No. 687,289.

Patented Nov. 26, 1901.

H. H. THORNTON.

RIVETING MACHINE.

(Application filed Mar. 7, 1901.)

(No Model.)

Fig. 1.

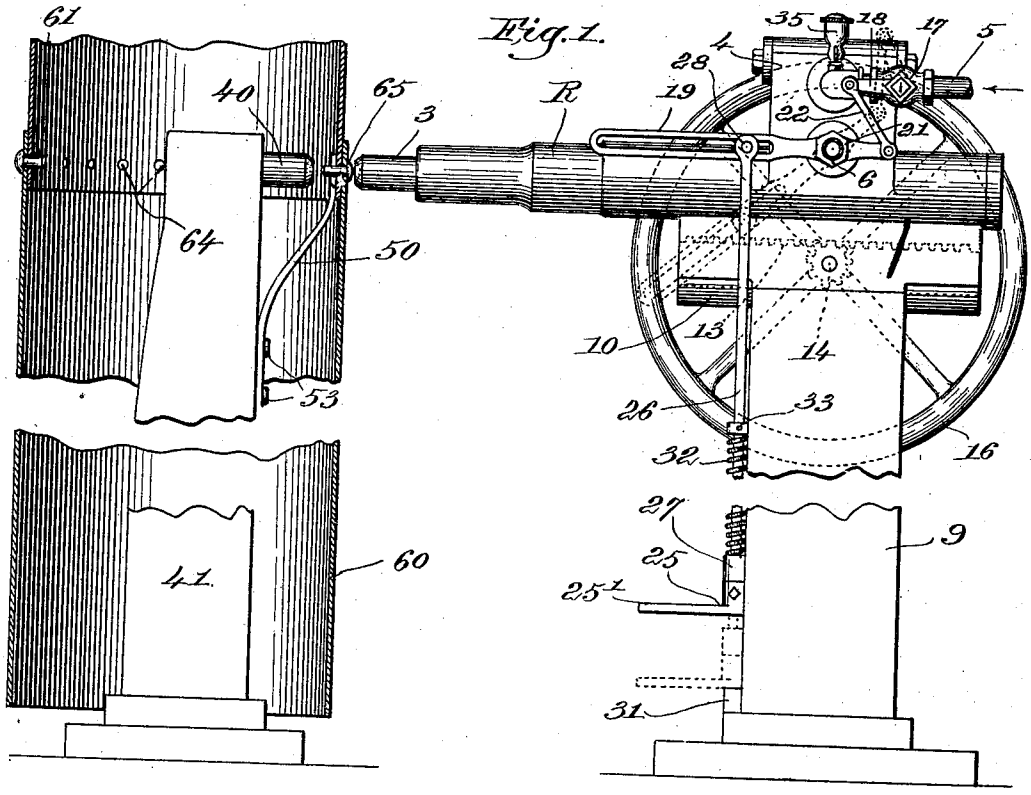


Fig. 2.

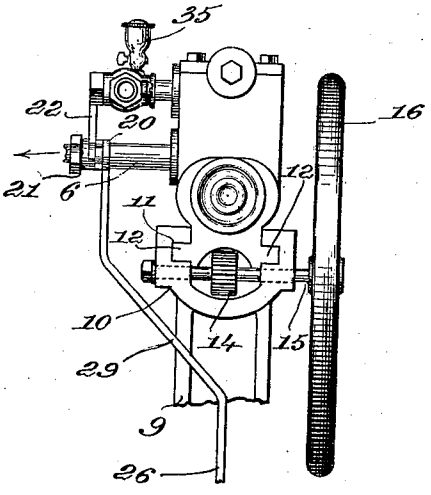
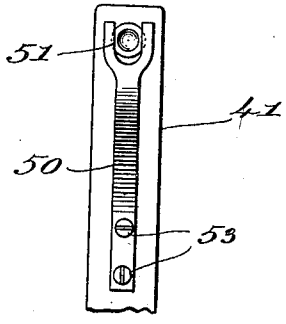


Fig. 3.



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RIVETING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 687,289, dated November 26, 1901.

Application filed March 7, 1901. Serial No. 50,157. (No model.)

To all whom it may concern:

Be it known that I, HENRY H. THORNTON, a citizen of the United States, residing at Somerville, in the county of Suffolk and State of Massachusetts, have invented an Improvement in Riveting-Machines, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention has for its object the production of a novel form of riveting-machine which is especially adapted for use in riveting together sections of cylinders or pipes or other curved sections, though I wish it understood that the device may be used in flat work.

The invention comprises a suitable pneumatic riveting device and an anvil, the said riveting device and anvil being carried by parallel supports, which are preferably vertically arranged, the support for the anvil being of such a character as to admit of slipping the cylindrical or other shaped section over the same, so that the anvil will be on the inside thereof. The riveting device is mounted on its standard or support for movement bodily toward and away from the anvil, and suitable mechanism independent from the means for moving the riveting device toward or from the anvil is provided for controlling the admission of the compressed fluid to the said riveting device, whereby the riveting device may be moved bodily toward the anvil until the riveting-tool contacts with the head of the rivet, and subsequently the valve may be operated to admit compressed fluid to the riveting device. The valve-operating mechanism comprises a lever, pivotally connected to the riveting device and operatively connected with the valve, and a foot-treadle which has a yielding engagement with the valve-operating lever, whereby an operative connection between the foot-treadle and the valve-operating lever is maintained regardless of the position of the riveting device on the standard.

Heretofore in riveting together sections of cylinders the rivet has generally been inserted from the inside, so that the head of the rivet rests against the inside of the cylinder, and the end of the rivet which projects beyond the exterior of the cylinder is operated upon by the hammer to head the same. This method of operation requires an attendent to hold the cylinder tightly against the anvil, so that the head of the rivet will be held against the inside of the cylinder during the riveting operation, as otherwise a tight joint would not be effected. Moreover, in riveting together sections of a comparatively small pipe or cylinder it is very difficult to insert the rivets through the holes from the inside.

With my improved riveting-machine I insert the rivets from the exterior, so that the head of the rivet engages the exterior of a cylinder, and in order to positively hold the two section of the cylinder that are to be riveted together against the head of the rivet I provide what I term a "push-back," the same consisting of a spring or yielding arm attached to the anvil support, and which is adapted to yieldingly engage the interior of the cylinder during the riveting operation and hold the sections that are being riveted tightly against the head of the rivet, so that a tight joint is produced.

Referring to the drawings, Figure 1 is an elevation of my improved riveting-device. Fig. 2 is an end view of Fig. 1, and Fig. 3 is a detail showing the push-back.

The riveting device is designated by R, and it may comprise the usual mechanism, including a cylinder in which a pneumatically-operated piston works, the said piston including a hammer which during its reciprocations strikes a series of blows upon the riveting-tool 3, which is loosely sustained in the end of the cylinder at the riveting device, as usual. The riveting device also includes the valve-chamber 4, to which the usual inlet-pipe 5 is connected and in which the usual valves for controlling the admission of the compressed fluid to the cylinder are inclosed. The exhaust-pipe from the cylinder is designated by 6.

The parts thus far described are common in all pneumatically-operated riveting-machines and go to make up what I designate generally as a "riveting device," the said riveting device coöperating with the anvil, designated by 40 and hereinafter described.

Inasmuch as the riveting-machine herein

described is especially adapted for riveting together sections of piping of any cross-sectional shape, I preferably mount the riveting device upon the vertical standard 9, which may be of any suitable shape, it supporting at its upper end a head 10, having suitable horizontal guideways 11 therein to receive flanges 12 on the bottom of the riveting device R, whereby the said riveting device is slidably mounted on the standard 9 for bodily movement in a horizontal direction.

The riveting device is provided, underneath the same, with a rack 13, (shown in dotted lines in Fig. 1,) which engages a pinion 14, mounted on a horizontal shaft 15, said shaft having at one end a suitable hand-wheel 16, by means of which the riveting device can be moved bodily toward and from the anvil, as will be readily understood. Other means for giving the riveting device its horizontal movement may be employed, if desired, and also the specific manner in which the riveting device is guided in the head 10 may be varied.

The inlet-pipe 5, which admits the compressed fluid to the valve-chamber 4, is provided with a valve 17, having an arm 18 extending therefrom, the said arm 18 being pivotally connected to a valve-actuating lever 19, which is pivotally supported in any suitable way upon the riveting device, preferably by pivoting the same upon the end of the exhaust-pipe 6. For this purpose the exhaust-pipe 6 is turned down at its end to make a shoulder 20, against which the valve-actuating lever 19 abuts, and a suitable nut 21, screwed on the end of the exhaust-pipe, will operate to hold the said lever in place. The lever 19 is connected to the arm 18 of the valve by a link 22, and the said lever 19 is rocked about its pivot to operate the valve 17, preferably by means of a foot-treadle 25, the said foot-treadle comprising a foot-plate 25′, which is attached to the lower end of a vertical rod 26, the said rod passing through suitable guides 27 on the standard 9. I have provided a sliding connection between the valve-actuating lever 19 and the rod 26 of the foot-treadle, whereby an operative connection is established between the foot-treadle 25 and the valve-operating lever at any position of the riveting device R upon the standard 9. This sliding connection is effected by constructing the lever 19 with the slot 27 and by providing the end of the rod 26 with a pin 28, which engages said slot, the rod 26 being bent, as at 29, to bring its upper end in alinement with the lever 19. With this construction it will be seen that the foot-treadle 25 is operatively connected to the valve regardless of the position of the riveting device upon the head.

In the operation of the device the operator will manipulate the hand-wheel 16 and move the riveting device R toward the anvil until the riveting-tool 3 engages the rivet, when he will depress the foot-treadle 25 and bring the valve-actuating lever 19 into the dotted-line position in Fig. 1, said lever, through the link 22, operating to throw the valve into the dotted-line position, which is the open position of the valve, whereby the compressed fluid is admitted through the inlet 5 to the valve-chest 4 of the said riveting device.

Preferably I will provide a suitable stop device 31 for limiting the downward movement of the treadle farther than is sufficient to open the valve 17, and in order to bring the treadle to its normal position, (shown in full lines,) and thereby close the valve, I provide a suitable spring, which is shown as a compression-spring 32, surrounding the rod 26 and abutting at one end against the guide 27 and at the other end against the collar 33 on the said rod 26. The return of the rod 26 to its normal position and the consequent closing of the valve may also be accomplished by a weighted lever instead of the spring, as will be obvious.

Preferably a suitable oil-cup 35 will be attached to the inlet-pipe, whereby oil may be sucked in with the compressed fluid to lubricate the moving parts in the interior of the riveting device.

The anvil is designated by 40, and when the device is to be used for riveting together sections of piping the said anvil will be mounted upon a vertical support 41, which is of such a size as to permit pipes of small diameter to be slipped over the same, said support being parallel to the support 9 of the riveting device R.

The end of the anvil 40 will be preferably concave to give the proper shape to the head which is to be formed on the point of the rivet, and of course the end of the riveting-tool 3 will also be provided with a similar concave face to receive the head of the rivet and preserve its proper shape.

Heretofore in riveting sections of piping it has been customary to insert the rivets from the interior of the pipe by means of tongs or other suitable devices, so that during the riveting operation the head of the rivet will rest against the anvil and the point thereof project beyond the exterior of the pipe to be operated upon by the riveting device. In making a section of piping of small diameter, however, it is exceedingly difficult to thus insert the rivets from the interior of the pipe, especially if the section of pipe is of some considerable length, the process of riveting the side and circumferential seams of the piping, therefore, being very slow and tedious.

Much time and labor may be saved by inserting the rivets from the outside, in which case the point of the rivet engages the anvil while the blows are delivered to the head of the rivet; but in order to make a perfect joint it is necessary that during the riveting operation the rivet should be prevented from working back out of the hole—that is, the head of the rivet should be held firmly against the surface of the work—for it will be obvious that if the rivet has worked back so that its

head does not engage the work the blows of the riveting device will cause the rivet-head to overflow the cup in the end of the riveting-tool and a fin or web will be formed about the head of the rivet, thus preventing a tight joint. To obviate this difficulty, I have provided a yielding member which I term a "push-back" and which is so positioned that during the riveting operation it will engage that face of the work beyond which the point of the rivet projects and operate to hold the work tightly against the head of the rivet, the rivet-head, it being understood, being seated in the cup-shaped end of the riveting-tool. Preferably I construct my pushback in the form of a suitable spring which is attached to the anvil or its support, said spring in its normal or distended position having its working face in line with but at a slight distance from the end of the anvil, so that as the work is moved toward the anvil by the bodily forward movement of the riveting device said working face of the pushback will engage the work before the point of the rivet engages the anvil, the final movement of the riveting device to bring the rivet-point in engagement with the anvil operating to compress the spring, and thus maintain the work firmly against the head of the rivet.

Any suitable spring device may be employed; but I preferably construct my push-back in the form illustrated, wherein the spring is in the nature of a spring-arm 50, attached at one end in any suitable way to the standard 41, as by screws 53, and has its other end or head offset so as to stand in line with but at a slight distance from the end of the anvil 40, said head being adapted to bear against the interior of the overlapping sections of piping and hold the same tightly against the head of the rivet during the riveting operation. The spring-arm 50 is preferably provided at its free or head end with the forked portion 51, (see Fig. 3,) the branches of which during the riveting operation bear against the inside of the work at either side of the rivet.

When my machine is used in riveting together sections of piping, the section 60 of piping, which is to be riveted onto the end of the length of pipe designated by 61, is first slipped over the anvil and standard 41, and the length of piping which has already been constructed and which is suspended above the anvil in any suitable way is lowered and the end thereof telescoped into or over the upper end of the section 60 until the rivet-holes in the two sections register. An operator then inserts the rivets 65 into the rivet-holes from the exterior or from the side of the work toward the riveting device, and the work is positioned for riveting. The operator then manipulates the hand-wheel 16 and moves the riveting device toward the anvil, the riveting-tool 3 engaging the head of the rivet and carrying the lower end of the pipe-sections toward the anvil 40. Just before the end of the rivet contacts with the anvil the push-back 50 engages the interior of the cylinders, this position of the parts being seen in Fig. 1, and as the riveting device is still farther moved toward the anvil to bring the end or point of the rivet against the anvil the elasticity of the push-back 50 will crowd the pipe-sections tightly against the head of the rivet and maintain them in this position during the riveting operation. The operator will then operate the foot-treadle to thereby open the valve 17 and admit compressed fluid to the riveting device, when the vibrations of the hammer will head-over the end of the rivet and form a head thereon on the inside of the pipe-sections. Since the head of the rivet is seated in the cup-shaped end of the riveting-tool and since the push-back operates to hold that portion of the work being riveted firmly against the head of the rivet, there is no possibility of the rivet working back out of the hole during the riveting operation, and the result will be a perfect joint. It will thus be seen that it is unnecessary to employ an attendant to hold the work tightly against the head of the rivet, as would be necessary if the push-back were not used.

The push-back when made with the forked head illustrated in Fig. 3 also operates as a centering device for the pipe-sections or other work being riveted.

In order to do perfect riveting, it is necessary that when the riveting device is in operation the rivet should be in line with the central line of the riveting-tool and anvil, so that the blows of the riveting device may be delivered longitudinally of the rivet—that is, when cylindrical or curved surfaces are being riveted together the central line of the anvil and riveting-tool should be radial with respect to that portion of the curved surface between the tool and the anvil, and when flat surfaces are being operated on such central line should be perpendicular to the surface. This correct position of the sections being riveted is obtained by the head 51 of the push-back 50, for the said head being broad and having its face perpendicular to the central line of the riveting-tool and anvil will by its engagement with the interior of the curved sections or with one face of the flat sections correctly position the same, so that the rivet which has been inserted in the hole is in alinement with the said central line of riveting-tool.

It will be observed from the above description that my yielding push-back has an elastic body, and inasmuch as the push-back is merely for the purpose of bringing the two sections of piping against the head of the rivet prior to the time when the end of the rivet strikes the anvil a comparatively light spring will suffice for the push-back.

When the machine is made for riveting together long sections of piping, the anvil and riveting device will be so high that it will be necessary to provide a suitable platform on

which the operator may stand and manipulate the wheel 16 and foot-treadle 25, the foot-treadle in this case only reaching to the platform.

It will be obvious to those skilled in the art that my riveting device is not limited in its use to riveting together sections of piping, but may be used equally well in riveting together flat sections of metal or other material.

Various changes may be made in the structure of my device without departing from the spirit of my invention.

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

1. In an apparatus of the class described, a support, a pneumatic riveting device mounted thereon for horizontal movement, an anvil, means to move the riveting device bodily toward and from the anvil, a valve to control the admission of the compressed fluid to the riveting device, and foot-operated devices for controlling said valve, said foot-operated devices having an operative connection with the valve at any position of the riveting device.

2. In an apparatus of the class described, a support, a pneumatic riveting device mounted thereon for horizontal movement, and arranged to deliver blows in a horizontal line, an anvil, means to move the riveting device bodily toward and from the anvil, a valve to control the admission of the motive fluid to the riveting device, a valve-actuating lever connected to the valve, and a foot-treadle having a sliding engagement with said lever, whereby the foot-treadle is operatively connected with the valve at any position of the riveting device.

3. In an apparatus of the class described, a vertical support, a pneumatic riveting device mounted thereon for horizontal sliding movement, an anvil, a rack on the said riveting device, a pinion on the support engaging said rack, means for manually operating said pinion to move the riveting device bodily toward and from the anvil, a valve to control the admission of compressed fluid to the riveting device, and foot-operated devices for controlling said valve, said foot-operated devices having an operative connection with the valve at any position of the riveting device.

4. In an apparatus of the class described, a vertical support, a pneumatic riveting device mounted thereon for sliding movement, and arranged to deliver blows in a horizontal direction, an anvil also mounted on a vertical support, means to manually move the riveting device toward and from the anvil, a valve for controlling the admission of the motive fluid to the riveting device, a foot-treadle attached to the support for the riveting device and having an operative connection with the valve at any position of the said riveting device.

5. In an apparatus of the class described, a support, a pneumatic riveting device slidably mounted thereon, an anvil, means to manually move the riveting device toward and from the anvil, a valve movable with the riveting device for controlling the admission of motive fluid thereto, an exhaust-pipe, a valve-operating lever pivoted on the exhaust-pipe and connected to the valve, a foot-treadle on the support slidably connected to the said valve-operating lever, whereby the valve is operatively connected to the treadle at any position of the riveting device.

6. In an apparatus of the class described, a support, a pneumatic riveting device slidably mounted thereon, an anvil, means to move the riveting device toward and from the anvil, a valve to control the admission of the motive fluid to the riveting device, a slotted valve-actuating lever pivoted to the riveting device and operatively connected to the valve, and a foot-treadle connected to the support and having a projection engaging the slot of the lever, whereby the valve is operatively connected to the treadle regardless of the position of the riveting device.

7. In an apparatus of the class described, a support, a pneumatic riveting device slidably supported thereon for horizontal movement, an anvil, means to manually move the riveting device bodily toward and from the anvil, a valve for controlling the admission of the motive fluid to the riveting device, an exhaust-pipe, a slotted valve-operating lever pivoted on the exhaust-pipe and connected to the valve, a foot-treadle on the support and slidably engaging the slot in the valve-actuating lever, whereby, when the treadle is depressed, the valve will be opened, and a spring to return the valve-actuating lever to its normal position and close the valve.

8. In a riveting-machine, a riveting device, an anvil, means to move the riveting device toward and from the anvil, and a yielding push-back attached to the anvil, said push-back having an elastic body and operating to hold the work against the head of the rivet.

9. In a riveting-machine, a riveting device, an anvil, means to move the riveting device toward and from the anvil, and an elastic arm rigidly attached at one end to the anvil, the free end of said arm being adapted to contact with the work before the rivet is brought in contact with the anvil, whereby the work is held against the head of the rivet.

10. In a riveting-machine, a riveting device, an anvil adapted to have a cylindrical or other shaped section slipped over the same, and a yielding push-back attached to the anvil, said push-back having an elastic body and adapted to engage the inside of the section before the rivet is brought in contact with the anvil, whereby the rivet may be inserted from the outside of the cylinder, the push-back operating to hold the work against the head of the rivet during the riveting operation.

11. In a riveting-machine, a riveting device, an anvil, said anvil adapted to have a

cylindrical or other section slipped over the same, means to move the riveting device toward and from the anvil, a yielding push-back having an elastic body provided with a forked head in line with the anvil and adapted to engage the inside of the section either side of the rivet-hole before the rivet is brought in contact with the anvil, whereby the rivet may be inserted from the exterior, the push-back operating to hold the overlapped portions of the sections against the head of the rivet during the riveting operation.

12. In a device of the class specified, a pair of parallel standards, a pneumatic riveting device movably supported upon one of said standards, and an anvil on the other, means to move the riveting device bodily toward and from the anvil, a valve to control the admission of motive fluid to said riveting device, a valve-actuating lever carried by the riveting device, a foot-treadle having a sliding engagement with the said lever, whereby an operative connection is maintained between the foot-treadle and said lever at any position of the riveting device, and a yielding push-back attached to the anvil-support and adapted to engage the work and hold the same tightly against the head of the rivet.

13. In a riveting-machine, a riveting device, an anvil coöperating therewith, said anvil adapted to have a cylindrical section slipped thereon, an elastic centering device connected to the anvil and operating to center the cylindrical section, and bring the rivet in line with the direction in which the blows are struck.

14. In a riveting-machine, a riveting device, an anvil coöperating therewith, a yielding arm connected to the anvil, said arm having an elastic body and a working face in front of the anvil and at right angles to the central line of the anvil and riveting device, whereby as the riveting device is brought into operative position, said working face of the arm engages and positions the work.

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

HENRY H. THORNTON.

Witnesses:
LOUIS C. SMITH,
GEO. H. MAXWELL.