Dec. 21, 1954 J. C. QUEBERG 2,697,264

PIPE PERFORATING MACHINE

Filed Oct. 21, 1950

2 Sheets-Sheet 1

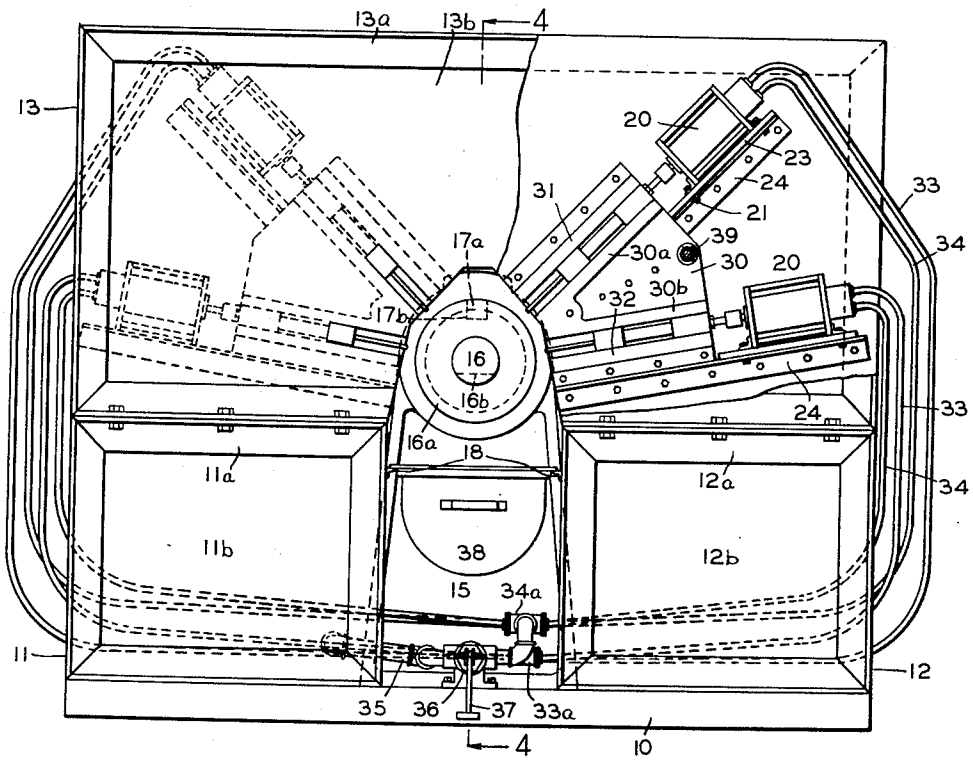


FIG. - 1

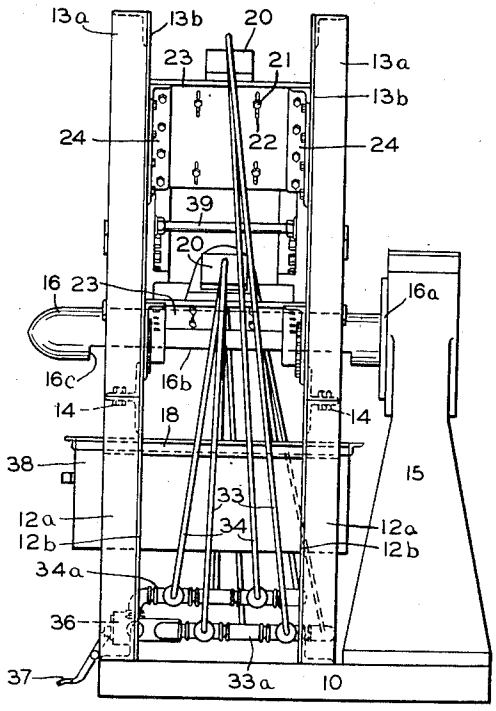


FIG. - 2

INVENTOR.
JOHN C. QUEBERG
BY
Hyde, Meyer, Baldwin & Doran
ATTORNEYS

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2 Sheets-Sheet 2

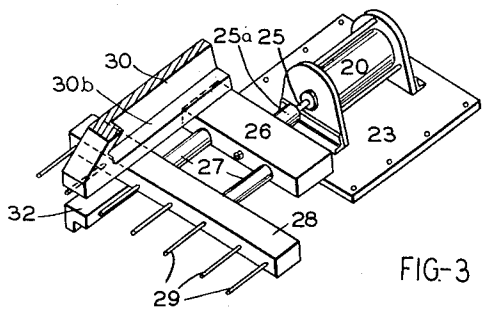


FIG.-3

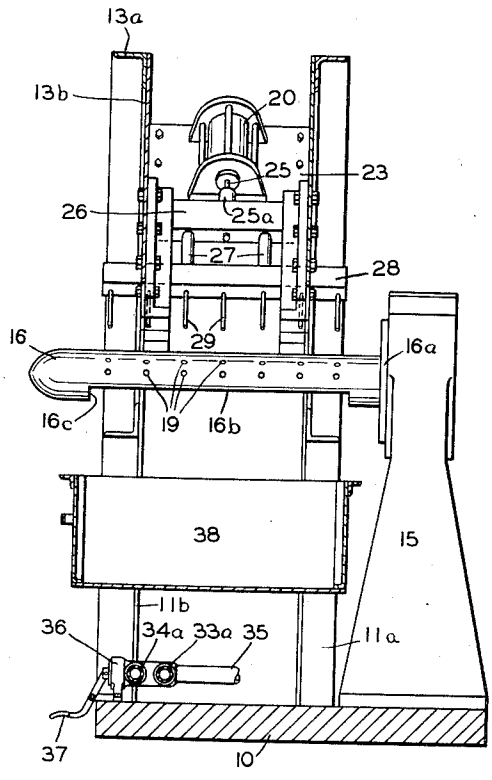


FIG.-4

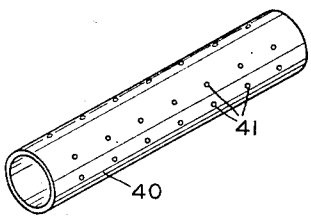


FIG.-5

INVENTOR.
JOHN C. QUEBERG

BY

Hyde, Meyer, Baldwin & Doran

ATTORNEYS

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PIPE PERFORATING MACHINE

John C. Queberg, Akron, Ohio, assignor to American Vitrified Products Company, Cleveland, Ohio, a corporation of New Jersey

Application October 21, 1950, Serial No. 191,362

3 Claims. (Cl. 25—105)

This invention pertains to novel and improved pipe perforating machines and more particularly to machines for perforating drainage pipes made from clay or other plastic material.

As is known to those skilled in the art drainage pipes normally have a number of small holes in their under semi-cylindrical portion in order to allow drainage liquid to enter the pipe. These perforations are generally made in the newly formed pipe, before baking.

An object of this invention is to provide an improved machine for perforating a section of pipe at a plurality of locations in a single operation and by time-saving as well as efficient means.

Other objects and advantages will become apparent from the following description, in conjunction with the accompanying drawings.

In the drawings, in which like numerals refer to like parts throughout,

Fig. 1 is a front elevational view of the machine, partly broken away, to reveal internal structure;

Fig. 2 is an end elevational view;

Fig. 3 is a perspective view of one of the punch units used in the machine;

Fig. 4 is a sectional view taken on line 4—4 of Fig. 1 but omitting one of the punch units for the sake of clarity, and,

Fig. 5 is a perspective view of a typical pipe after perforation.

Speaking first generally the invention comprises a frame having adjustably mounted thereon a plurality of punch units angularly disposed about a mandrel on which the pipe is retainably supported. Each punch unit is powered by a fluid motor and punches a plurality of holes simultaneously; actuation of all units is controlled by a single valve.

Referring to the drawings which illustrate a preferred embodiment, the structure on which the various parts are mounted comprises a base **10** carrying three box-like sections **11**, **12** and **13**. Sections **11** and **12** are similar in all respects and are formed of angle irons **11***a* and **12***a* which rigidly support metal walls consisting of sheets **11***b* and **12***b*, respectively. Mounted on top of sections **11** and **12** is a section **13**, also constructed of angle iron **13***a* and sheet metal walls **13***b*. All sections are joined together by suitable means, as, for example, bolts **14**. Rods **39** serve to brace the structure.

Mounted on the rear portion of base **10** is a pedestal **15** which retains and supports the end portion **16***a* of mandrel **16**. Mandrel **16** is of generally cylindrical shape and slightly smaller in diameter than the inside diameter of the pipe to be perforated. A portion is cut out of the bottom section as shown at **16***b* to allow the droppings resulting from the perforating operation to fall into a drawer **38** disposed between sections **11** and **12**, and slidably supported by brackets **18** attached to said sections **11** and **12**. The droppings are scraped out of the pipe by shoulder **16***c* as the pipe is withdrawn from mandrel **16**. Mandrel **16** is removable from pedestal **15** and is fixedly maintained in the correct orientation in the pedestal by a complementary key and keyway combination **17***a* and **17***b*. Mandrel **16** has apertures **19** formed therein and arranged in four longitudinal rows parallel to its axis. These apertures receive the tips of the punches soon to be described.

In the present embodiment the perforating operation is performed by four identical punch units mounted in the upper frame section **13** and angularly disposed around

mandrel **16**. Each unit is powered by a fluid motor **20**, adjustably mounted by bolts **21** through slots **22** in a plate **23** which is supported between the metal sheets **13***b* by brackets **24**. In this instance, air motors of a conventional double-acting type are used to reciprocate the punch units. The piston rod **25** of each motor is attached through extensions **25***a* to guide bar **26** which has push rods **27** connecting it to punch bar **28**. Set into punch bar **28** are seven punches **29**, of equal length, all lying in a common plane and parallel to each other and radially disposed with respect to the longitudinal axis of the mandrel.

Guide ways are provided in which the ends of guide bar **26** ride as the motor piston is reciprocated. In the preferred embodiment, cooperating guide blocks **30**, **31**, **32** are carried on walls **13***b*, and are suitably spaced to receive, in slidable relationship, the ends of punch bars **28**. The central V-shaped block serves simultaneously to provide the edges **30***a* and **30***b* of the upper and lower guide ways which are respectively complementary to the blocks **31** and **32**. All of the pieces just described are bolted to the sheet metal walls **13***b*. The metal walls **13***b* are slotted so that punch bars **28** may project through on both sides.

The punch units are arranged radially about mandrel **16** and so aligned that the planes of reciprocation of the units intersect on the axis of the mandrel. The exact angular disposition of the units is not critical and the illustration of the embodiment herein is not to be understood as a limitation of the invention. However, in this preferred embodiment, the units are positioned at approximately 45° and 80° respectively, on each side of the vertical plane through the mandrel axis.

When the units are in their forward position, as will be hereinafter described, the punches **29** intersect the mandrel **16** and are received into the respective apertures **19** in the mandrel. These apertures **19** are slightly larger than punches **29**.

Each motor has two fluid power feed conduits, one conduit **33** to advance the unit towards perforating position, and a second conduit **34** to retract the unit to its initial idle position. When the fluid power is air, as in the embodiment illustrated, an air compressor (not shown) provides pressure through line **35** to valve **36** which is operated by treadle **37**. Treadle **37** is spring held in its upper position whereby air pressure is transmitted through valve **36**, line **34***a*, and "retract" conduits **34** to motors **20** to hold all punch units in their retracted or idle position as shown in the drawings. When the operator depresses treadle **37**, valve **36** is actuated and the path of the compressed air is through line **33***a* and "advance" conduits **33** to motors **20**. Thus, the punch units are all moved inward toward mandrel **16** into perforating position as motor piston rods **25** move forward. When the treadle is released, the air pressure through conduits **34** again returns the units to idle position.

Although the machine is not limited to operations on a particular size pipe, the preferred embodiment described herein is adapted to perforate 4, 6, and 8 inch pipe. Therefore, three mandrels are provided, one for each of the pipe sizes. As previously pointed out, the mandrel is of a size whereby the pipe may be easily slipped over it with a frictional sliding fit. Each mandrel, of course, has an enlarged end portion **16***a* of the proper size to fit into pedestal **15** and a keyway **17***b* to cooperate with the pedestal key **17***a*.

When it is desired to perforate a pipe, the operator first selects the mandrel of the size corresponding to the pipe size and inserts it into pedestal **15**. When positioned in the pedestal so that the key and keyway **17***a*, **17***b* are interlocked, the apertures **19** in mandrel **16** are properly aligned with respect to the punches **29**. When the pipe **40** is slipped over mandrel **16**, the punch units are in their retracted or idle position as shown in Fig. 1. The operator then steps on treadle **37** which through valve **36**, cuts off the air pressure from line **34***a* and "retract" conduits **34**, and admits pressure to the line **33***a* and "advance" conduits **33**. The motors **20** thereby cause the piston rods **25** to move forward, advancing the punch units composed of guide bars **26**, push rods **27**, punch bars **28** and punches

29 toward the pipe 40 and mandrel 16. The forward movement continues until the punches 29 have gone through the pipe wall and entered into the apertures 19 in the mandrel 16. The movement is stopped when the pistons in each motor 20 have reached their limit of travel. The operator then releases treadle 37 which admits air pressure through line 34*a* and "out" conduits 34 to withdraw punches 29 from perforating relationship with the mandrel and pipe and returns the punch units to their rest position. As the pipe 40 is pulled off the mandrel 16, shoulder 16*c* scrapes the droppings out of the pipe and they fall into drawer 38 after the pipe is removed. The machine is then ready to operate on the next pipe.

Pipe 40 then appears as shown in Fig. 5. The perforations 41 correspond in position to apertures 19 on the mandrel 16.

As was previously pointed out motors 20 are adjustably mounted on plates 23. By loosening bolts 21, the motors may be moved radially toward or away from the mandrel in order to properly adjust punches 29 in perforating relationship with apertures 19 in the mandrel.

Any suitable source of fluid power, such as air or oil, may be used in the machine. Only slight changes in the valve and conduit system shown in this preferred embodiment would be necessary to convert the machine from air power to hydraulic power.

As can be seen from the above description of a preferred embodiment of the invention, the structure can be manufactured almost completely from readily available standard structural parts such as sheets, angles, rods, and plates. It is practically fool-proof and can be easily operated by unskilled labor after a short instruction period.

A valve controls the operation of all perforating units by means of a single treadle, thereby leaving the operator's hands free to quickly change the pipe sections being perforated. Thus, considerable speed in the operation can be attained.

In addition, fluid power is inexpensive, and, in the case of air, is "expendible." A closed system can be readily devised for oil power if desired.

Various changes in details and arrangements of parts can be made by one skilled in the art without departing from the spirit of the invention or the scope of the appended claims.

What I claim is:

1. Apparatus for producing perforations at predetermined locations in the tubular wall of a generally cylindrical section of drainage pipe formed from a hardenable mastic material comprising a supporting frame, an elongated tubular mandrel supported in fixed position on said supporting frame and having an opening through its lower

tubular wall, said mandrel having upper and lower exterior surfaces conforming to the interior surface of said pipe section whereby to support and maintain said pipe section in sleeved relation thereon, and perforating means supported on said frame and spaced around the upper portion of said mandrel, said perforating means including a plurality of punches and fluid power means for moving said punches toward and away from said mandrel, the outer surface of said mandrel being provided with a like plurality of apertures in axial alignment with said punches whereby, when said mandrel supports an unhardened pipe section, advance of said punches until said punches enter into said apertures produces perforations in said pipe section as desired and the droppings from said perforations fall through said opening onto the pipe bore, whereby the edge of said opening scrapes said droppings out of said pipe bore as the pipe is removed from said mandrel.

2. In a pipe punching machine, an elongated tubular mandrel, said mandrel having an opening in its lower tubular wall and having an exterior surface for supporting and maintaining pipe in sleeved relation thereon during punching, and punching means fixed to said mandrel and movable toward and away from said mandrel, the surface of said mandrel being provided with an aperture in alignment with said punch, whereby, when said mandrel supports a pipe, advance of said punch until said punch enters into said aperture produces a perforation in said pipe and the dropping falls through said opening onto the pipe bore, whereby the edge of said opening located in close proximity to the bottom of the pipe bore scrapes said dropping out of said pipe bore as the pipe is removed from said mandrel.

3. In a pipe machining apparatus, an elongated supporting member for supporting and maintaining a pipe in sleeved relation thereon during machining, a pipe machining means associated with said supporting member, said supporting member being so constructed that droppings from said machining can fall onto said pipe bore, scraping means fixed to said supporting member and located closely adjacent the bottom of the pipe bore when in sleeved relation for scraping said dropping out of said pipe bore as the pipe is removed from said supporting member.

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