F. W. McKNIGHT.

PIPE RIVETING MACHINE.

APPLICATION FILED DEC. 16, 1908.

940,608.

Patented Nov. 16, 1909.

2 SHEETS—SHEET 1.

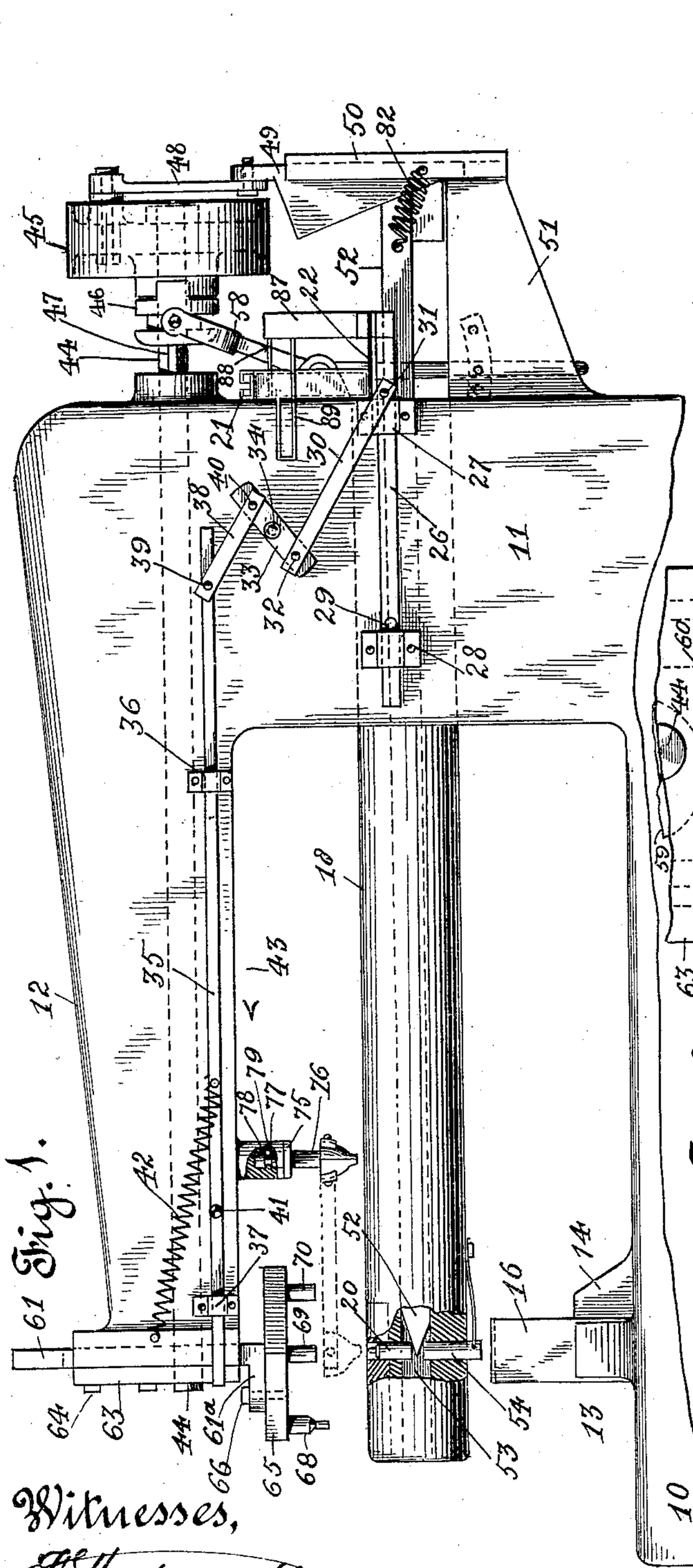

Fig. 1.

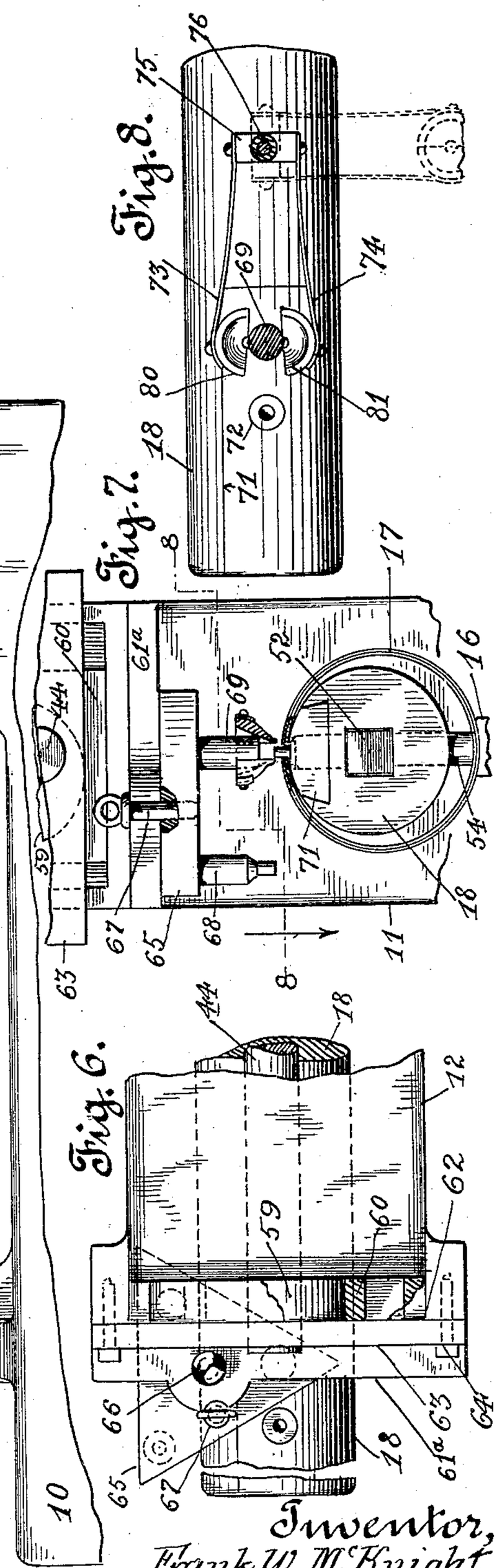

Fig. 7.

Fig. 8.

Fig. 6.

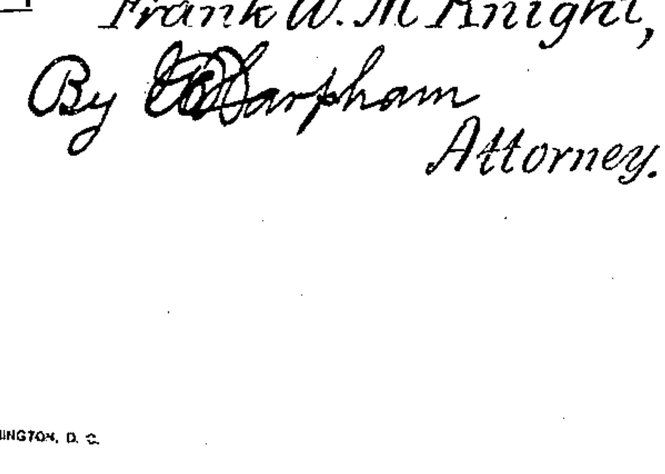

Fig. 5.

Witnesses,

F. E. Montenerdl.

S. B. Gustin.

Inventor,

Frank W. McKnight,

By C. C. Dorpham

Attorney.

F. W. McKNIGHT.

PIPE RIVETING MACHINE.

APPLICATION FILED DEC. 16, 1908.

940,608.

Patented Nov. 16, 1909.

2 SHEETS—SHEET 2.

Fig. 2.

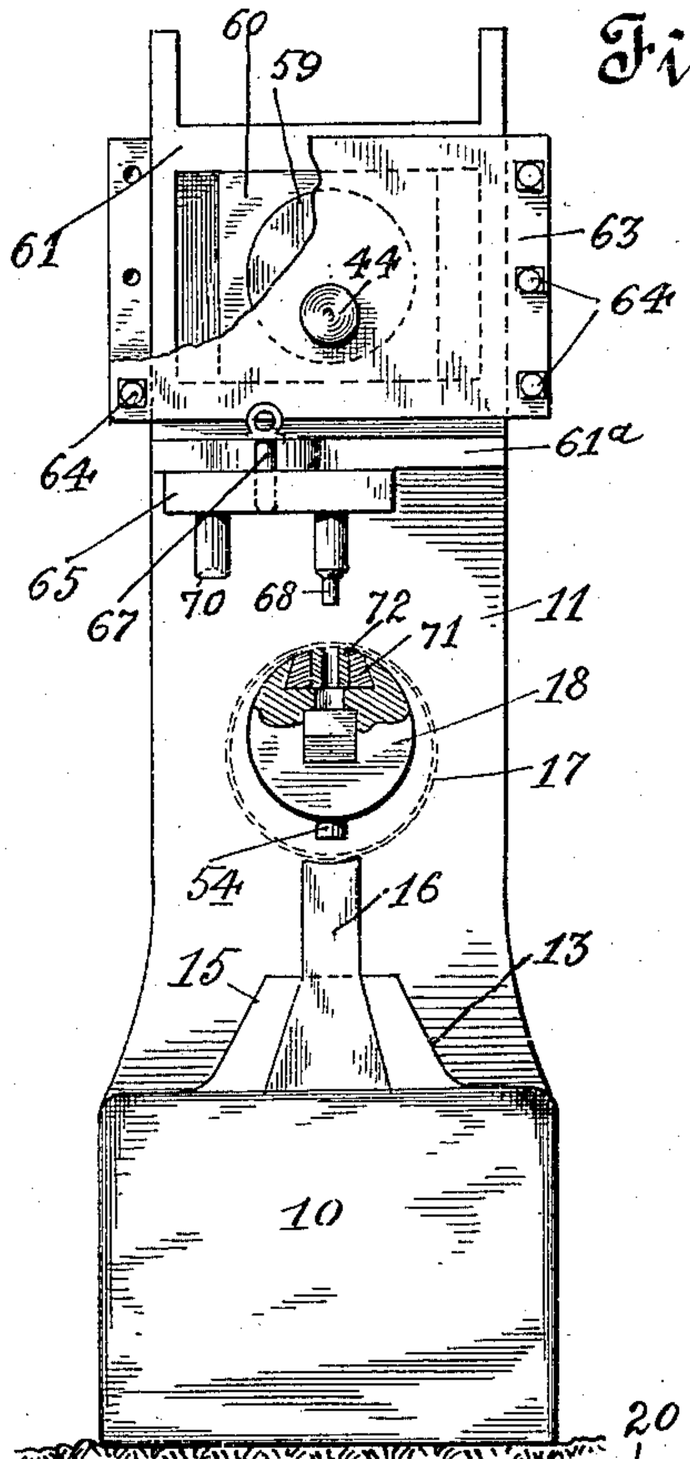

Fig. 3.

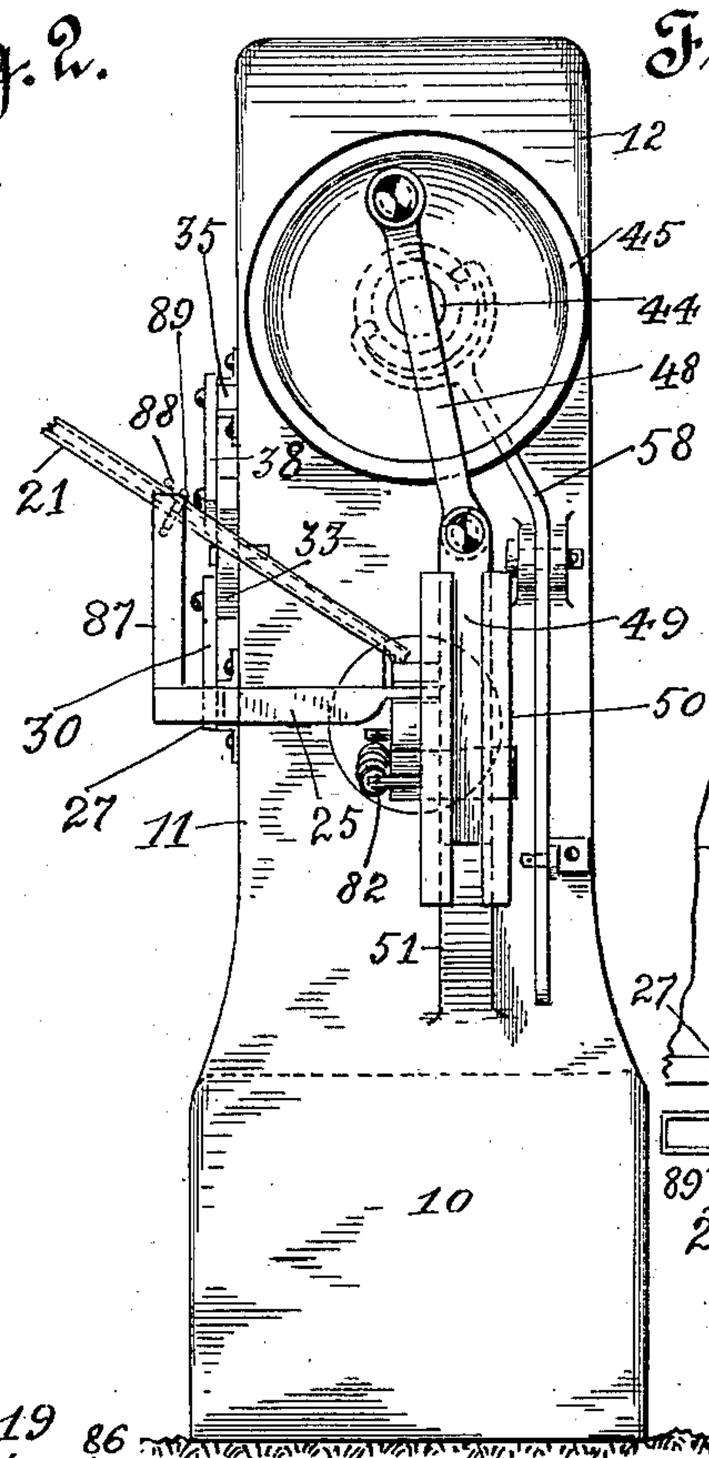

Fig. 9.

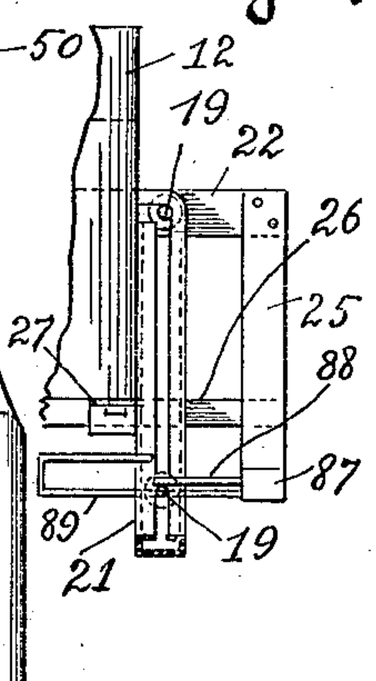

Fig. 4.

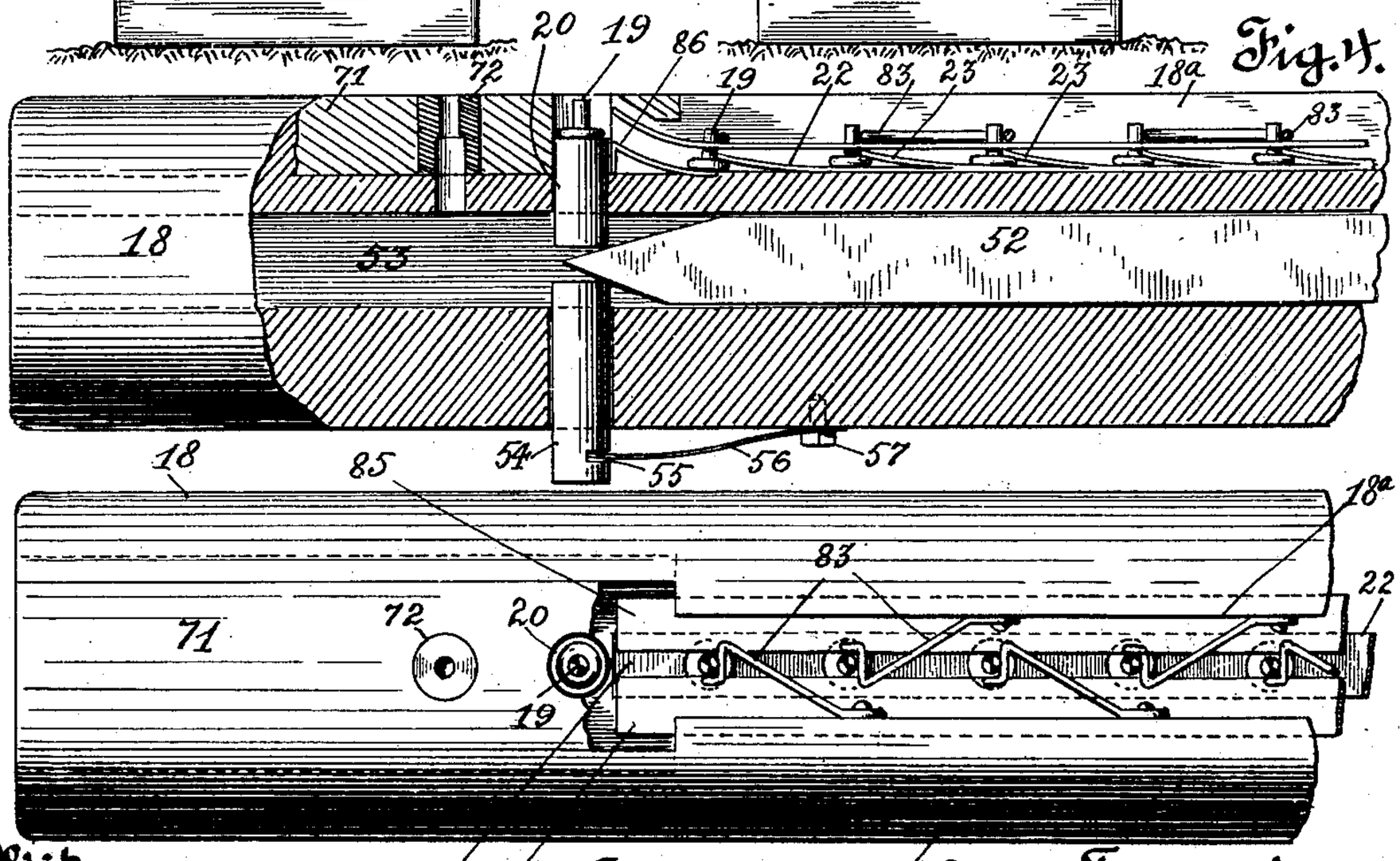

Fig. 5.

Witnesses,

Hollandewerdt.

S. B. Austin.

Inventor

Frank W. McKnight,

By E. B. Orpham

Attorney.

UNITED STATES PATENT OFFICE.

FRANK W. McKNIGHT, OF LOS ANGELES, CALIFORNIA, ASSIGNOR OF ONE-HALF TO J. B. KRIMMINGER, OF LOS ANGELES, CALIFORNIA.

PIPE-RIVETING MACHINE.

940,608. Specification of Letters Patent. **Patented Nov. 16, 1909.**

Application filed December 16, 1908. Serial No. 467,762.

To all whom it may concern:

Be it known that I, FRANK W. McKNIGHT, a citizen of the United States, residing in the city of Los Angeles, county of Los Angeles, and State of California, have invented new and useful Improvements in Pipe-Riveting Machines, of which the following is a specification.

My invention relates primarily to a machine for riveting the round seams of sheet iron or steel pipe, but it may also be used for straight seam work, and the object thereof is to provide a machine that will place the rivets from the inside of the pipe and hold them in position while the outer end of the rivet is headed on the outside of the pipe. I accomplish this object by the machine described herein and illustrated in the accompanying drawings in which;

Figure 1 is a side elevation with parts broken away for clearness of illustration. Fig. 2 is a front elevation with parts broken away and parts in section to show details of construction. Fig. 3 is a rear end elevation. Fig. 4 is a fragmental enlarged detail view of a portion of the riveting mechanism. Fig. 5 is a plan of the parts shown in Fig. 4 with a portion broken away for clearness of illustration. Fig. 6 is a plan of the front portion of Fig. 1. Fig. 7 is a front elevation of a portion of the machine showing a piece of pipe in place ready to be riveted. Fig. 8 is a plan of the outer end of the horn with the parts above the same as shown in Fig. 7 cut on the line 8—8 of Fig. 7. Fig. 9 is a detail of the rivet feeding tube and connected parts.

In the drawings 10 is the base of the machine which is preferably of hollow cast metal. Extending from the rear end of the base is a vertical upright member 11 and to the top of the upright is a forwardly extending top member 12. The base vertical and top member form the frame and are all preferably of cast metal and are preferably cast integral and hollow. Upon the base member and near the front thereof are lugs 13, 14 and 15 which form a dovetailed socket open at the front and top for the reception of the supporting bar 16, which is placed beneath the pipe 17 shown in dotted lines in Fig. 2 and in full lines in Fig. 7 when holes are to be punched or rivets to be headed. The upper surface of the supporting bar is concave to fit the curvature of the pipe which is placed thereon.

In the drawings the smallest sized pipe is illustrated in position in Fig. 7, and when larger sized pipe is used in the machine a shorter supporting bar would be used. Secured to the vertical member of the frame and extending forwardly and parallel with the base member is the horn or mandrel 18 which is provided with a conduit or channel 18^a through which rivets 19 are conveyed and delivered upon the placing bar 20. The rivets are placed by hand in a feeding tube 21 down through which they slide by gravity and are delivered one at a time upon the feed bar 22. This feed bar is preferably formed of a flat strip of spring steel to which are secured on the upper side thereof wings 23, the free ends of which project above the body so as to receive the head of the rivet thereunder as best shown in Fig. 4. These wings are spaced apart the distance that the feed bar is reciprocated at each stroke thereof. The feed bar reciprocates in a channel 18^a in the horn. This motion is accomplished by the end bar 25 which is attached at one end of the feed bar and at the other end to the guide bar 26. Guide bar 26 is reciprocated through bearings 27 and 28 which are secured to the side of the frame. It is provided with a stop pin 29 which engages bearing 28 and limits the forward movement thereof.

A link bar 30 is connected by pivot pin 32 to lever 33 which is pivoted by a bolt 34 to the side of the frame. An operating bar 35 is slidably mounted in bearings 36 and 37 secured on the side of the frame. A link bar 38 is pivotally connected by a pivot pin 39 to the operating bar and by pivot pin 40 to lever 33. Operating bar 35 has a handle or knob 41 which also acts as a stop when it contacts with bearing 37. A spring 42 has one end connected to operating bar 35 and the other end to the frame and draws the operating bar in the direction of the arrow 43 when the operator removes his hand from the handle 41, thereby causing the movement of the feed bar toward the rear end of the machine, and leaving it in the position shown in Fig. 4.

Extending longitudinally the top of the frame is the operating shaft 44 on which is loosely mounted pulley 45 to which power

is applied when it is desired to operate the machine. A clutch 46 is slidably mounted on the operating shaft and is rotative therewith. A spline 47 locks the clutch to the shaft. When the clutch is thrown into engagement with the driving pulley it locks the pulley to the shaft and the rotation of the pulley then causes the rotation of the shaft. Pulley 45 carries a pitman rod 48 which is connected to a V-shaped driving block 49 which is vertically movable in guide 50 which is suitably secured by brace 51 to the rear of the frame as best shown in Fig. 1. The driving block contacts with the rear end of an anvil bar 52 which extends longitudinally through a channel 53 in the horn. The front end of the anvil bar is wedge shaped as shown in Figs. 1 and 4 and normally lies with the point thereof between placing bar 20 and steadying bar 54. Steadying bar 54 is provided with a slot 55 in which is received the free end of a flat spring 56 which is secured to the horn by a screw 57. A clutch shifter 58 throws the clutch into or out of engagement with pulley 45. On the front end of the operating shaft and eccentrically secured thereto is a cam 59 on which is mounted a slide block 60. This slide block is moved by the cam transversely the front of the frame and carries a tool frame 61 which reciprocates vertically in a recess 62 in the front end of the top member of the frame. The tool frame is held in place by a face plate 63 which is bolted to the frame, by bolts 64. To the foot 61[a] of the tool frame is secured a tool head 65 by a bolt 66, said bolt having the lower portion thereof threaded and screwed into the tool head and the portion thereof which passes through the foot of the frame being smooth so that the tool head can be revolved when desired. The tool head is preferably triangular and is provided with one or more holes for the reception of a pin 67 which when in the hole bears against the foot of the frame and locks the tool head against rotation. The tool head carries removable punch 68 and two hammers 69 and 70. The upper surface of the front end of the horn may be provided with a removable die block 71. In this die block is mounted removable punch dies 72 which can be changed as desired for larger or smaller rivets.

It will be understood that the horn will be a little longer than the joints of pipe that are to be riveted together, so that the overlapped ends of the pipe joints can be brought over the punch die and holes may be punched through the overlapped ends. This is accomplished by placing upon the horn a joint of pipe and then forcing into or over the end thereof the next joint of pipe the required distance for the lap. The inside lap is then laid by the use of hammer 69. The tool head is then rotated to bring the punch into register with the punching die. Motion is then imparted to the operating shaft. The rotation of the operating shaft through its connecting mechanism causes the punch to punch one of the necessary holes in the pipe. As the punch recedes the pipe is rotated on the horn to bring it in proper position for the next hole which is punched as the punch again descends. As the punch is descending the anvil bar is moved forward thereby bringing it nearly beneath the punch die and giving the horn a firm support at this point.

As soon as the holes are punched the pipe is moved on the horn to bring one of the rivet holes into register with a rivet which has been fed upon the placing bar by the feed bar. In order to find the position which the rivet hole shall occupy I provide a rivet hole locater which is composed of spring arms 73 and 74 which are secured to a head block 75 mounted on a stud 76 which stud is rotatively mounted in bearing 77 secured to the upper member of the frame. Stud 76 has a groove 78 therein and a pin 79 passes through the bearing and into the groove thereby holding the stud in position and permitting it to revolve. On the front end of the spring arms is a hollow finding cone which is vertically divided, one half 80 of the cone is secured to arm 73, and the other half 81 is secured to arm 74. When the point of the cone is in register with the center of the placing bar the hole in the pipe is brought directly beneath the cone and it is then in position to receive the rivet. The tool head is then rotated to bring hammer 70 directly over the center of the cone. Power is then applied to rotate the operating shaft and the anvil bar is reciprocated between the placing bar and steadying bar thereby forcing the placing bar upwardly and causing the rivet to pass into the rivet hole in the pipe as shown in Fig. 7. The further motion causes the hammer to descend and head the rivet, and as the hammer ascends the anvil bar recedes and the placing bar drops back to the position shown in Figs. 1 and 4. The operator then feeds another rivet upon the placing bar and shifts the position of the pipe so that a new rivet hole is in the position to receive the next rivet, when the operation is repeated until the full joint is riveted. The tool head is then rotated so that hammer 69 may be used to bring down the projecting overlapping edges of the joints into close contact with the adjacent body. During this operation no rivets are fed and the finding cone is moved to the position shown in dotted lines in Fig. 8 and in full lines in Fig. 1.

It will be observed that when riveting is being performed or rivet holes punched, that supporting bar 16, anvil bar 52 and placing

bar 20 and steadying bar 54 form a solid support to the rivet while the hammer is heading down the same. A spring 82, one end of which is secured to guide 50 and the other to anvil bar 52 retracts the anvil bar when driving block 49 is moved upwardly. When larger sized pipes are riveted a shorter supporting bar and a longer steadying bar would be used.

By this construction an efficient riveting machine is produced by means of which round seams are quickly and efficiently riveted with the headed end of the rivet outside of the pipe and the smooth head on the inside of the pipe. If desired straight seaming can likewise be performed with the machine.

Secured to the horn in channel 18[a] are springs 83 which project diagonally across the line of travel of the rivets and then at right angles thereto. These springs lie on alternate sides of the channel and prevent the rivets from any backward movement when the feed bar reciprocates toward the rear of the frame. Guide plates 84 and 85 are secured in channel 18[a] and permit the rivet to pass between them with the head underneath and held in loose contact with the feed bar. A guide plate 86 adjacent to the placing bar guides the rivets upwardly so that the extreme forward reciprocation of the feed bar will cause a rivet to be placed on the top of the placing bar.

The feeding of the rivets one by one upon the feed bar is accomplished as follows: Feeding tube 21 consists of a long tube having a slot in the upper surface through which the body of the rivets will pass. The body of the tube is of the configuration to allow the heads of the rivets to slide easily therethrough with the body projecting through the slot. An upright bar 87 is secured to guide bar 26. This bar carries wire 88 which is a straight wire, and wire 89 which extends below the tube and then crosses back over the feed tube and when the operating bar of the feeding mechanism is in its normal position the end of wire 89 passes across the slot in the feed tube so as to prevent the rivets sliding down the same. When the operating bar is brought to the position shown in Fig. 1 the upper portion of wire 89 is withdrawn from in front of the lower rivet. As it is being withdrawn from in front of this rivet and before the same is completely effected, wire 88 is passed across the slot in the feeding tube and between the lower rivet and the one next above it, so that when wire 89 is withdrawn from in front of the lower rivet, only the lower rivet will slide down the feeding tube and upon the feeding bar. The top portion of the feed tube adjacent to the rear of the machine extends across the feed bar and toward the front of the machine so as to hold the rivet upon the feed bar when the same is being reciprocated rearwardly and to form a stop to prevent the rivets from sliding too far when released by wire 89.

Having described my invention what I claim is:

1. In a pipe riveting machine, a frame; a horn secured to the rear portion of the frame and extending toward the front portion, said horn having an anvil bar channel extending longitudinally therethrough; an anvil bar having a wedge shaped front end, longitudinally movable in the channel in said horn; means to reciprocate said anvil bar in said channel; a feed channel in the top portion of said horn extending from the rear to near the front thereof; a placing bar in the front portion of said horn vertically reciprocal across the front end of the feed channel; and means to feed rivets through said feed channel and deliver the same one at a time upon said placing bar.

2. In a pipe riveting machine, a frame; a horn secured to the rear portion of the frame and extending toward the front thereof, said horn having a feed channel extending longitudinally therein from the rear toward the front portion thereof; a placing bar in the front portion of said horn and vertically movable therein to reciprocate across the front end of the feed channel; a feed bar longitudinally movable in said feed bar channel; spring wings having the free ends thereof separated from the body of the feed bar and having the rear ends thereof secured to the feed bar; springs secured to the horn and extending obliquely across the feed bar toward the front of the machine, and then turning at right angles across the center of the same, and then toward the front, said springs being alternately placed on opposite sides of the feed bar channel; and means to reciprocate said feed bar in said channel.

3. In a pipe riveting machine, a frame; a horn secured to the rear portion of the frame and extending toward the front thereof; said horn having a feed channel extending longitudinally therein from the rear to the front portion thereof, and an anvil bar channel extending longitudinally therethrough; an anvil bar in said last channel; means to reciprocate said anvil bar in said channel; means to feed rivets through said feed channel; and means to raise rivets so that the body projects out of said feed channel and to hold the same when being headed.

4. In a pipe riveting machine, a frame; a horn secured to the rear portion of the frame and extending toward the front thereof, said horn having a feed channel extending longitudinally from the rear toward the front portion thereof and also having an anvil bar channel extending longitudinally therethrough; a placing bar in the front portion of said horn, and vertically movable therein;

a steadying bar in the front portion of said horn and vertically movable therein; feeding means in said feed channel adapted to feed rivets one at a time upon the placing bar; an anvil bar in said anvil bar channel, said anvil bar having the front end thereof pointed; means to move the anvil bar longitudinally in its channel whereby the placing bar is caused to move upwardly and the steadying bar is caused to move downwardly; a hammer operatively secured in the upper portion of the frame; and means to operate the hammer to cause it to head a rivet held on the supporting bar.

5. In a pipe riveting machine of the character described herein, a frame; an operating shaft revolubly mounted in the upper portion of said frame; a cam eccentrically mounted on the end of said shaft; a slide block mounted on said cam; a tool frame mounted in the end of the upper portion of said frame and adapted to reciprocate vertically, said frame being operable by said slide block; a tool head pivotally secured to said tool frame; a punch removably connected to said tool head; hammers connected to said tool head; in combination with a horn adapted to hold a pipe, said horn having a punching die therein and having means to feed a rivet from the rear end thereof to near the front and through a hole in the pipe and hold the same while the rivet is being headed.

6. In a pipe riveting machine of the character described herein, an U-shaped frame; a horn mounted between members of said frame and extending beyond the front portion of the upper member thereof, said horn having channels therein one above the other; means to feed rivets to the outer end of the upper channel of said horn one at a time; means to move the rivets so that the body thereof projects above the plane of the upper face of the horn; an anvil bar in said lower channel; means to reciprocate said anvil bar in said channel; means to support the horn when a rivet is being headed; and means to head a rivet on said horn.

7. In a pipe riveting machine of the character described herein, a frame; a horn secured to said frame, said horn having a feed channel extending longitudinally therein in the upper portion from the rear to near the front end thereof, and an anvil bar channel below said feed channel; an anvil bar in said last channel; means to reciprocate said anvil bar in said channel in combination with means to move rivets through said feed channel and deliver the same at the outer end of said channel, one at a time; and means to move and hold rivets with the body thereof projecting above the plane of the upper face of the horn.

In witness that I claim the foregoing I have hereunto subscribed by name this 9th day of December, 1908.

FRANK W. McKNIGHT.

Witnesses:

G. E. HARPHAM,

S. B. AUSTIN.