In the accompanying drawings: Figure 1 is a plan view of my machine. Fig. 2 is a vertical section thereof on the line *t t* of Fig. 1 some of the parts being in elevation. Fig. 3 is an enlarged transverse section thereof on the line *v v* of Fig. 1 looking to the right. Fig. 4 is a vertical section on the line *u u* of Fig. 1 looking to the left. Fig. 5 is a sectional view of detached parts on the line *y y* of Fig. 4, some of the parts being in elevation. Fig. 6 is a vertical section of parts thereof on the line *n n* of Fig. 7. Fig. 7 is a vertical section on the line *x x* of Fig. 1, some of the parts being omitted. Fig. 8 is a vertical section on the line *w w* of Fig. 1. Fig. 9 is a vertical section on the line *s s* of Fig. 7. Fig. 10 is a vertical section on the line *r r* of Fig. 1. Fig. 11 is a detached side elevation of the clutch and worm wheel, and Fig. 12 is a central vertical section of the same on the line *o o* of Fig. 10.

A designates the driving shaft having loosely mounted upon it a worm 13 which is provided with a clutch mechanism hereinafter described for connecting and disconnecting it to and from said shaft. Said shaft is also provided at one end with a worm 14 which engages the worm gear 15 and drives the cam shaft B. Said shaft A is also provided with a beveled gear 16 which engages and drives a like gear 17 on the second driving shaft C. The cam shaft B is also provided with a beveled gear 18 engaging a like beveled gear 19 on the second cam shaft D.

20 designates a chute or hopper in which I stack a series of nut blanks, and opposite the opening at one side of said hopper is an intermittingly rotating head E mounted upon the shaft F. This head is provided with sev-

eral sets of jaws of which the middle jaw 21 is rigidly fixed on said head in a radial position with a V shaped end facing outwardly so that when it stops in front of the hopper as shown in Fig. 3, the V shaped end is in proper position to receive the advanced angular corner of one of the hexagonal nut blanks. The jaw 22 is also fixed in the head and its end is parallel to a radial line of said head, while its side edges by which it is held and guided for adjustment are so inclined to said end face that the outer corner thereof forms an angle of sixty degrees. The moving jaw 23 is of the same shape and is hung upon a swinging arm 24 immediately opposite the jaw 22 and the mechanism hereinafter described is such that this movable jaw is held away from the fixed jaw 22 at a time when the jaws are immediately in front of the bottom nut blank in the hopper. On the opposite side of the hopper is a slide or conveyer 25, the outer end of which is connected by a pin and slot connection to a rocking arm or lever 26. This lever has attached to it a roller projection 27, Fig. 3, which is carried on an adjustable arm 28 pivoted to said lever 26 and made adjustable to change the position of the roller projection 27 by means of the set screw 29. Said roller projection is acted upon by the cam 30 on the cam shaft B so as to move said conveyer and force the bottom nut blank from the hopper in between the jaws on the head. This lever 26 is moved in the reverse direction by the spring 86 after it is released by the cam 30.

Transversely through the head E is a cam shaft carrying the cam 31, Fig. 3, at the end nearest the movable jaw, while its opposite end carries the rocker arm 32 as shown on the other side of said head in Fig. 4. The slide 33, Fig. 4, is arranged in suitable ways in the frame connected by a pin and slot connection with the lever 333, which lever is acted upon by the cam 34 on the cam shaft B to move the slide 33 against one end of the rocker arm 32 and rock the cam 31 for forcing the movable jaw upon the nut blank. This cam is so shaped that when the jaw is closed the pressing point of the cam is so nearly radial as to make said cam retain its grip until it is withdrawn by force. When the cam 34 disengages said lever, the spring 35, Figs. 3 and 4, returns it to its normal position. A stationary

backer or table 37 lies immediately by the side of the jaws that are thus presented to the hopper. The drill spindle 38 is now advanced to drill a hole in the nut blank. This drill spindle is best shown in Fig. 9. A lever 39 is pivoted to the frame by one end, while its upper end carries a shipper 40 for connecting it with the drill spindle and its lever is acted upon by the cam 41 on the cam shaft D for drilling a hole through the blank. The drill spindle is moved back again by means of a lever 42 actuated by a spring 43, Fig. 1, to force said lever 42 against the lever 39. In addition to the drill spindle and the parts thus described for operating it, I employ a guide or pick off 43^x which is mounted upon a slide 44 in the frame (see Figs. 1 and 9) and actuated in one direction by the cam 45 of the cam shaft B acting on the lever 46 which lies between said cam and slide, and in the opposite direction by means of the spring 47, Fig. 1, whereby said guide or pick off is firmly pressed on the nut under the influence of said cam until the drill is well started after which the guide or pick off is removed out of the way of the nut by means of the spring 47, but still leaving it in a position to act as a pick off when the drill withdraws. Its first action is that of a guide to start the nut in its proper position in the head, then to hold the nut and guide the drill at its start, and lastly to act as a pick off when the drill retreats. It is evident that its first action would be the same if the adjacent drill spindle were not supplied with a drill. The cam 30 acts to hold the conveyer against the nut during the drilling operation.

48 designates a clutch lever or latch having a lateral projecting arm 49 which is operated upon by means of the projection or cam arm 50 on the shaft D at each revolution of said shaft to withdraw this latch from the projecting part of the clutch pin 51. As in ordinary clutches of this class, the spring 52 of said clutch pin moves longitudinally to engage a lug or projection 53, Fig. 12, in the hub or collar 54 that is rigidly secured to the shaft D. This clutch pin passes through the hub of the worm 13, whereby said worm is temporarily connected with the shaft A and carried one revolution whenever said pin is released from the clutch latch 48 and then disconnected and stopped at the end of one revolution as in an ordinary power press. In thus revolving the worm 13, it acts upon the pin wheel 55 for imparting one quarter of a revolution to the shaft F and its head E, thereby bringing the nut from the point in front of the drill upwardly between the stationary backer 56 and the side dressing tool and spindle 57. As arranged this dressing tool is for dressing the rounded side of the nut, or as it is called in shop parlance, crowning the nut. This dressing spindle 57 is provided with an ordinary shipper 58 by which it is connected to one end of the lever 59 for being actuated by the cam 60 to move the dressing spindle

forward, while a spring 61, Fig. 1, moves this dressing spindle in the return direction. The clutch of the worm is now again thrown into action to revolve the head another one quarter of a revolution and to stop it, thereby carrying the nut to a point between the movable backer 62, Figs. 1 and 6, and the dressing tool and spindle 63, Figs. 1 and 2. This dressing spindle 63 is in like manner connected by means of a shipper to a lever 64 which is operated to press the dressing spindle forward by means of the cam 65 on the shaft B and returned by means of the spring 66, Fig. 1. The movable backer 62 is connected by a slide 633 with the cam 644 of the shaft D for moving this slide and backer into their position against the nut, while said slide and backer are withdrawn by means of the spring 655 as shown in full lines in Fig. 1 and broken lines in Fig. 6. By the means before described, the intermittently revolving head is carried another one quarter of a revolution and the nut which we are following stopped between the second movable backer 67, Figs. 2 and 6, on the slide 633 before described, and the tap 68 on the sliding spindle 69. This spindle is connected by means of an ordinary shipper to the lever 70, Fig. 2, which lever is connected by means of a link or bar 71 with the lever 72, one end of said lever being operated upon by the yielding cam 73 of the shaft D to move the spindle and tap forward for pressing it into the nut. The threaded portion of the tap is made larger than its shank so that the nut may run over the body of the tap upon said shank. At the proper time, the rigid cam 74 on the shaft D engages the second arm 75 of the lever 72 and thereby moves the tap and its spindle back out of the way of the head leaving the nut on the shank of the tap. It should be noted that the movable backers and two spindles are upon one side of the head while the stationary backer and other two spindles are on the opposite side of said head so that the nut is operated upon from opposite sides.

Although I have followed but one nut through the machine, each of the operations which I have described are performed at different points in the revolution of the head so that after the head has made one revolution these operations are simultaneously being performed at different points on the head. When the nut is brought into position in front of the tap and before the tapping is quite complete, the lever 76, Figs. 3 and 4, is acted upon by the cam 77 of the shaft B to press its end up against one end of the rocker arm 32 for rocking said arm and the connected cam 31, so as to release the pressure of the movable jaw upon the nut and permit the nut to be taken upon the shank of the tap. This lever 76 is returned by means of the spring 78.

The slide 33 before described acts upon one end of the rocker arm 32 to move the cam for closing the jaws while the lever 76 acts upon

the opposite end of said rocker arm to move the cam for releasing the jaws. As shown the end of the slide comes in contact with the end of the screw 90 of the rocker arm 32, but said screw when once adjusted practically becomes a part of said arm.

Upon the shaft D there is a cam 79 which acts upon one end of an angle lever 80 to depress the lever 81 and withdraw the locking arm 82 from one of the notches 83 in the pin wheel 55 (see Fig. 7). The head is given its motion at a time when this locking arm is withdrawn and as the lever 80 is released by this cam, and the head completes each quarter revolution the spring 84 lifts the lever 81 and locking arm 82 to lock the pin wheel and head in place during the operations that are performed on the nuts while the head is at rest.

The spindles 38 and 57 are rotated by means of the gear wheel 87 on the shaft C and connecting gearing clearly shown in Figs. 1, 2, 3 and 8 while the spindles 63 and 69 are driven by the gear wheel 88 on the same shaft and connecting gearing as shown in Figs. 1, 2 and 4, but the particular means for giving rotary motion to these spindles is not material to my invention.

The swinging arms 24 that carry the movable jaws 23 are forced toward the cams 31 by the springs 89, Fig. 3, and all of the jaws for carrying the nuts in the head are made adjustable by means of screws as will readily be understood without further explanation by an inspection of Fig. 3.

While I have described my machine as arranged for drilling, facing and tapping the nuts, it is evident that the machine may be used for facing and tapping punched nuts or previously drilled nuts, if desired, the other operations remaining unchanged, or it may be used for facing alone, and therefore after showing and describing the construction and mode of operation of my machine, I wish it to be understood that the parts or combinations pointed out in any one of the several claims are not necessarily dependent upon the specific construction of those parts which are not particularly pointed out in the same claim.

The finish or shape of the nuts may be varied at pleasure by supplying the various spindles with different tools.

I claim as my invention—

1. The combination of the intermittingly revolving head, a series of nut holding jaws mounted on said head, the hopper, the conveyer 25, the cam for holding the nut conveyed by said conveyer to said jaws, a backer covering one broad side of the nut between said jaws during their period of rest in front of said conveyer and a tool spindle on that side of the nut which is opposite said backer for operating on the nut while thus held, substantially as described and for the purpose specified.

2. The holding jaws 21, 22 and 23, the middle one of which has a V shaped end while

the other jaws are arranged at an angle of sixty degrees to the middle longitudinal line of said middle jaw and have their ends parallel thereto, substantially as described and for the purpose specified.

3. The combination of the intermittingly revolving head, a series of nut holding jaws mounted thereon, a hopper having a side opening which faces the edge of said head, a reciprocating conveyer moving to and from the jaws in the edge of said head and operating mechanism for said head and conveyer, substantially as described and for the purpose specified.

4. The combination of the head having holding jaws, the cam 31 for moving one of said jaws, the rocker arm connected with said cam with its opposite ends projecting in opposite directions therefrom and mechanisms for acting upon the opposite ends of said rocker arm for moving said cam in reverse directions, substantially as described and for the purpose specified.

5. The combination of the head, the nut holding jaws carried thereby, the swinging arm pivoted by its inner end to said head and carrying the moving one of said jaws at its outer end and the cam 31 mounted in said head between the fulcrum of said arm and said moving jaw for pressing upon the body of said arm to close the jaws and hold them closed while the head moves, substantially as described and for the purpose specified.

6. The combination of the intermittingly revolving head having nut holding jaws, the guide or pick off on one broad side of said head, a backer upon the opposite broad side of said head and operating mechanism, substantially as described and for the purpose specified.

7. The combination of the intermittingly revolving head, a series of nut holding jaws mounted on said head, the hopper, the conveyer 25, the cam for operating the jaw for holding the nut conveyed by said conveyer to said jaws, a backer covering one broad side of the nut between said jaws during their period of rest and a guide as 43^x on that side of the nut which is opposite said backer, substantially as described and for the purpose specified.

8. The combination of the intermittingly revolving head, having nut holding jaws, a stationary backer upon one side of the nut as held in the jaws of said head, a tool carrying spindle on the other side of said nut immediately opposite said backer, a movable backer on the broad side of the head opposite said stationary backer, a tool carrying spindle immediately opposite said movable backer and operating mechanism, substantially as described and for the purpose specified.

9. The combination of the intermittingly revolving head having nut holding jaws, the tapping spindle, a yielding cam and connecting devices for moving said spindle longitudinally to its work and a rigid cam for giving

the return motion thereto, substantially as described and for the purpose specified.

10. The combination of the intermittingly revolving head having nut holding devices, a dressing tool and spindle on one side of the nut as held by said head for dressing one broad side of said nut, the tapping spindle on the same side of said nut, the movable backer opposite said tapping spindle and operating mechanism, substantially as described and for the purpose specified.

11. The combination of the intermittingly revolving head having nut holding jaws, the drill spindle and guide or pick off on one broad side of said head, a backer upon the opposite broad side and operating mechanism, substantially as described and for the purpose specified.

12. The combination of an intermittingly revolving head having nut holding jaws, mechanism for conveying nut blanks to the jaws in said head, dressing tools and spindles on the opposite broad sides of said head, a tapping

tool and spindle for threading the hole in the nut and operating mechanism, the arrangement and location being substantially as described and operating to automatically receive and hold the blanks in the head and while so held present them consecutively to said dressing and tapping tools for dressing their opposite faces and threading their holes and then to automatically discharge them from said head as set forth.

13. The combination of the head, a series of spindles for operating upon the work held within said head, the driving shaft A, mechanism for moving said head, clutch devices for connecting and disconnecting said head moving mechanism and shaft, and mechanism for automatically tripping said clutch devices, substantially as described and for the purpose specified.

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