No. 621,418. Patented Mar. 21, 1899.

A. I. JACOBS.

STUD FORMING MACHINE.

(Application filed May 2, 1898.)

(No Model.) 4 Sheets—Sheet 1.

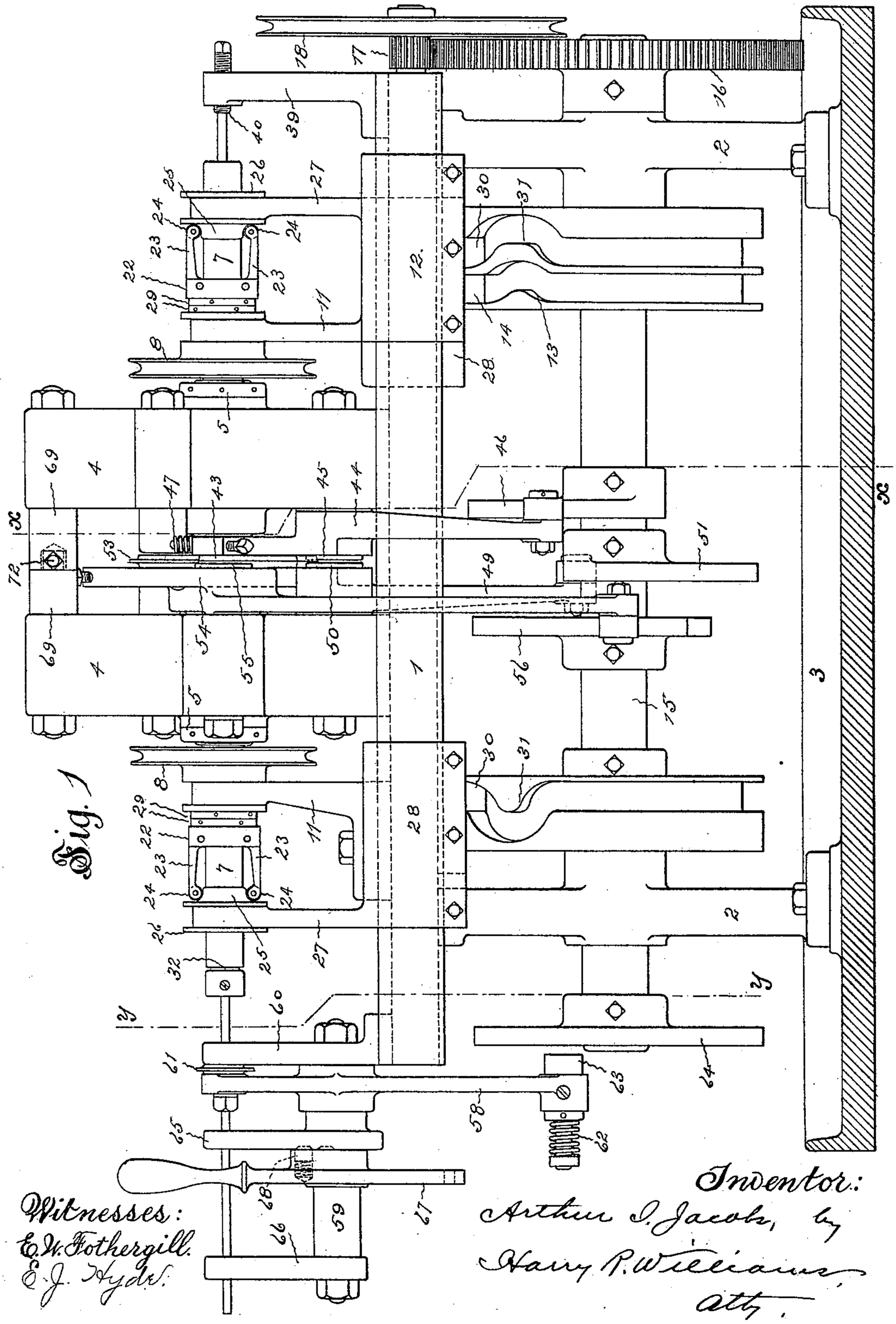

Fig. 1.

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(No Model.) 4 Sheets—Sheet 2.

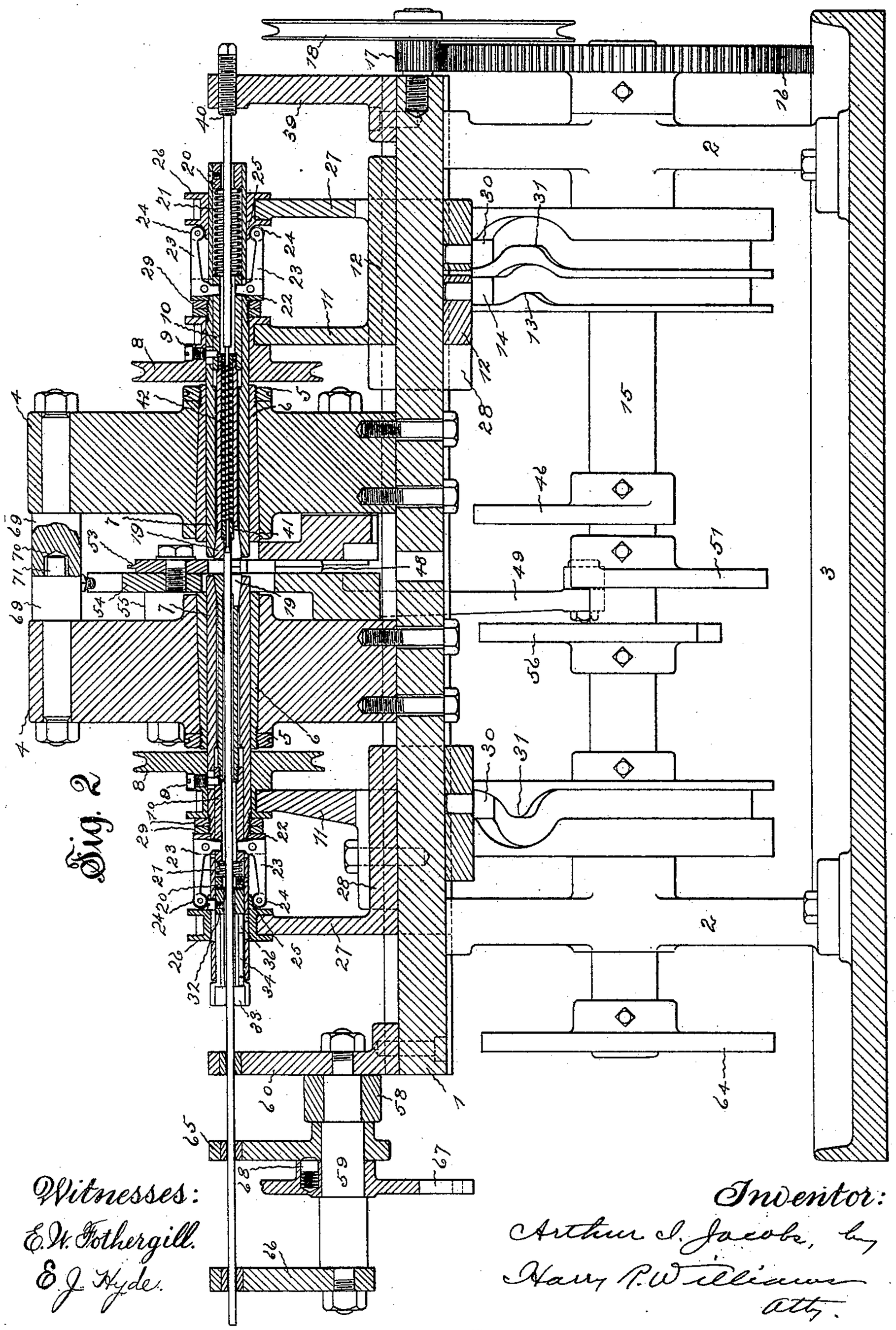

Fig. 2

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(Application filed May 2, 1898.)

(No Model.) 4 Sheets—Sheet 3.

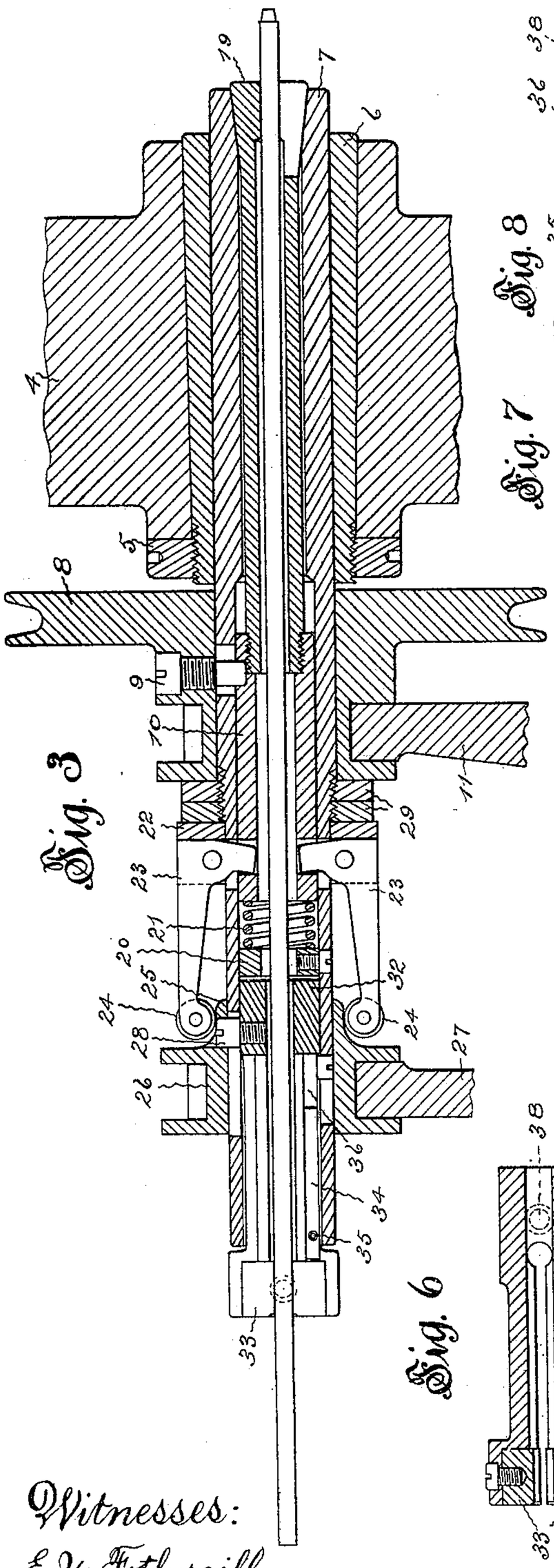

Fig. 3

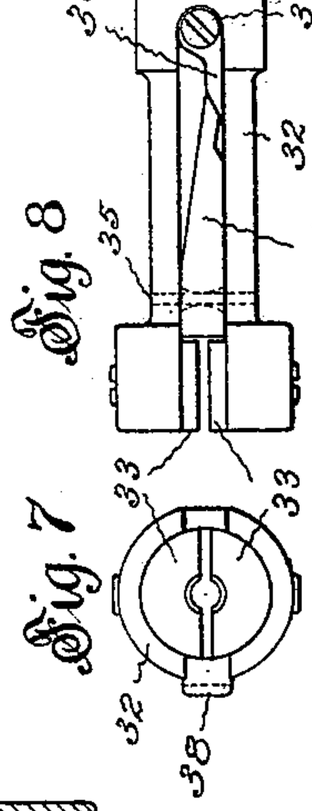

Fig. 8

Fig. 7

Fig. 6

Fig. 4

Fig. 5

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(No Model.) 4 Sheets—Sheet 4.

Fig. 5

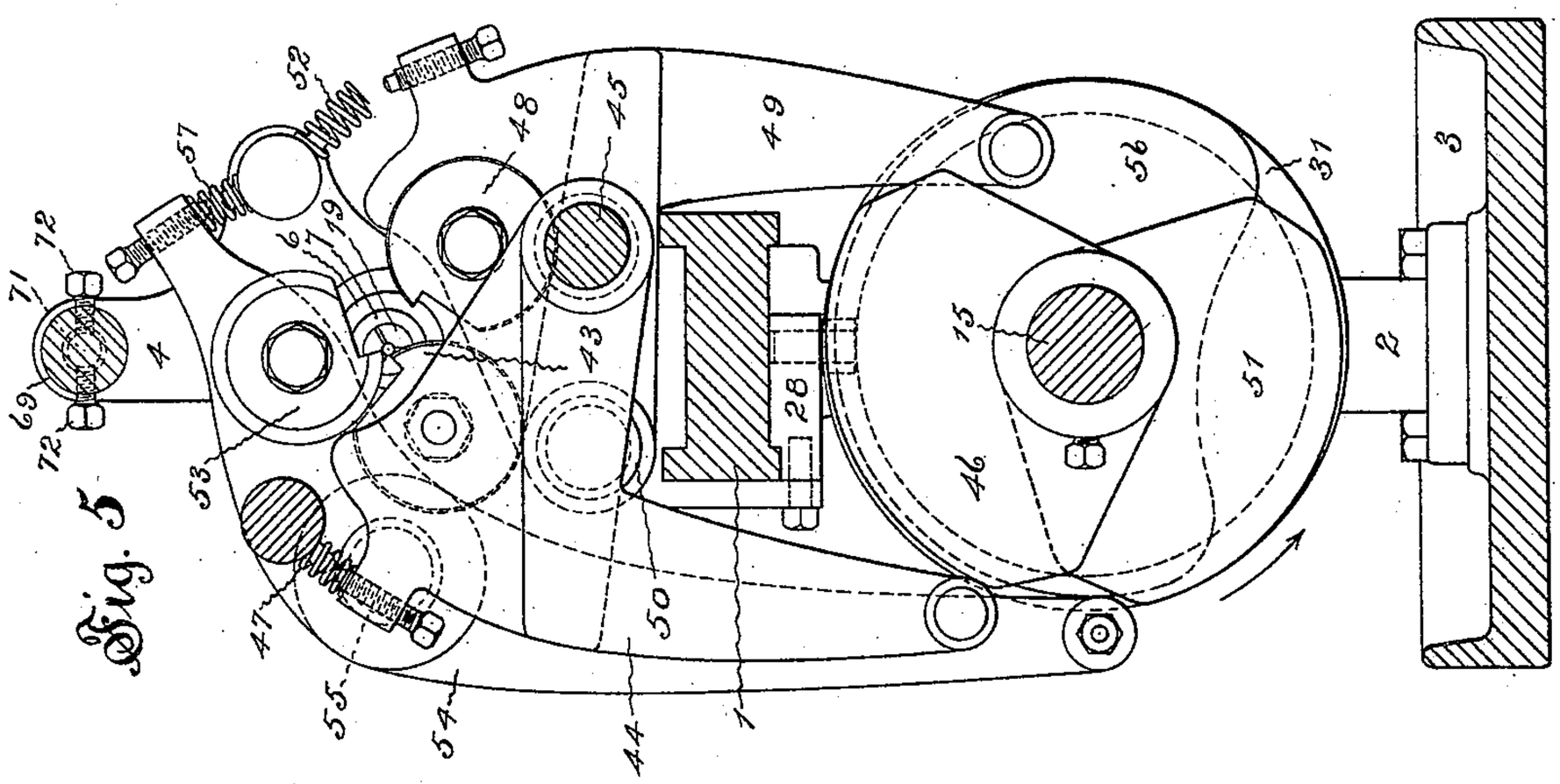


Fig. 9

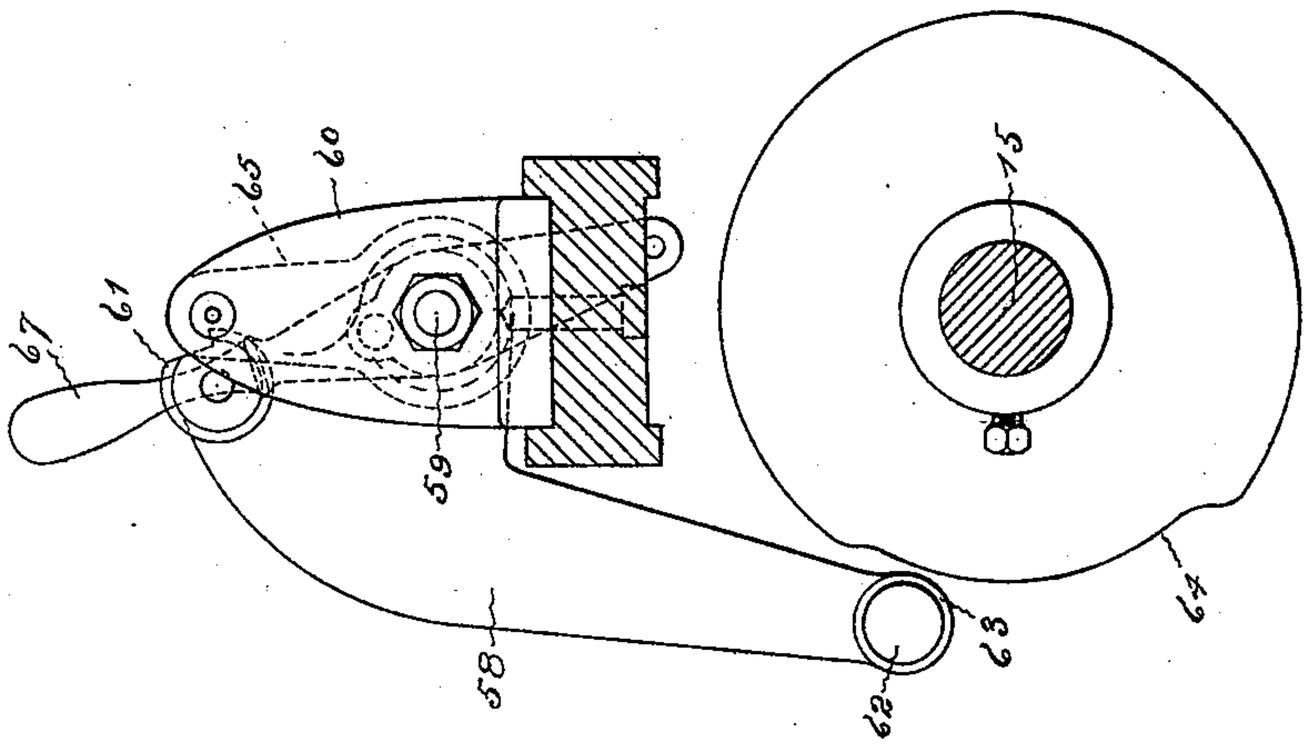
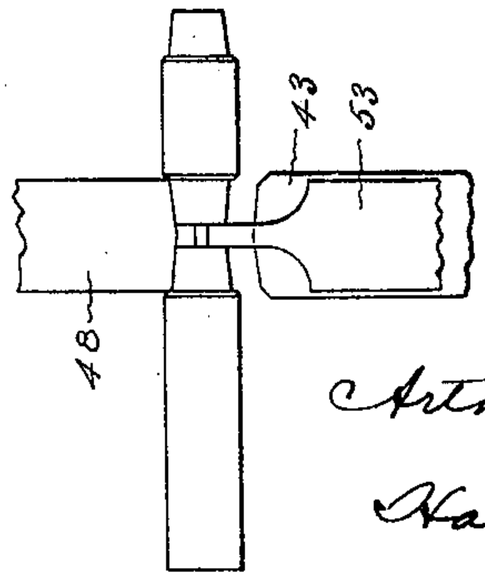


Fig. 10



Witnesses:
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UNITED STATES PATENT OFFICE.

ARTHUR I. JACOBS, OF HARTFORD, CONNECTICUT, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE WIRE GOODS COMPANY, OF WORCESTER, MASSACHUSETTS.

STUD-FORMING MACHINE.

SPECIFICATION forming part of Letters Patent No. 621,418, dated March 21, 1899.

Application filed May 2, 1898. Serial No. 679,447. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR I. JACOBS, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Stud-Forming Machines, of which the following is a specification.

This invention relates to a machine for forming studs from a rod.

The object of the invention is to provide a simple and durable machine which will operate continuously and that will rapidly form finished studs of accurate gage.

The embodiment of the invention that is illustrated and described herein has a feed mechanism that intermittently advances the rod into the path of the forming and severing tools, a rotary chuck-mechanism for grasping and holding the rod while it is being rotated and the tools are being presented, a cut-off that is brought into action for trimming the rod being fed to a length that will contain exactly enough material to form a multiple of studs, so that the last stud formed from the end of the rod will be as accurate as the others, a stop for bringing the mechanisms to rest if the end of the rod is not being watched by the attendant and the cut-off operated to trim the end of the rod, a roughing-tool, a finishing-tool, and a severing-tool for roughly turning down and accurately finishing the rear end of the front stud and the front end of the next stud and for severing from the end of the rod the studs as they are finished, and means for ejecting the finished studs from the chuck-jaws, as more particularly hereinafter described, and pointed out in the claims.

Of the illustrations, Figure 1 shows a front elevation of a machine that embodies the invention. Fig. 2 shows a front elevation, with the upper part cut in section, of the same machine. Fig. 3 shows an enlarged section of the chucking mechanisms on the feed side of the machine. Fig. 4 shows a similar section of the chucking mechanism on the ejecting side of the machine. Fig. 5 shows a transverse sectional view taken on the plane indicated by the dotted line X X of Fig. 1, illustrating the tools and their advancing mechanisms. Fig. 6 shows a section of the feed-grip. Fig. 7 shows an end view of the feed-grip. Fig. 8 shows a side view of the feed-grip. Fig. 9 shows a transverse section taken on the plane indicated by the dotted line Y Y of Fig. 1, illustrating the rod-trimming and the stopping mechanisms; and Fig. 10 shows a view of the roughing, finishing, and severing tools, illustrating the manner in which they form the back end of the front stud and the forward end of a rod.

The bed 1 of the machine illustrated is supported upon standards 2, secured to a base 3 of ordinary shape. Head-blocks 4 are secured to the bed near the middle, and held in perforations in these blocks by adjusting-nuts 5 are split bushings 6, that form the bearings for the hollow spindles 7.

Pulleys 8, that are adapted to be belted to any convenient source of power, are mounted upon the spindles. The hubs of these pulleys are grooved and are fastened by screws 9 to the spindles 7 and to the hollow chuck-carriers 10, that are inside of the spindles, in such manner that the spindles must rotate with but can be moved slightly longitudinally independently of the pulleys, while the chuck-carriers have no movement independently of the pulleys. Engaging the walls of the grooves of the hubs of these pulleys are the forked ends of arms 11, the arm that engages with the hub of the pulley on the feed side of the head-blocks being fixedly secured to the bed, while the arm that engages with the hub of the pulley on the ejecting side of the head-blocks is secured to a slide 12, that is moved at the proper times back and forth along the top of the bed by the engagement of a cam 13 with a roll 14, secured to the slide. The cam 13 is mounted upon the main cam-shaft 15, which is supported by the standards below the bed and which at one end bears a spur-gear 16, that is in mesh with a pinion 17, attached to the driving-pulley 18, Figs. 1 and 2.

Each chuck-carrier supports a split-jaw chuck 19, which has the usual tapering periphery at the jaw end. Between the inner ends of the chuck carriers and collars 20, secured to the inside of the spindles, are spiral springs 21, and as the chuck-carriers are not free to move these springs tend to retract the

spindles and allow the chuck-jaws to normally remain open. Pivotally connected with a collar 22 on each spindle are angle-levers 23. The short arms of these levers pass through slots in the spindles into slots in the chuck-carriers, while the long arms are provided with rolls 24, that are arranged to be engaged and oscillated by cones 25 upon grooved blocks 26, that are engaged by arms 27, secured to slides 28. As the chuck-carriers are held from movement by the engagement of the arms 11 with the pulley-hubs, the oscillation of the levers, which occurs at the proper times, causes the spindles to move against the springs and close the chuck-jaws, in which condition they are shown in the drawings. The spindles are provided with adjusting check-nuts 29 in front of the collars 22 for regulating the positions and movements of the spindles. The slides 28 are moved back and forth along the top of the bed by the engagement with rolls 30, attached to the slides of the cams 31, mounted upon the cam-shaft 15, Figs. 1 and 2.

Fastened to and movable with the block 26 that is on the feed side of the machine is a sleeve 32. This sleeve is split and at the outer end holds the rod-gripping jaws 33. In a mortise in one side of the sleeve is a lever 34, that may be loosely retained in position by a pin 35, and engaging with the beveled end of this lever is a loose wedge 36, provided with a projecting screw-stud 37. The screw 38, that fastens the sleeve to the block 26, extends through a slot in the spindle, so the sleeve may be reciprocated independently of the spindle, and the wedge-stud 37 extends into a slot in the spindle which is slightly shorter than the distance the sleeve moves in feeding the rod. The natural resiliency of the metal of the split sleeve is depended upon to cause the jaws to grip the rod when the sleeve moves forward, and when the rod has been fed sufficiently the stud 37 engages the end of the slot in the spindle and stops. Further movement of the sleeve carries the lever against the wedge, and this causes the lever to oscillate and pry open the jaws. The jaws stay open until the backward movement of the slide causes the engagement of the stud with the other end of the slot and, stopping the wedge, draws the lever from it, so the jaws can spring closed and again grip the rod. In this manner during the forward movement of the sleeve the rod is gripped and fed, while during the backward movement the sleeve is kept from gripping the rod, Figs. 3, 6, 7, and 8.

After the rod has been fed the required distance and the jaws have been opened the block advances still farther to oscillate the angle-levers and cause the spindle to close the jaws of the chuck upon the stock that has been fed forward between them. The slide 28 on the feed side of the machine is moved sufficiently to feed the stock and then to oscillate the levers and close the chuck-jaws, while the corresponding slide at the other end of the machine is only required to close the chuck-jaws, Figs. 3 and 4.

A bracket 39 is secured to the bed on the ejecting side of the machine, and supported by this bracket is a threaded gage 40, that extends through the spindle and chuck-carrier to the chuck-jaws. The feed carries the rod forward until it is stopped in correct position by abutting against the gage, which, being threaded, can be adjusted so as to stop the rod very accurately. The cam 13 moves the slide 12 at the proper time, so as to draw back the spindle, chuck-carrier, and chuck, and as the gage 40 is held from movement any stud that has been severed from the rod and is in the adjacent chuck-jaws is forced out and discharged from the machine as finished. After a finished stud has been thus ejected the slide 12 is moved forward up to the tools to receive the end of the rod, which has been turned so as to form the front end of the next stud. In the chuck on the ejecting side, at the end of gage 40, is a sleeve 41, that is forced by a spring 42 into position to receive and guide the front end of the rod into the ejecting chuck-jaws. This sleeve is more particularly employed for supporting the last stud that is formed from the rod and preventing it from dropping down when it is passed from the chuck on the feeding side of the machine to the chuck on the ejecting side, Fig. 4.

After each forward feed of the rod the tools are advanced to perform their functions. The roughing-tool 43, or that tool which turns down the stock to approximately the finished size, is a circular cutter and is mounted on a lever 44, that is pivoted upon a stud 45, which projects from the head-block on the ejector side of the machine. The lower end of this lever bears a roll that is held in engagement with the roughing-cam 46 on the cam-shaft, which at the proper time oscillates the lever, so that the roughing-cutter is brought into contact with and operates upon the part of the rod that has been fed forward into its path. A spring 47 is utilized to hold the roughing-tool lever back with its roll closely against the cam when it is performing its work. The finishing-tool 48 is a circular cutter that is employed to turn the partially-formed stud to final size and insure studs of accurate gage. This tool is mounted on a lever 49, pivoted upon a stud 50, that projects from the head-block on the feed side of the machine. The lower end of this lever is provided with a roll that is arranged to engage with the surface of the finishing-cam 51, which when the roughing-tool has completed its work oscillates the finishing-tool lever, so that the finishing-tool is moved up to accomplish its work. A spring 52 is employed to hold this lever back with its roll against the cam when the finishing-tool is cutting. The roughing-tool lever 44 and the finishing-tool lever 49 are practically duplicates, and as the cutters are obliged to move

up in the same plane toward the same axis these levers are offset, so that they may be properly pivoted in position without interfering with each other. The severing-tool 53, or that tool which cuts off the finished stud from the end of the rod, is similar in shape to the other tools and is mounted so as to move in the same plane upon the lever 54, that is pivoted upon a stud 55, which projects from the head-block on the feed side of the machine. This lever is provided with a roll that is held in engagement with a cam 56 on the cam-shaft, and a spring 57 holds the lever back with its roll against the cam while it is performing its work of severing a stud from the rod, Fig. 5. These tools move between the head-blocks in the same vertical plane and toward a common axis, the severing-tool commencing about the time the roughing-tool begins and ending about the time the finishing-tool completes its cut. The roughing and finishing tools are shaped to cut the adjacent ends of two studs, and when the severing-tool has completed its work the part that is severed from the rod is an accurately, finished stud, Fig. 10.

In order that the last stud shall be just the same length as the others and no short stud get into the output of the machine and in order that the cutting may be continuous and one rod made to closely follow another, the back ends of the rods as they are fed are trimmed off, so that the portion that is fed in will be of an exact length sufficient to allow a multiple of even studs to be formed. When the rod is trimmed in this manner, the last stud will be the same length as the others and the first stud of the following rod will be accurately formed. Besides preventing the formation of studs of inaccurate gage, this insures studs of sufficient length being fed to the chuck-jaws to be properly and securely held for the operation of the tools.

A lever 58 is mounted upon an arbor 59, projecting from a bracket 60, secured to the bed outside of the feed-sleeve, and upon this lever a circular cutter 61 is mounted a distance from the severing-tool 53 that is equal to an exact multiple of finished studs and the amount of stock that will be cut away in severing them from the rod. Upon a spring-bolt 62, mounted in the lower end of the lever 58, is a roll 63, and borne by the cam-shaft adjacent to this roll is a cam 64. When the end of the rod that is being fed into the machine nears the cutter 61, the attendant pushes the spring-bolt, so that the roll 63 will be engaged by the cam 64 and the lever caused to oscillate and the cutter to trim off the end of the rod and leave in the machine a portion that can be exactly cut into a number of studs of accurate length. This cam is so timed that the trimming cut is accomplished while the other tools are operating and the rod is held from longitudinal movement, Figs. 1 and 9.

Loose on the arbor 59 is an arm 65, that has a perforation through its upper end in line with the guiding-perforations through the bracket 60 and the bracket 66 at the end of the arbor. Mounted on the arbor is a lever 67, that at one end has a handle and at the other end a perforation for the attachment of a cord or other connections which may be used to connect the lever with any ordinary form of belt-shifter that is so arranged with a weight or spring that it tends at all times to throw the belt from the driving-pulley to a loose pulley. The lever 67 is provided with a spring-plunger 68, that is adapted to engage with a recess in the arm 65, and thus the strain of the belt-shifting device is transmitted to this arm. As long as a piece of rod is passing through the perforations in the guiding-brackets and through the perforation in the arm the latter cannot move, and thus of course the belt-shifting device is held against movement. Should the end of the rod that is being fed through these perforations into the machine pass through the perforation in the end of the arm 65, leaving the arm free, there will be nothing to prevent the belt-shifter from throwing the belt from the driving-pulley to a loose pulley, and thus stopping the machine. By means of this mechanism if the attendant is not at hand to trim off the end of the rod that is being fed and supply another rod to be fed the machine will be stopped before the end of the first rod is fed past the trimming-cutter. If the attendant is watching and inserts another rod closely behind the front rod that is nearly used up, the arm will not become free to allow the belt-shifter to be thrown and stop the machine. When the attendant is thus occupied feeding the machine, he causes the trimming-cutter to operate and cut the back end of the forward rod for the purpose of obtaining the exact length from which a multiple of studs can be formed, as previously explained, Figs. 1, 2, and 9.

To insure the exact alinement of the chucks and the accurate operations of the turning and severing tools, provision is made for springing the head-blocks. At the top the head-blocks are provided with hubs 69, one of which has a recess 70 and the other a tenon 71, that is slightly smaller than the recess into which it projects. Turning in threaded sockets in the hub that is recessed and bearing against the opposite sides of the tenon on the other hub are stud-bolts 72. By regulating these bolts the head-blocks may be sufficiently sprung to correctly aline the chucks and insure perfect work, Figs. 1, 2, and 5.

A rod of stock is passed to the feed-jaws, and by the movements of the sleeve to which they are attached advanced into the machine until the front end is presented to the tools. The feed tends to advance the rod a little more than the length of one stud and the amount of material that is used in severing the studs from the rod at each step, so that the rod will surely feed the correct distance. After the tools have operated upon the front

end of the rod the next forward movement of the feed advances the rod until it is stopped by the gage in the chuck on the ejecting side of the machine. After each forward movement of the rod the chuck-jaws are closed by the movements of the hollow spindles and the rod rotated with the spindles and chucks. With the forward end of the rod that has been turned to form one end of the stud held in the chuck on the ejecting side of the machine and the rod a little distance therefrom held by the chuck on the feed side of the machine the roughing-tool is moved up and afterward the finishing-tool, so as to shape the back end of the first stud and the front end of the next stud. At the time these tools are operating the severing-tool is also at work cutting the stud that is being finished from the end of the rod, and this is fully accomplished just after the finishing-cutter has completed its work. Then as the chucks are opened by the reverse movement of the spindles the chuck and spindle on the ejecting side are given a slight backward movement, and the completed stud being held from movement with the chuck and spindle by the gage drops from the chuck-jaws. The chuck and spindle that have thus dropped the finished stud are then moved forward to receive the front end of the rod, and after receiving it the chucks are closed and the cutters again caused to operate. These operations are repeated until the rod is completely used up. As the rod has been trimmed so as to be the correct length, the last end will be formed into a stud of exact gage. The piece of rod that has been fed past the feed mechanism is advanced by the next rod that is fed to the machine. The spring-sleeve at the end of the gage guides the short end of the rod into the chuck on the ejecting side of the machine, so the last stud will be properly held. This guiding-sleeve is thrust forward by the spring to receive the tenon that has been turned on the front end of the end piece. If it were not for this guiding-sleeve, the end piece might drop down when it passed from the chuck on the feed side of the machine and not be properly grasped by the chuck on the ejecting side. When the end piece is properly grasped by the chuck on the ejecting side, the next action of the tools forms studs in the same manner as from a long rod, the severing-tool, however, making its cut at the junction and taking a portion off from the back end of the front rod and the front end of the following rod.

This machine finishes studs from rods, which are easy to handle, as continuously and accurately as if the stock were fed from a continuous coil. The parts are so arranged that the mechanisms operate rapidly and surely, and they can be adjusted to turn each stud to exact gage. Both the first and last studs of the rod will be as accurate as the others, so that the output will be uniform and can be packed into boxes or thrown into hoppers for use in other machines without further inspection. The roughing-tool accomplishes the bulk of the turning, and as the finishing-tool is required to do but little work it will remain sharp and finish the studs accurately. The movements of the hollow spindles for closing the chuck-jaws obviate any liability of accidental movement of the stock from exact position after it has been fed and is being clamped by the chuck-jaws. Besides obviating the chance of having short studs in the output the trimming off of the rod eliminates all danger of destruction of chuck-jaws, which would be liable to occur if short pieces that perhaps might not be properly held by the chuck-jaws were allowed to pass into position to be operated upon by the tools.

I claim as my invention—

1. In a stud-machine, in combination, a bed, head-blocks secured to the bed, a hollow spindle loosely supported by each block, a hollow chuck loosely supported within each spindle, means for rotating the spindles and chucks together, means for reciprocating both of the spindles independently of the chucks, mechanisms for holding the chuck on the feed side of the machine against longitudinal movement, mechanisms for moving together longitudinally the chuck and the spindle on the ejecting side of the machine, a stationary gage-rod extending within the longitudinally-movable chuck, mechanisms for feeding a rod to the chucks, tools located between the blocks for turning down the rod and severing the studs, and mechanisms for moving the tools, substantially as specified.

2. In a stud-machine, in combination, a bed, head-blocks secured to the bed, reciprocating and rotating hollow spindles supported by the blocks, rotating hollow chucks within the spindles, mechanisms for feeding a rod to the chucks, adjustable connections between the blocks whereby the axes of the chucks which they support may be alined, a roughing-tool, a finishing-tool and a severing-tool movable in the same vertical plane between the blocks toward and from the axes of the chucks, and mechanisms for moving the tools, substantially as specified.

3. In a stud-machine, in combination, a bed, head-blocks secured to the bed, reciprocating and rotating hollow spindles supported by the blocks, a rotating hollow chuck within one spindle and held against longitudinal movement, a rotating hollow chuck within the other spindle and arranged to be given a reciprocation, a stationary gage located within the reciprocating chuck, mechanisms for feeding a rod to the chucks, a roughing-tool, a finishing-tool and a severing-tool movable in the same vertical plane between the blocks toward and from the axes of the chucks, and mechanisms for moving the tools, substantially as specified.

4. In a stud-machine, in combination, a bed, head-blocks secured to the bed, a hollow spin-

dle loosely supported by each block, a hollow chuck loosely supported within each spindle, means for rotating the spindles and chucks together, means for reciprocating both of the spindles independently of the chucks, mechanisms for holding the chuck on the feed side of the machine against longitudinal movement, mechanisms for moving longitudinally the chuck on the ejecting side of the machine, a stationary gage-rod adjustably held so as to extend within the longitudinally-movable chuck, a centering-sleeve in the longitudinally-movable chuck, mechanisms for feeding a rod to the chucks, tools located between the blocks for turning down the rod and severing the studs, and mechanisms for moving the tools, substantially as specified.

5. In a stud-machine, in combination, a bed, head-blocks secured to the bed, a hollow spindle loosely supported by each block, a hollow chuck loosely supported within each spindle, means for rotating the spindles and chucks together, means for reciprocating both of the spindles independently of the chucks, mechanisms for holding the rotating means and the chuck on the feed side of the machine against longitudinal movement, mechanisms for moving together axially the chuck, the spindle and the rotating means on the ejecting side of the machine, a stationary gage-rod adjustably held so as to extend within the longitudinally-movable chuck, mechanisms for feeding a rod to the chucks, tools located between the blocks for turning down the rod and severing the studs, and mechanisms for moving the tools, substantially as specified.

6. In a stud-machine, in combination, a bed, head-blocks secured to the bed, a hollow spindle loosely supported by each block, a hollow chuck loosely supported within each spindle, means for rotating the spindles and chucks together, springs for moving the spindles from each other, levers for moving the spindles toward each other independently of the chucks, wedge-blocks for oscillating the levers, slides for moving the wedge-blocks, mechanisms for feeding a rod operated by one of the slides, tools located between the blocks for turning down the rod and severing the studs, and mechanisms for moving the tools, substantially as specified.

7. In a stud-machine, in combination, a bed, head-blocks secured to the bed, a hollow spindle loosely supported by each block, a hollow chuck loosely supported within each spindle, mechanisms for rotating the spindles and chucks together, springs for moving the spindles from each other, levers for moving the spindles toward each other independently of the chucks, wedge-blocks for oscillating the levers, slides for moving the wedge-blocks, a feed-tube connected with one of said slides, a stationary gage-rod adjustably held so as to extend within one of the chucks, a slide connected with the chuck in which the gage is located, means for reciprocating the latter slide, tools located between the blocks for turning down the rod and severing the studs, and mechanisms for moving the tools, substantially as specified.

8. In a stud-forming machine, in combination, a bed, head-blocks secured to the bed, reciprocating and rotating hollow spindles supported by the blocks, a rotating hollow chuck within one spindle and held against longitudinal movement, a rotating hollow chuck within the other spindle and arranged to be given a reciprocation, a stationary gage within the reciprocating chuck, a centering-sleeve located in the reciprocating chuck about the end of the gage, a spring for forcing the centering-sleeve forward, mechanisms for feeding a rod to the chucks, tools located between the blocks for turning down the rod and severing the studs, and mechanisms for moving the tools, substantially as specified.

9. In a stud-machine, in combination, a bed, head-blocks secured to the bed, reciprocating and rotating hollow spindles supported by the blocks, rotating hollow chucks within the spindles, mechanisms for feeding a rod to the chucks, a roughing-tool, a finishing-tool and a severing-tool movable in the same vertical plane between the blocks toward and from the axes of the chucks, mechanisms for moving the tools, a cutter movably supported by the bed a distance from the severing-tool equal to the length of stock necessary to form a multiple of finished studs, and means for bringing the cutter into operation for trimming off the end of the rod, substantially as specified.

10. In a stud-forming machine, in combination, a bed, head-blocks secured to the bed, reciprocating and rotating hollow spindles supported by the blocks, rotating hollow chucks within the spindles, mechanisms for feeding a rod to the chucks, a roughing-tool, a finishing-tool and a severing-tool movable in the same vertical plane between the blocks toward and from the axes of the chucks, mechanisms for moving the tools, and a movable arm adapted to be connected with a belt-shifter, supported by the bed and normally held from movement by engagement with the rod that is being fed, substantially as specified.

11. In a stud-forming machine, in combination, a bed, head-blocks secured to the bed, reciprocating and rotating hollow spindles supported by the blocks, rotating hollow chucks within the spindles, mechanisms for feeding a rod to the chucks, a roughing-tool, a finishing-tool and a severing-tool movable in the same vertical plane between the blocks toward and from the axes of the chucks, mechanisms for moving the tools, a lever movably supported by the bed, a cutter borne by the lever a distance from the severing-tool equal to the length of stock necessary to form a multiple of studs, and a cam for oscillating the lever and for bringing the cutter into operation for trimming off the end of the rod that is being fed, substantially as specified.

12. In a stud-forming machine, in combination, a bed, head-blocks secured to the bed, reciprocating and rotating hollow spindles supported by the blocks, rotating hollow chucks within the spindles, mechanisms for feeding a rod to the chucks, a roughing-tool, a finishing-tool and a severing-tool movable in the same vertical plane between the blocks toward and from the axes of the chucks, mechanisms for moving the tools, a cutter movably supported by the bed a distance from the severing-tool equal to the length of stock necessary to form a multiple of studs, means for bringing the cutter into operation for trimming off the end of the rod that is being fed, and a movable arm adapted to be connected with a belt-shifter, supported by the bed and normally held from movement by engagement with the rod that is being fed, substantially as specified.

13. In a stud-machine, in combination, a bed, head-blocks secured to the bed, a hollow spindle loosely supported by each block, a hollow chuck loosely supported within each spindle, mechanisms for rotating the spindles and chucks together, means for reciprocating both of the spindles independently of the chucks, mechanisms for holding the chuck on the feed side of the machine against longitudinal movement, mechanisms for moving together longitudinally the chuck and the spindle on the ejecting side of the machine, a stationary gage-rod extending within the longitudinally-movable chuck, and mechanisms for feeding a rod to the chucks, substantially as specified.

14. In a stud-machine, in combination, a bed, head-blocks secured to the bed, reciprocating and rotating hollow spindles supported by the blocks, rotating hollow chucks within the spindles, mechanisms for feeding a rod to the chucks, a tool movable between the blocks toward and from the axes of the chucks, mechanisms for moving the tool, a cutter movably supported by the bed a distance from the tool equal to the length of stock necessary to form a multiple of finished studs, and means for bringing the cutter into operation for trimming off the end of the rod, substantially as specified.

15. In a stud-forming machine, in combination, a bed, head-blocks secured to the bed, reciprocating and rotating hollow spindles supported by the blocks, rotating hollow chucks within the spindles, mechanisms for feeding a rod to the chucks, a cutting-tool movable between the blocks toward and from the axes of the chucks, mechanisms for moving the tool, and a movable arm adapted to be connected with a stopping means, supported by the bed and normally held from movement by engagement with the rod that is being fed, substantially as specified.

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Witnesses:
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E. W. FOTHERGILL.