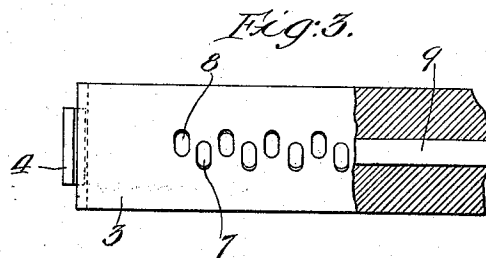
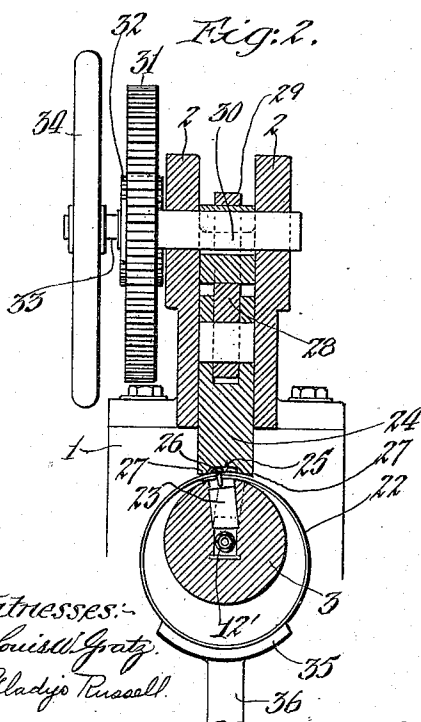
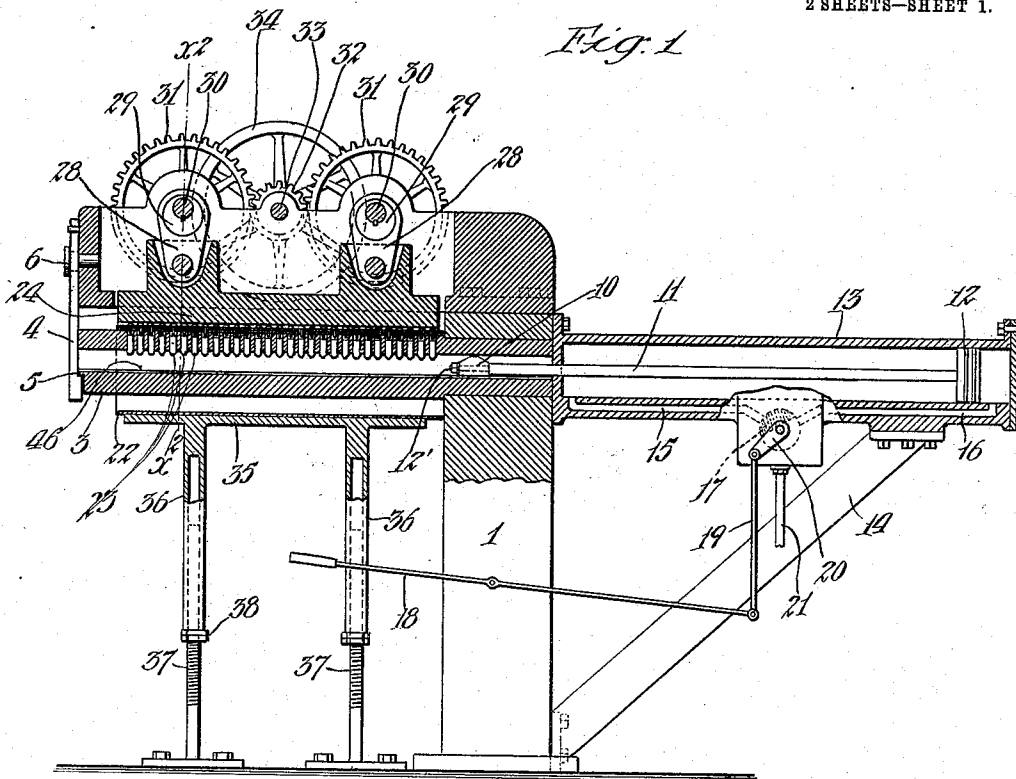


930,952.

2 SHEETS—SHEET 1.



Witnesses:-
Louis W. Gratz.
Gladys Russell.

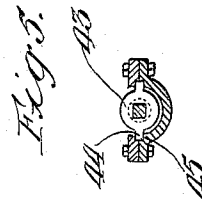
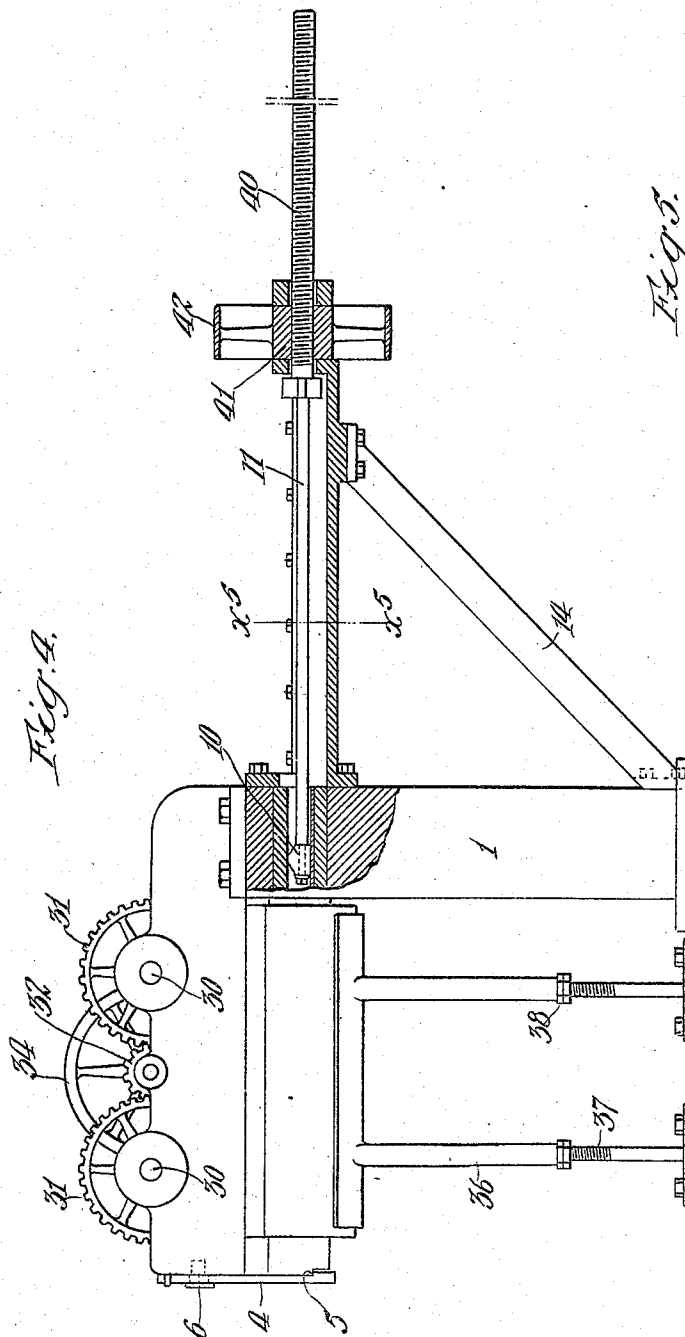
by *Inventor*
John R. French.
Townsend & Son Attys.

J. R. FRENCH.
RIVETING MACHINE.
APPLICATION FILED NOV. 2, 1908.

930,952.

Patented Aug. 10, 1909.

2 SHEETS—SHEET 2.



Witnesses:-
Louis W. Gratz,
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Atty's.

UNITED STATES PATENT OFFICE.

JOHN R. FRENCH, OF LOS ANGELES, CALIFORNIA.

RIVETING-MACHINE.

No. 930,952.

Specification of Letters Patent.

Patented Aug. 10, 1909.

Application filed November 2, 1908. Serial No. 460,762.

To all whom it may concern:

Be it known that I, JOHN R. FRENCH, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Riveting-Machine, of which the following is a specification.

This invention relates to riveting machines which are designed particularly for riveting pipe, and has for one of its objects to perform the riveting operation on the inside of the pipe, thus permitting the rivets to be inserted from the outside of the pipe, which is much easier than to insert them from the inside of the pipe.

The riveting operation is performed by a riveting device which operates on a line substantially perpendicular to the axes of the rivets, which results in riveting them in succession, the rivets being arranged in a row, and a further object is to provide novel means for quickly operating said riveting device along the row of rivets, so that the riveting operation will be performed in a much quicker manner than has been heretofore produced by any machine of which I am aware, and which also causes the retraction of the riveting device, after the operation of riveting, with a speed equal to the riveting stroke.

Another object is to provide novel and effective mechanism for clamping the overlapping edges of the pipe together and holding them securely during the riveting operation, and to enable the said mechanism to be very quickly operated by hand, either to clamp the pipe or release it.

Referring to the drawings:—Figure 1 is a side elevation, with the upper portion in longitudinal vertical section, of one form of the machine. Fig. 2 is a cross section on line x^2-x^2 Fig. 1, on a large scale. Fig. 3 is a plan view of the outer end of the stake, partly in section, on a larger scale. Fig. 4 is a side elevation of another form of the machine, partly in section. Fig. 5 is a cross section on line x^5-x^5 Fig. 4.

In the forms shown in Figs. 1 to 3, 1 designates the main frame of the machine having horizontal arms 2 which are located above a hollow stake 3. The inner end of the stake 3 extends into the main frame 1 so as to be firmly secured thereby, and to hold it rigidly during the riveting operation a swinging hook 4 is employed, which, prior to riveting, is swung down to engage a lip

5 on the stake 3, the hook 4 being pivoted at 6. The stake 3 is provided with two series of slots 7 and 8 which are arranged in two rows, the slots 7 alternating with slots 8, and both rows communicating with a longitudinal groove 9 formed in the center of the stake 3. Slidable in the groove 9 is a riveting device which, in the form shown, comprises a wedge 10 having two inclined faces, as shown, and preferably being secured to a piston rod 11 by a bolt 12, so that when one of the inclined faces becomes worn the riveting wedge may be reversed and the other inclined face used, and when this inclined face becomes too worn for use the riveting wedge may be entirely removed and a new one substituted. The riveting wedge is preferably operated through the medium of the piston rod 11 which is connected with a piston 12 traveling in a cylinder 13, the latter being attached to the main frame 1 and supported by a brace 14. Ports 15 and 16 lead from a valve 17 to the respective ends of the cylinder, and the valve 17 may be controlled by a lever 18 operating a link 19 which is connected with an arm 20 on the valve 17. The motive fluid is introduced to the valve 17 through an inlet pipe 21. Obviously, compressed air or steam could be employed, if desired, but hydraulic operation is preferred.

22 designates a pipe to be riveted and which is slipped on the stake 3. Slidably arranged in each slot 7 and 8 is a riveting block 23. As shown in Fig. 2, each riveting block is formed with a horizontal lower face which causes it to have a flat contact with the riveting wedge as the latter is reciprocated. The top face of each riveting block 23 performs the riveting operation as the block is moved up by the pressure of the riveting wedge 10. Each block is so constructed that it may be reversed. The rivets are kept in place and held firmly from rising by an anvil 24 which has a longitudinal groove 25 in its bottom which receives the heads of the rivets 26, while flanges 27 on each side of the groove 26 press against the pipe 22 and thus hold the overlapping edges together and in close contact with the stake 3. The anvil 24 is mounted to slide vertically between the arms 2 and is carried by two short eccentric rods 28 which are operated by eccentrics 29 on shafts 30. Each shaft 30 has a gear 31, and both gears 31 mesh with a pinion 32 on a shaft 33 which

operates by a hand wheel 34. By giving the hand wheel 34 a whirl it imparts rotation to gears 31 which raises the anvil 24 and releases the pipe, allowing it to be withdrawn or inserted in position. A whirl of the wheel serves to lower the anvil and it will be observed that when the anvil is in position against the pipe that the eccentrics 29 stand substantially on their lowest centers which, combined with the great leverage produced by the small pinion 32, results in holding the anvil 24 absolutely in position, and yet enables it to be quickly and easily raised or lowered, as desired. Furthermore, this construction also permits of the necessary degree of adjustment of the anvil according to the thickness of the pipe.

Upon introducing fluid at one end of the cylinder 13 and allowing it to escape from the other end, the piston 12 will be forced to the left causing the riveting wedge 10 to move along the row of riveting blocks 23 and lift them in succession, each riveting block riveting the rivet from the inside of the pipe as it is moved up by the riveting wedge, so that by the time the riveting wedge arrives at the end of its stroke all of the rivets will have been set. The piston in traveling through its stroke receives a succession of reactive resistances which are serially compensated by intervening accumulations of momentum due to further expansion of the fluid in the cylinder. The piston having a certain momentum, imparted by the fluid, strikes the first block 23 with a sharp hammer blow of the riveting device 10, this reacts upon the piston and momentarily checks it but the accumulation of pressure behind the piston immediately overcomes the reactive force and impels the piston through its next step with high momentum, due to the accumulated pressure, so that the second block 23 is struck a sharp hammer blow by the riveting device 10, and so on. Each time the blow is struck the piston is momentarily checked and the pressure behind it immediately piles up and as the riveting device is released by the riveting block the extra pressure which has piled up back of the piston shoots it forward with greater momentum so that it produces the sharp hammer blow laterally against the riveting block. If the resistance to the movement of the piston was one of uniformity and was unchanging from end to end of the stroke the piston would move through the stroke with a smooth action. It is the checking of its movement and the piling up of pressure with sudden release which imparts the high momentum to the piston through the spaces between the rivets where its movement is unrestricted that causes the sharp hammer blows; at the time the riveting device strikes the riveting block the movement of the piston is unrestricted and it is traveling at its

highest speed so that the impact on striking the block is sharp. The working stroke is while the riveting wedge moves to the right, and before it commences the reverse stroke the pipe is removed. The valve 17 is then reversed to cause the piston 12 to be moved back and restore the riveting wedge 10 to its original position.

In order to support the pipe, a saddle 35 is provided which has two hollow legs 36 telescoping with threaded rods 37 which rise from the floor. Nuts 38 may be adjusted on rods 37 for the legs 36 to rest upon to support the saddle 35 at the elevation desired. In the form shown in Fig. 4, the riveting wedge 10 instead of being operated by the piston and cylinder construction is operated by a screw 40 which is connected to the rod 11. The screw 40 does not revolve but is operated by a nut 41 arranged in the hub of a pulley 42 which may be operated in one direction to operate the wedge 10 through the working stroke, and the pulley may be then reversed to restore the riveting wedge. The pulley 42 may be easily operated in either direction by means of a pair of pulleys operating in reverse directions and controlled by a suitable clutch, which arrangement is not shown as it is a well known mechanical expedient. The rotation of the rod 11 is prevented by means of a collar 43 having lugs 44 which engage in ways 45, as shown in Fig. 5.

A wear-plate 46 is arranged in the bottom of the groove 9 and is preferably formed of hardened steel and forms a renewable shoe to receive the wear of the riveting wedge 10, which shoe may be renewed when worn.

What I claim is:—

1. Means for supporting the pipe, a riveting device, an anvil coöperating with the riveting device, a cylinder, and a piston slidable therein and connected with the riveting device for operating the same along the line of rivets to rivet the same.

2. A stake having a longitudinal groove therein, riveting blocks slidable laterally in said stake, an anvil coöperating with the riveting blocks, and a riveting device slidable longitudinally of the stake in said groove for operating said riveting blocks.

3. A stake having a longitudinal groove therein, a plurality of rows of riveting blocks, the riveting blocks being slidable transversely in the stake and the respective rows being in different planes, an anvil coöperating with the riveting blocks, and a riveting device slidable in said groove for operating said riveting blocks.

4. A frame, a stake thereon, a riveting device sliding in the stake, a cylinder on the frame, a piston sliding in the cylinder and connected with the riveting device to slide the same along the stake, an arm over the

stake, eccentrics mounted in the arm, an anvil, and eccentric rods between the anvil and eccentrics.

5 5. A frame, a stake thereon for supporting the pipe, an anvil substantially parallel with the stake, eccentric rods connected to the anvil, eccentrics operating the eccentric rods, shafts carrying the eccentrics, a gear on each shaft, a pinion meshing with both
10 gears, a shaft and handwheel for operating the pinion, and riveting means operating along the stake.

6. A frame, a stake thereon for supporting the pipe, an arm over the stake, and a hook
15 pivoted to swing laterally on the arm and adapted to engage a lip on the stake to hold the same.

7. A stake having a groove, a row of riveting blocks slidable transversely of the
20 stake, a wear-plate in the bottom of the groove extending along the row of riveting blocks, a riveting device sliding in said groove against the wear-plate, and clamping means for holding the pipe on the stake.

25 8. A frame, a stake thereon, a riveting de-

vice slidable along the stake, an anvil adjustable toward and from the stake for cooperating with the riveting device, and an eccentric device for positively adjusting the anvil toward and from the stake.

9. A frame, a stake thereon, an anvil supported adjacent the stake, a rod slidable longitudinally of the stake, and a reversible riveting device carried by said rod, said riveting device comprising a block each end
35 of which is wedge shaped.

10. In a riveting machine, a stake, a series of riveting blocks slidable transversely of the stake, and means operating longitudinally of the stake for imparting a succession
40 of lateral hammering impacts serially against the riveting blocks.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 28th day of October 1908.

JOHN R. FRENCH.

In presence of—

P. H. SHELTON,

FRANK L. A. GRAHAM.