M. CAINE.

MACHINE FOR INVERTING PIPE.

APPLICATION FILED FEB. 15, 1919.

1,312,017.

Patented Aug. 5, 1919.

2 SHEETS—SHEET 1.

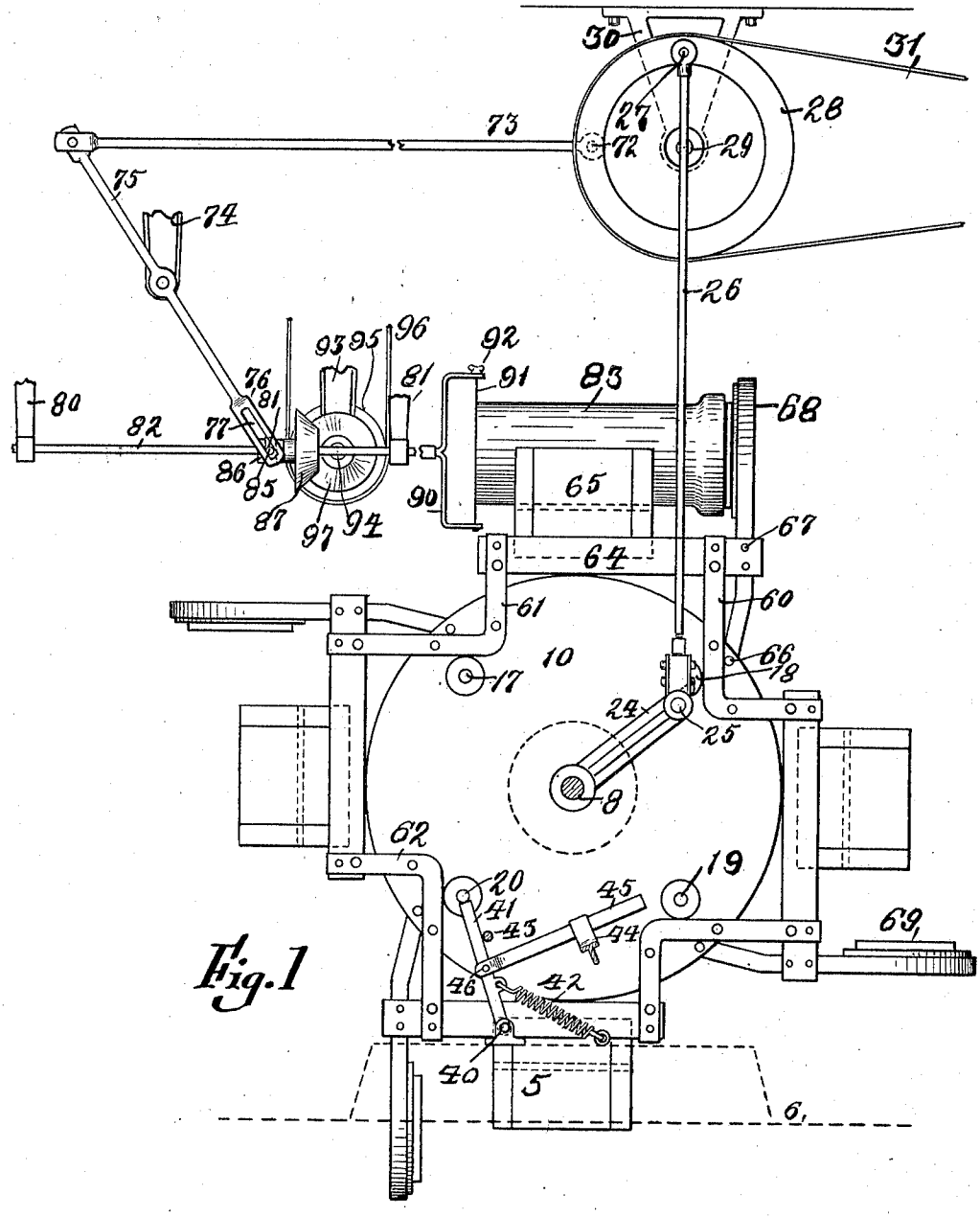


Fig. 1

Inventor

Marshall Caine,

By C. E. Humphrey

Attorney

THE COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

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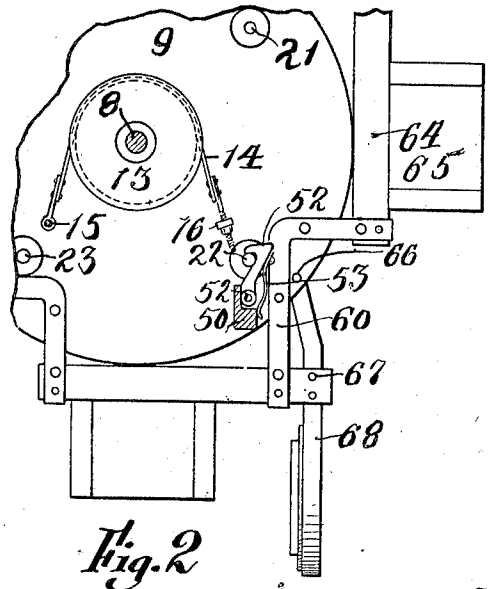


Fig. 2

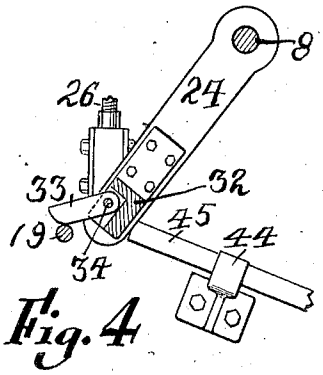


Fig. 4

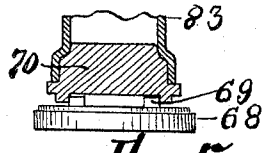


Fig. 5

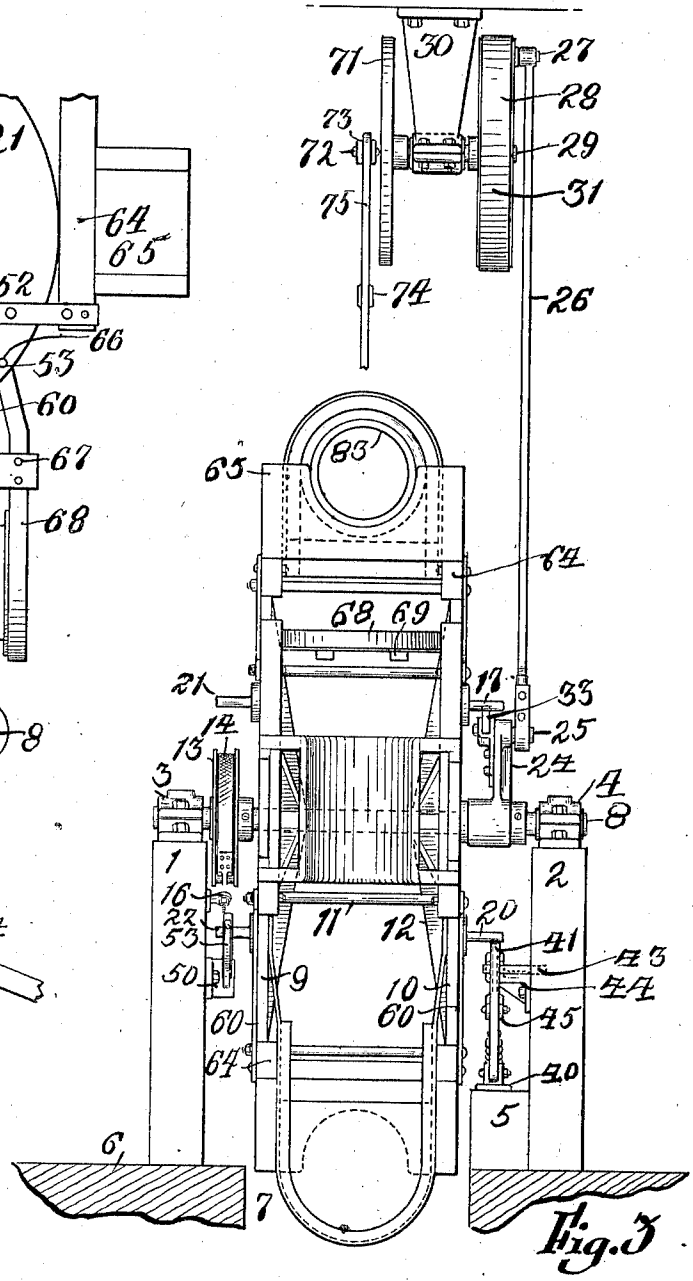


Fig. 3

Inventor

Marshall Caine,

By C. C. Humphrey

Attorney

UNITED STATES PATENT OFFICE.

MARSHALL CAINE, OF BARBERTON, OHIO.

MACHINE FOR INVERTING PIPE.

1,312,017. Specification of Letters Patent. Patented Aug. 5, 1919.

Application filed February 15, 1919. Serial No. 277,346.

To all whom it may concern:

Be it known that I, MARSHALL CAINE, a citizen of the United States, residing at Barberton, in the county of Summit and State of Ohio, have invented new and useful Improvements in Machines for Inverting Pipe, of which the following is a specification.

This invention relates to a machine for inverting pipe and is more especially adapted for the inversion of green sewer pipe which by reason of its softness must be dried with the socket or hub end upward.

As is well known sewer pipe is manufactured in a press with the hub or socket end downward and then must be inverted for the preliminary drying operation due to the fact that the weight of the pipe would distort the hub or socket in case the socket end was downward during the preliminary drying operation. In the manufacture of sewer pipe the socket forming head is lowered in unison with the pipe and then the pressure on the press is removed and the forming head lowered sufficiently to permit the placement of a pallet against the lower hub or socket end of the pipe and heretofore the pipe is lifted and inverted by hand and placed in a drying room. The inversion of pipe of any size even with the use of a pallet is an operation requiring trouble and expense and skill and hence the object of the present invention is to provide a machine by which the inversion of the pipe may be aided and assisted.

With the foregoing and other objects in view, the invention consists in the novel construction, combination and arrangement of parts constituting the invention to be hereinafter specifically described and illustrated in the accompanying drawings which form a part hereof wherein is shown the preferred embodiment of the invention, but it is to be understood that changes, variations and modifications can be resorted to which come within the scope of the matter hereinafter claimed.

In the drawings in which similar reference numerals indicate like parts in the different figures,

Figure 1 is a side elevation of a machine embodying the present invention.

Fig. 2 is a view of a portion of the mechanism on the side opposite to that shown in Fig. 1.

Fig. 3 is an end elevation looking from the left of Fig. 1.

Fig. 4 is a detail of the mechanism employed for rotating the device, and

Fig. 5 is a sectional view of the socket end of a sewer pipe positioned on a pallet and supported by a portion of the mechanism shown in Fig. 1.

Referring to the drawings in detail the device embodies two standards 1 and 2 provided at their upper ends with bearings 3 and 4. The standard 2 is provided with an offset constituting a seat 5 for a purpose to be later described. The standards 1 and 2 are mounted on a suitable foundation 6 provided with an opening 7 to permit the revolution of the mechanism to be further described.

Rotatably mounted in the bearings 3 and 4 is a shaft 8. Mounted on the shaft 8 are two circular disks 9 and 10 arranged in spaced relation and fixedly secured to the shaft 8 so as to revolve in unison therewith. These disks 9 and 10 are connected by cross bars 11 so that the two disks move together and are held from lateral and longitudinal movement with respect to each other. The disks 9 and 10 may if desired be reinforced by strengthening webs 12 preferably radially arranged and formed integral with the hub of each respective disk. Mounted on the shaft 8 is a flanged brake drum 13 about a portion of which extends a brake band 14 one end of which is anchored to a pin 15 secured to the standard 1 and the other end extending through a bracket 16 also secured to the standard 1 and having the end thereof threaded to accommodate a nut for controlling the tension of the brake band 14 on the brake drum 13. Disposed on the side face of the disk 10 are four pins 17, 18, 19 and 20 and similarly disposed on the opposite outer faces of the disk 9 are similarly disposed pins designated by reference numerals 21, 22 and 23 these being the only pins shown in the drawing, attention is directed especially to Figs. 2 and 3. The pin 21 is in transverse alinement with the pin 17, the pin 22 in axial alinement with the pin 20 and the pin 23 in alinement with the pin 19, and there is a pin, not shown which is in axial alinement with the pin 18. The pins on both of the disks are arranged in pairs the four pins on each disk are disposed so that two

of the pins are diametrically opposite to each other on opposite portions of the disk and the other two pins are similarly disposed and in lines at right angles with respect to the first pair of pins so that the pins are positioned around the surfaces of the disks at quadrant points. These points project outwardly from the sides of the disks and constitute means for the engagement of mechanism for rotating the disks in unison one-quarter of a revolution of each movement of the mechanism by which the disks are actuated.

The mechanism for rotating the disks in unison one-quarter of a revolution by a step by step movement consists of the following: Loosely mounted on the shaft 8 is a rocker arm 24 the outer end of which is provided with a pivot pin 25 to which is connected the head of a connecting rod 26 the upper end of which is pivotally connected to a pin 27 on a crank 28 mounted on a shaft 29 supported by a bracket 30. The outer face of the crank 28 is adapted to receive a belt pulley 31 by which the crank is rotated.

The free end of the rocker arm 24 is provided with a holding member 32 in which is pivotally mounted a catch 33 which is mounted on a pivot pin 34 the normal tendency of the latch being to fall by gravity to its operative position for a purpose to be described. The length of the rocker arm 24 is such that as it oscillates it passes in close proximity to the pins 17, 18, 19 and 20 and the catch 33 projecting beyond the end of the rocker arm inoperatively engages these pins when the rocker arm 24 is moved in one direction and the catch successively engages these pins during the upward oscillation of the arm. During the upward movement of the arm, as the catch 33 engages successively under the various pins 17 to 20 inclusive it imparts a partial rotation to the two disks and shaft 8, in other words the catch 33 rides inoperatively over the pins in its downward movement and engages under each pin successively and partially rotates the entire structure during its upward movement.

In order to positively lock the combined disks against movement at predetermined intervals when moved by means of the mechanism just described, I provide the following: Mounted on the shelf 5 is a hinge 40 to which is pivotally connected an arm 41 of such length that when swung in one direction it will encounter one of the pins 17 to 20 inclusive and arrest revolution of the disks. This arm is arranged to be swung into proper position to successively encounter one of these pins and constitute an abutment or a positive stop against rotation of the disks. The movement of the arm 41 toward its operative position is induced by means of a spring 42 anchored to a suitable member on the step 5 and limit the movement of the arm 41. A pin 43 is provided which projects outwardly from the standard 2. The oscillations of the arm 41 out of the path of movement of the various pins 17 to 20 inclusive is accomplished by the following means: Secured to the standard 2 is a bracket 44 in the outer end of which is a bearing in which is a slidably mounted bar 45 one end of which is pivotally connected at 46 with the arm 41 and the opposite or free end is so positioned as to lie in the path of movement of the rocking arm 24 when the latter is in its lower position, that is to say that when the arm 24 is oscillated or moved to its lower position to enable the catch 33 to engage the pin 19 in Fig. 1 the arm 24 will encounter the end of the bar 45 and oscillate the arm 41 to move the free end thereof out of engagement with the pin 20 thereby releasing the locking engagement between the pin 20 and the arm 41 to permit the catch 33 to rotate the two disks in unison one-quarter of a revolution on the next upward stroke or reciprocation of the rod 26.

Secured to the inner face of the standard 1 is a bracket 50 which supports a pivot pin 51 on which is a catch 52 held in its operative position by means of a spring 53 so that the operative portion of the catch will lie in the path of movement of the pins on the disk 9 and engage them successively and constitute a lock against reverse rotation of the two disks 9 and 10.

Secured to the outer faces of both disks 9 and 10 are brackets for supporting pipe receiving cradles and as the arrangement and construction of the mechanisms on the two disks are similar it is believed that a description of the mechanism connected with the disk 10 and shown best in Fig. 1 will be sufficient for the understanding of both. The mechanism for supporting the cradles comprises a plurality of L-shaped arms 60 so positioned and disposed that each of the brackets are arranged to support the cradle holding mechanism of two coadjacent cradles. In Fig. 1 as shown the L-shaped members 60, 61, 62 and 63 which are equally disposed about the face of the disk 10 with the arms of coadjacent brackets arranged in parallelism. As the arrangement of all of the brackets and the mechanism supported thereby is similar it is believed that a description of one will be sufficient for the understanding of them all, and hence reference is directed to the brackets 60 and 61. Extending between the arms of the brackets 60 and 61 is a bar 64 and corresponding brackets are provided on the outer face of the disk 9 and also a bar similar to the bars 64 extending between the brackets on this latter disk. Secured by any appropriate means and extending between the bars 64 is a cradle

65 which comprises a semicircularly-formed member which constitutes a supporting medium for the pipe during its inversion. Secured by fastening means 66 to the inner faces of the two disks 9 and 10 and also secured by fastening means 67 to the bars 64 is a supporting platform 68 provided with a pair of guides 69, which constitute means on the platform 68 to support the pipe during a portion of its revolution during its inversion. Adapted to be temporarily positioned on each platform 68 is a pallet 70 provided with suitable lugs or ribs to interengage with the ribs 69 for holding the pallet in proper position. The upper conformation of the pallet 70 is such that it may be inserted in the socket or hub end of a sewer pipe and sustain the same during the inverting operation. The cradles 65 are arranged in pairs with the members of the pairs opposite to each other or equally spaced about the disks 9 and 10.

Mounted on the shaft 29 and reference is directed to Fig. 3 is a crank 71 bearing a pin 72 on which is pivotally mounted a connecting rod 73. The crank 71 is adapted to rotate in unison with the shaft 29 and induce reciprocal motion of the connecting rod 73. Pivotally mounted on a suitable support 74 is a lever 75 one end of which is pivotally connected with the connecting rod 73 and the opposite end 76 bifurcated and also provided with elongated slots 77.

Mounted in suitable supports 80 and 81 is a horizontal shaft 82 arranged in axial alinement with a pipe 83 which is in its horizontal position during the inverting operation. Loosely secured on the shaft 82 is a collar 84 provided with laterally projecting nogs 85 which engage in the slots 77 of the free end of the lever 75. On one side of the collar 84 is a fixed collar 86 which holds the collar 84 from longitudinal movement. Fixedly mounted on the shaft 82 is one member 87 of a cone-shaped friction clutch the hub of which serves to constitute an abutment for the collar 84. By this arrangement when the crank 71 is rotated the connecting rod 73 is reciprocated, the lever 75 oscillated and the shaft 82 shifted toward and away from the smaller end of the sewer pipe 83 which is in its upper or horizontal position. Mounted on the inner end of the shaft 82 is a yoke 90 the separated arms of which are wider than the diameter of the pipe 83 and extending between these separated ends is a wire 91 which is kept under tension by means of a take-up device 92.

Mounted on a suitable supporting bracket 93 is a horizontal shaft 94 arranged at right angles with respect to the shaft 82 and bearing a driving pulley 95 which is rotated by a belt 96. The shaft 94 is equipped with a cone-shaped friction clutch member arranged to lie in the path of movement of the member 87 when the latter is shifted to its operative position and to thereby induce rapid rotation of the shaft 82 and the yoke 90 with its cutting wire 91.

The operation of the device is as follows: Motion is communicated to the shaft 29 by means of the belt 31 running over the outer face of the crank 28 causing a reciprocal up and down movement of the connecting rod 26. As the lower end of the connecting rod moves to its lower position the catch 33 rides over, inoperatively, one of the pins on the disk 10 after which the catch 33 moves by gravity to its operative position. Downward movement of the connecting rod 26 of course oscillates the arm 24 which during its downward movement, engages the end of the bar 45 and shifts the latter to the left in Fig. 1 causing it to oscillate the arm 41 out of operative engagement with one of the pins, for instance, pin 20, on the disk 10. As the connecting rod and arm 24 move to their upper position the disks 9 and 10 are given a one-quarter of a revolution due to the engagement of the catch 33 with one of the pins on the disk 10 and as soon as the upward movement of the arm 24 commences, engagement between the arm 24 and the arm 45 terminates, and the spring 42 draws the arm 41 into operative position to engage the next succeeding pin on the disk 10 to operate as a temporary positive stop or abutment against further movement of the two disks. In view of the fact that the sewer pipe to be inverted by this device is heavy there is always a liability of the disks overrunning or revolving farther than is desired and consequently the brake mechanism shown best in Fig. 2 is employed which comprises a partial band brake 14 and in order to effect a positive lock against reverse rotation the catch 52 is employed so that the mechanism to revolve the device by a step by step movement which is preferably one-quarter of a revolution is provided for. In practice one operator inserts a pallet under the green pipe at the socket end and places the pallet with its supported pipe on the horizontal face of one of the platforms 68 and the pipe is carried upwardly one-quarter of a revolution into the position shown at the top of Fig. 1 where it is supported by the cradle 65 in a horizontal position and while in this position the front end of the pipe is trimmed. This trimming operation is performed by means of the wire 91. As the crank 71 revolves it oscillates the lever 75 causing a horizontal movement of the shaft 82 toward and away from the pipe 83 and when the wire approaches its operative position the cone pulley 87 engages the cone pulley 97 and rapid rotation of the shaft 82, yoke 90, and wire 91 takes place which effectually trims the open or unsocketed end of the sewer pipe. Before further move-

ment of the disks takes place the trimming wire 91 is withdrawn by the same mechanism which brought it into operative position allowing the pipe 81 to be moved to the left in Fig. 1 where it is received on a suitable platform by an attendant thereby accomplishing the inverting and trimming operation without any danger of injury to the green pipe and at the same time the trimming operation is secured and accomplished during the interval while the pipe 83 is in its horizontal position.

I claim—

1. A device of the class described embodying a frame revoluble in a vertical plane, cradles for holding pipe mounted on said frame and disposed near the peripheral portion thereof, said cradles arranged to hold said pipe during the orbital movement of said pipe about the axis of revolution of said frame during the inverting operation, automatic means operable only to revolve said frame intermittently a fractional portion of a revolution at a time, and means to operate said frame revolving means.

2. A device of the class described embodying a frame revoluble in a vertical plane, cradles for holding pipe mounted on said frame and disposed near the peripheral portion thereof, said cradles arranged to hold said pipe during the orbital movement of said pipe about the axis of revolution of said frame during the inverting operation, automatic means including a rocker arm operable only to revolve said frame a fraction of a revolution by a step by step movement, and means including a crank and connecting rod to operate said rocker arm.

3. A device of the class described embodying a frame revoluble in a vertical plane, cradles for holding pipe mounted on said frame and disposed near the peripheral portion thereof, said cradles arranged to hold said pipe during the orbital movement of said pipe about the axis of revolution of said frame during the inverting operation and means to revolve said frame a fraction of a revolution by a step by step movement, a trimming device adapted to trim the unsocketed end of each pipe while in its horizontal position.

4. A device of the class described embodying a frame revoluble in a vertical plane, cradles for holding pipe mounted on said frame and disposed near the peripheral portion thereof, said cradles arranged to hold said pipe during the orbital movement of of said pipe about the axis of revolution of said frame during the inverting operation and means to revolve said frame a fraction of a revolution by a step by step movement, a rotatable trimming device adapted to trim the unsocketed end of each pipe while in the horizontal position.

5. A device of the class described embodying a frame revoluble in a vertical plane, cradles for holding pipe mounted on said frame and disposed near the peripheral portion thereof, said cradles arranged to hold said pipe during the orbital movement of said pipe about the axis of revolution of said frame during the inverting operation, means to revolve said frame a fraction of a revolution by a step by step movement, a rotatable trimming device arranged to reciprocate tangentially with respect to the axis of movement of said pipes and arranged to engage and trim the unsocketed end of each pipe while in a horizontal position.

6. A device of the class described embodying a frame revoluble in a vertical plane, cradles for holding pipe mounted on said frame and disposed near the peripheral portion thereof, said cradles arranged to hold said pipe during the orbital movement of said pipe about the axis of revolution of said frame during the inverting operation, means to revolve said frame a fraction of a revolution by a step by step movement, a trimming device arranged to reciprocate tangentially with respect to the axis of movement of said pipes and arranged to engage and trim the unsocketed end of each pipe while in a horizontal position and means to reciprocate said trimming device toward and away from said pipe.

7. A device of the class described embodying a frame revoluble in a vertical plane, cradles for holding pipe mounted on said frame and disposed near the peripheral portion thereof, said cradles arranged to hold said pipe during the orbital movement of said pipe about the axis of revolution of said frame during the inverting operation, means to revolve said frame a fraction of a revolution by a step by step movement, a rotatable trimming device arranged to reciprocate tangentially with respect to the axis of movement of said pipes and arranged to engage and trim the unsocketed end of each pipe while in a horizontal position, means to rotate said trimming device, and means to shift said trimming device toward and away from the pipe while in its horizontal position.

8. A device of the class described embodying a frame revoluble in a vertical plane, cradles for holding pipe mounted on said frame and disposed near the peripheral portion thereof, said cradles arranged to hold said pipe during the orbital movement of said pipe about the axis of revolution of said frame during the inverting operation, means to revolve said frame a fraction of a revolution by a step by step movement, a rotatable trimming device arranged to reciprocate tangentially with respect to the axis of movement of said pipes and arranged to engage and trim the unsocketed end of each pipe while in a horizontal position, means to shift said trimmer into engagement with

a pipe while in its horizontal position, means to rotate said trimmer while in engagement with said pipe, said means being inoperative when said trimmer is shifted out of engagement with said pipe.

9. A device of the class described embodying a frame revoluble in a vertical plane, cradles for holding pipe mounted on said frame and disposed near the peripheral portion thereof, said cradles arranged to hold said pipe during the orbital movement of said pipe about the axis of revolution of said frame during the inverting operation, automatic means operable only to revolve said frame intermittently a fractional portion of a revolution at a time, means to operate said frame revolving means, and means to lock said frame against unintentional rotary movement, said means being arranged to automatically operate at the termination of the intermittent movement of said frame.

10. A device of the class described embodying a frame revoluble in a vertical plane, cradles for holding pipe mounted on said frame and disposed near the peripheral portion thereof, said cradles arranged to hold said pipe during the orbital movement of said pipe about the axis of revolution of said frame during the inverting operation, automatic means operable only to revolve said frame intermittently a fractional portion of a revolution at a time, means to operate said frame revolving means, and means to lock said frame against unintentional reverse rotation, said means being arranged to automatically operate synchronously with the termination of the intermittent movement of the frame.

11. A device of the class described embodying a frame revoluble in a vertical plane, cradles for holding pipe mounted on said frame and disposed near the peripheral portion thereof, said cradles arranged to hold said pipe during the orbital movement of said pipe about the axis of revolution of said frame during the inverting operation, automatic means operable only to revolve said frame intermittently a fractional portion of a revolution at a time, means to operate said frame revolving means, locking mechanism arranged to arrest the revolution of said frame automatically at predetermined intervals and to prevent forward rotation of said frame, and locking mechanism engaging said frame to prevent reverse rotation thereof and arranged to engage said frame at each termination of movement thereof and to synchronize with the frame revolving means.

In testimony whereof I have hereunto set my hand.

MARSHALL CAINE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."