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CLINCHING MACHINE

Filed July 23, 1931

2 Sheets-Sheet 1

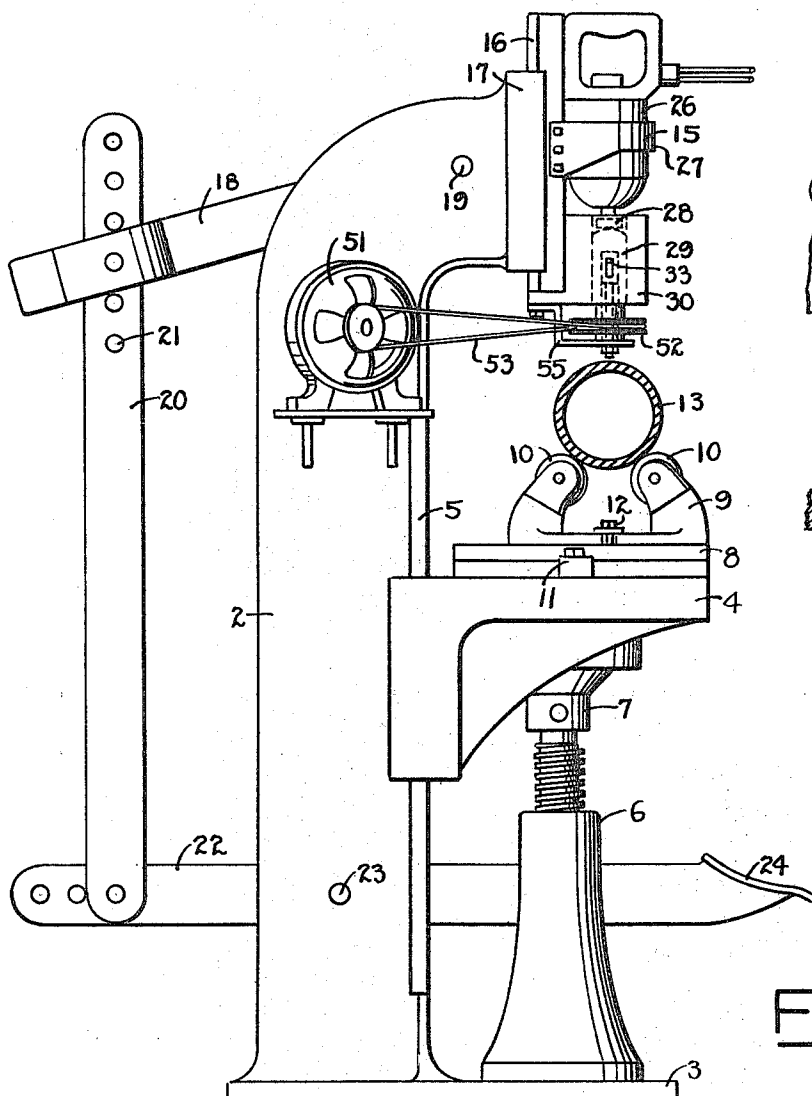


Fig. 1.

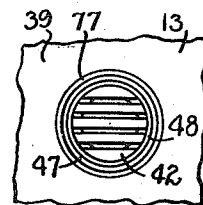


Fig. 3.

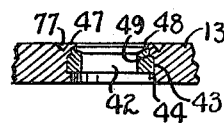


Fig. 4.

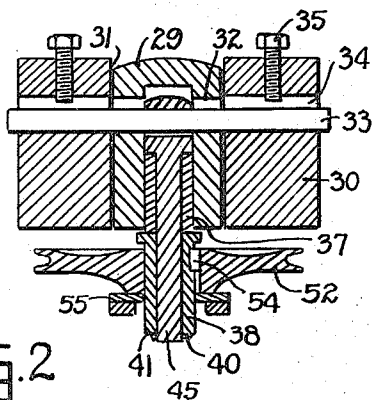


Fig. 2.

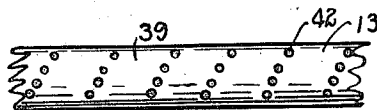


Fig 7 RICHARD C. WOODWARD
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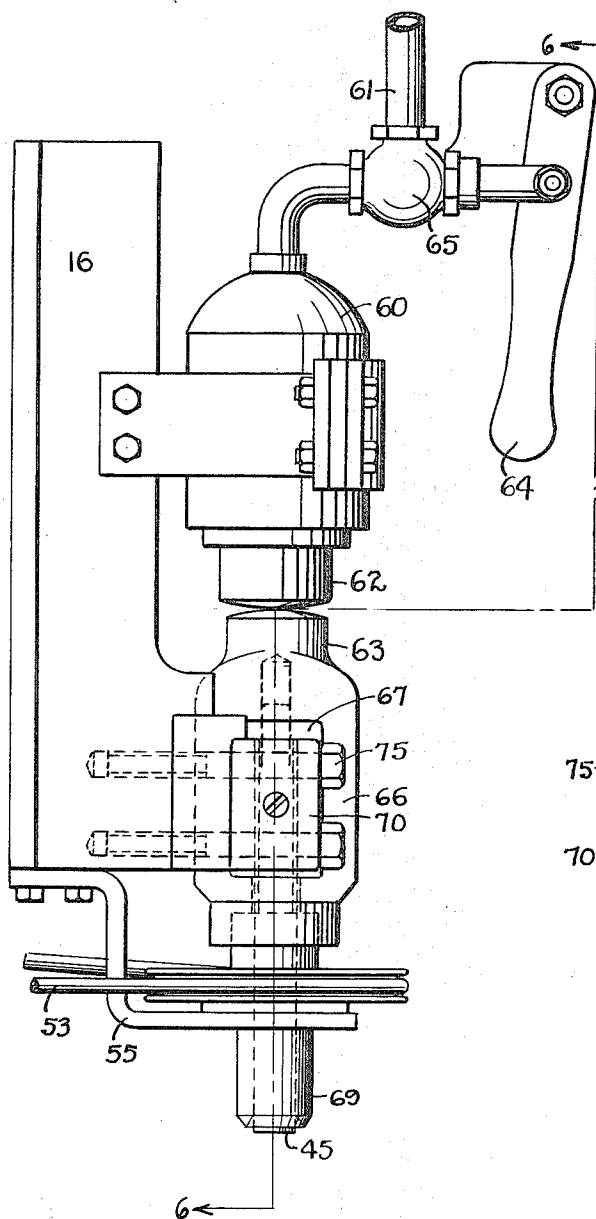


Fig. 5.

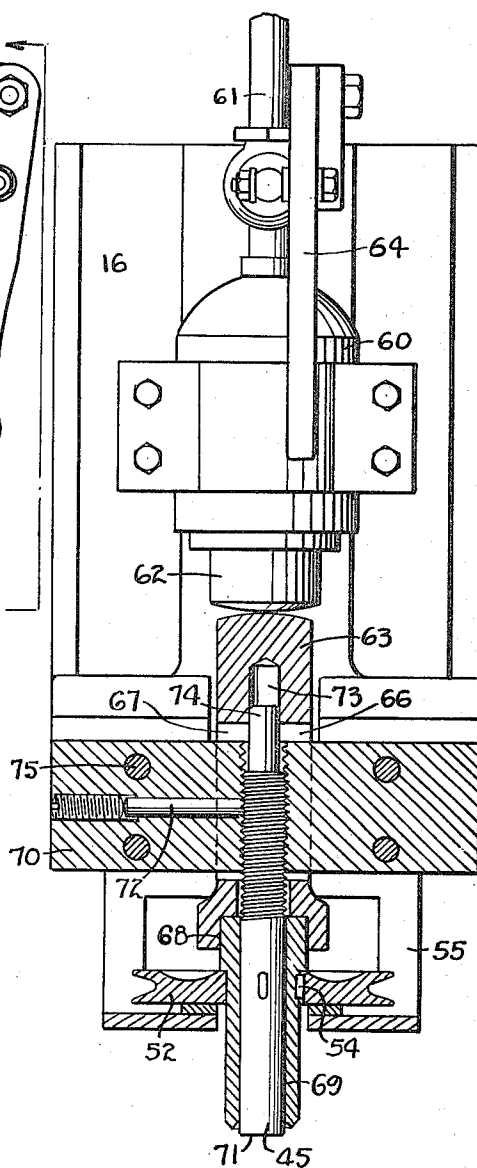


Fig. 6.

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1,928,653

CLINCHING MACHINE

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8 Claims. (Cl. 29—33)

The invention relates to an improvement in clinching machines particularly of the type used in displacing material in order to retain an article in position in a larger body.

It is one of the objects of the invention to provide a clinching machine which is adapted to depress a small article in a larger cavity and then displace a portion of the material about the cavity in order to retain the smaller article in position.

Another object of the invention is to provide a clinching machine in which the clinching operation is performed by a combined spinning and hammering movement.

Another object of the invention is to provide a riveting hammer which is adapted to be rotated while the hammering movement is being performed.

A still further object of the invention is to provide a spindle for retaining the inserted article in position while a co-axial hammer is used to displace the material to clinch such article in position.

A still further object of the invention is to provide a clinching machine in which the article being operated on may be rotated to cause longitudinal movement upon rotation thereof so that by merely rotating the body a series of cavities will be constantly placed in alignment with the clinching hammer.

Other and further objects of the invention will be readily apparent to those skilled in the art when the following description is considered in connection with the accompanying drawings, wherein:—

Fig. 1 is a side elevation of a machine embodying the invention with a piece of pipe in position to have strainer buttons clinched therein.

Fig. 2 is a sectional view showing the arrangement of the hammer and the anvil which is used to operate the same.

Fig. 3 is a top plan view of a strainer button which has been clinched in position in a pipe with the machine disclosed.

Fig. 4 is a sectional view of the pipe with a strainer button clinched in position.

Fig. 5 is a detailed view of a modified form of the invention in which a fluid operated hammer is used.

Fig. 6 is the front of the elevation of the device shown in Fig. 5 with certain of the parts shown in section and taken on the line 6—6 of Fig. 5.

Fig. 7 shows an elevation of a piece of pipe which has been filled with strainer buttons.

In the production of a strainer pipe which is

particularly adapted for use in oil and water wells, it is desirable to manufacture small plugs or strainers which have long been designated as strainer buttons. Cavities are formed in the pipe which is to serve as a body or support for these buttons, and the buttons are then inserted in these cavities and clinched in position. These buttons have been clinched in position by hand and with riveting machines, but the machine disclosed in the present application has been found to be of material advantage in that it greatly facilitates the clinching operation and insures proper positioning of the strainer button as well as its secure attachment to the strainer pipe.

Fig. 7 shows an elevation of a piece of strainer pipe to which the buttons have been fitted and particularly shows the helical arrangement of the buttons with respect to the body. This helical arrangement is of advantage in that in forming the openings in the pipe to receive the buttons and also in the operation of inserting the buttons the pipe may be rotated upon inclined supports so that it will travel longitudinally and the operation may be carried on continuously by merely rotating the pipe on its supports so that it will travel longitudinally. The supports are indicated as being a part of the machine shown at 2. This machine has a base 3 and a support stand 4, which is adapted for vertical adjustment along the ribs 5. This stand is adjusted vertically by means of a jack or other means 6 which is adjustable to alter the elevation of the stand 4. On the stand is a slidable plate 8 which carries the brackets 9 and rollers 10. This plate 8 may be anchored by a holder 11 and the bracket 9 is preferably adjustable with respect to the plate by means of a bolt 12. With this structure it is possible to change the inclination of the axis of the rollers 10 with respect to the axis of the pipe 13 which is supported on the rollers. By inclining these rollers by rotation of the bracket 9 the amount of travel of the pipe 13 when it is rotated on the rollers may be adjusted. Devices of this type are believed to be well known in the art and are explained here in order that the movement of the pipe with regard to the clinching machine will be understood, as this is an important part of the machine in order to speed up the operation thereof.

The machine embodies a clinching head indicated generally at 15. This head is mounted upon a frame 16 which is adjustable with respect to the face 17 of the portion 2. Any suitable device may be used to control the elevation of the head 15 but the present structure embodies an

arm 18 which is pivoted on a bolt 19 in the portion 2. This arm 18 may be connected with a bar 20 which has a plurality of openings 21 therein to accommodate connection of the bar 18 at a plurality of positions. The location of this connection between the bar and arm governs the amount of travel of the head 15. The bar 20 is in turn connected with the lever 22 which also has a plurality of openings to permit adjustment. This lever 22 is pivoted on the bolt 23 carried by the body of the machine and is provided with a contact member 24 which is adapted to be depressed by the foot of the operator. Thus, when it is desired to use the machine the operator will place his foot upon the lever 22 and move it downwardly so that the linkage arrangement will also cause downward movement of the clinching head 15.

The clinching head which constitutes one of the novel features of the invention may be made up in several forms and for purposes of illustration we have shown a head which embodies a power unit or motor of some type which is adapted to operate as a hammer. Fig. 1 shows an electrically driven hammer which includes a housing 26 which is attached to the frame 16 by means of a band 27. A head 28 on the hammer is adapted to be reciprocated by the operation of a solenoid or armature, which is contained within the housing 26. It is merely intended to obtain a rapid vibration of this head 28 in order to provide a hammering effect upon the anvil 29. This anvil is shown in section in Fig. 2 and is constructed so that it may be supported within but arranged so that it may have a reciprocating motion with respect to the holder 30. This holder 30 is mounted on the frame 16 but is provided with an opening 31 in which the anvil 29 is adapted to reciprocate. The anvil is provided with a passage 32 which receives a support rod 33 which rests in the openings 34 in the holder 30. This rod extends transversely through the anvil 29 and rests in the holder 30. Set screws 35 may be used to limit the movement of this rod 33. The anvil 29 has inserted therein a bushing 37 which projects slightly over the anvil and is arranged to contact with a die 38 which is adapted to rest on the surface 39 of the pipe 13.

Thus, reciprocating movement of the anvil 29 causes a similar movement of the bushing 37 which strikes the head of the die 38 and imparts to it a hammering action which will be transferred to the surface 39 of the pipe 13. The contact face 40 of the die is cut away as at 41 so that two oppositely disposed contacted areas will be provided so that the material of the face 39 of the pipe will be flowed from one position to another in order to accomplish a riveting or clinching action. The face 40 is tapered so that it will displace the material contacted on the pipe and move it to clinch the strainer button in position.

In order that the strainer button will be positioned properly in the pipe, it must be pressed into the cavity. Fig. 4 shows a section of the pipe 13 wherein the strainer button 42 has been moved into the cavity 43 where it may be clinched in position. The strainer button 42 may be tapered to fit in the cavity 43 or the cavity may be provided with a shoulder rest as 44 in order to receive the button. To move the button into proper position a ram 45 has been provided, which ram is supported on the cross rods 33. This ram or spindle extends downwardly inside of the bushing 37 and the die 38 and is movable longi-

tudinally with respect to both the bushing and the die. When it is desired to operate the machine the pipe 13 is rotated to such a position that the cavity 43 is directly beneath the spindle 45. The button 42 is then placed in position and the operator then depresses the portion 24 of the lever 22. This, in turn, lowers the head 15, the holder 30 and the spindle 45.

By proper adjustment of the set screws 35 the spindle 45 will be moved downwardly so that the button 42 will be forced into the cavity 43 to fit in the taper of the cavity or against the shoulder 44. As long as the lever is depressed at 24 the spindle 45 will hold the button in position. The motor contained in the housing 26 may now be turned on so that the head 28 will vibrate and cause vibration of the bushing 37 and the die 38. This vibration displaces the material about the periphery of the button 42 on the surface 39 of the pipe so that a portion such as 47 will be moved to overlie the upper edge 48 of the strainer button. The strainer buttons may be provided with a groove 49 so that the material 47 will be flowed to overlie the button.

It has been found in the operation of the machine that a much better clinching operation may be obtained if the die 38 is rotated while it is being vibrated to cause the riveting action. To accomplish this rotation or spinning, a motor 51 has been provided which is arranged to cause rotation of a drive wheel 52 by means of a belt 53.

Fig. 2 shows a sectional view of the wheel 52 and a key 54 which engages the die 38. In this manner the die 38 will be compelled to rotate with the wheel 52 and may be free for vertical movement or reciprocation with respect thereto. The wheel 52 is supported on the bracket 55 which extends from the frame 16.

The control of the device may be so correlated that the motor in the housing 26 and the motor 51 will be turned on and off simultaneously so that the hammering and spinning action will be accomplished at the same time and the material 47 in this manner will be displaced much more uniformly and will be deposited in a proper position about the button 42 so that it will be positively retained and firmly anchored in the strainer pipe. The cut away portion 41 on the die 38 when rotated during the hammering operation carries with it small portions of material which will be deposited in different positions about the face of the button, and the hammering action is greatly facilitated by having the cut away portions on the contacting surface of the die. It is to be understood, however, that this die 38 may be formed in any desired manner in order to accomplish the proper displacement of the material of the pipe so that it will securely retain the strainer button in position.

Figs. 5 and 6 show a modified form of hammer head and spinner construction which utilizes a fluid driven hammer indicated generally at 60. This hammer is driven by a flow of compressed fluid, flowing through a line 61 and may be of any construction which is now well known in the art. This hammer is arranged to reciprocate a head 62 which contacts an anvil 63. Control of the hammer 60 is accomplished by means of the handle 64 which may be used to open or close the valve 65 in the line 61.

The anvil 63 is of somewhat different construction than the anvil 29 previously described, and has a yoke construction such as 66 so that an opening 67 is provided in the central part thereof.

The anvil 63 extends downwardly and is formed with a socket 68 which receives a die 69 which is the equivalent of the die 38 shown in Fig. 2. This die 69 is arranged to be driven by the wheel 52 as previously described.

The spindle 45 in the construction shown in Figs. 5 and 6 is modified in that it is supported in the cross head 70 and has been shown as threaded thereto so that it may be adjusted vertically to depress the button 42 any desired amount. By adjustment of the threaded connection between the spindle and the cross head the lower end 71 may be adjusted as to its maximum downward movement. A locking pin 72 is shown as passing through the cross head 70 so that the spindle 45 may be locked at any desired elevation. A cavity 73 is formed in the anvil 63 so that the spindle and anvil will be aligned at all times, and the upper end 74 of the spindle will pass into this cavity 73. The cross head 70 is retained in position on the bracket 16 by means of bolts or other fastening device 75.

The operation of the machine seems to be readily apparent and when it is desired to move the strainer button into position and to hammer and spin the material adjacent the edges thereof into a position such that it will clinch the button securely in position the entire operation may be carried on simultaneously. However, either the hammering or the spinning as well as the insertion of the button may be carried on as separate operations and the machine used for any one of the three operations independently of the others. After the button has been clinched in the pipe it will have the appearance shown in Fig. 3 wherein a groove 77 will remain. A considerable amount of material, however, has been displaced to overlie the edge of the strainer button and hold it in position for the reason that such buttons and strainer pipe are subjected to extensive corrosion and abrasion when they are placed in an oil well or water well, particularly where the flow of fluid is under high pressure and contains corrosive material. Considerable difficulty has been encountered in the past with the corrosion of the material about the edge of the strainer button so that the button would be free to fall out of the supporting pipe.

It is the endeavor of the present machine to provide a combined hammering, clinching and spinning operation so that the button will be securely anchored in the pipe and cannot readily be displaced and so that a considerable quantity of material will be present to resist both corrosion and abrasion.

Having described the invention what we claim is:—

1. A clinching machine adapted to secure strainer buttons in a pipe and including a movable head, means to depress said head, means to

move the strainer button into position and means on said head to spin the material of said pipe about the periphery of said strainer button.

2. A clinching machine adapted for use in clinching strainer buttons in well screen pipe including means to force the strainer button into the opening in the pipe including a spindle to protect the face of the strainer button, means to hammer the metal of the pipe about the edge of the button, and means to spin said hammering means.

3. In a clinching machine, a spindle to position the article to be clinched, a die concentrically disposed around said spindle to displace metal about the article so that it will overlie the article, and means to hammer and rotate said die to facilitate the clinching operation.

4. A machine of the character described including an adjustable support stand, adjustable rollers thereon to support a pipe, a head on said machine, means to depress said head and force a strainer button into position, a vibrating spinning die carried by said head and adapted to clinch a strainer button in the pipe while the button is being held by said means.

5. A head for clinching machines including a reciprocating hammer, an anvil adapted to be struck by said hammer, a die adapted to be moved by said anvil, independent means to rotate said die, and a spindle projecting from the center of said die and adapted to remain stationary.

6. A head for clinching machines, means to depress said head, a die supported by said head, means to rotate said die, means to hammer said die, and a spindle in said die adapted to be held stationary during the hammering and spinning of said die.

7. A head for clinching machines, means to depress said head, a die supported by said head, means to rotate said die, means to hammer said die, a spindle in said die adapted to be held stationary during the hammering and spinning of said die, and means to adjust the position of said spindle with respect to said die.

8. A machine for clinching strainer buttons in well screen pipe including means to support the pipe so that it will move longitudinally of said machine upon rotation, a clinching head, means to move said head downwardly to clinching position, and means to perform the clinching including a spindle to hold the strainer button in the pipe, and a die to spin and hammer the metal of the pipe which is closely adjacent the strainer button so that said button will be engaged thereby and clinched in position.

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