Feb. 11, 1969 J. S. CONN 3,426,774

HYDRAULIC RAMS

Filed Oct. 24, 1966 Sheet 1 of 2

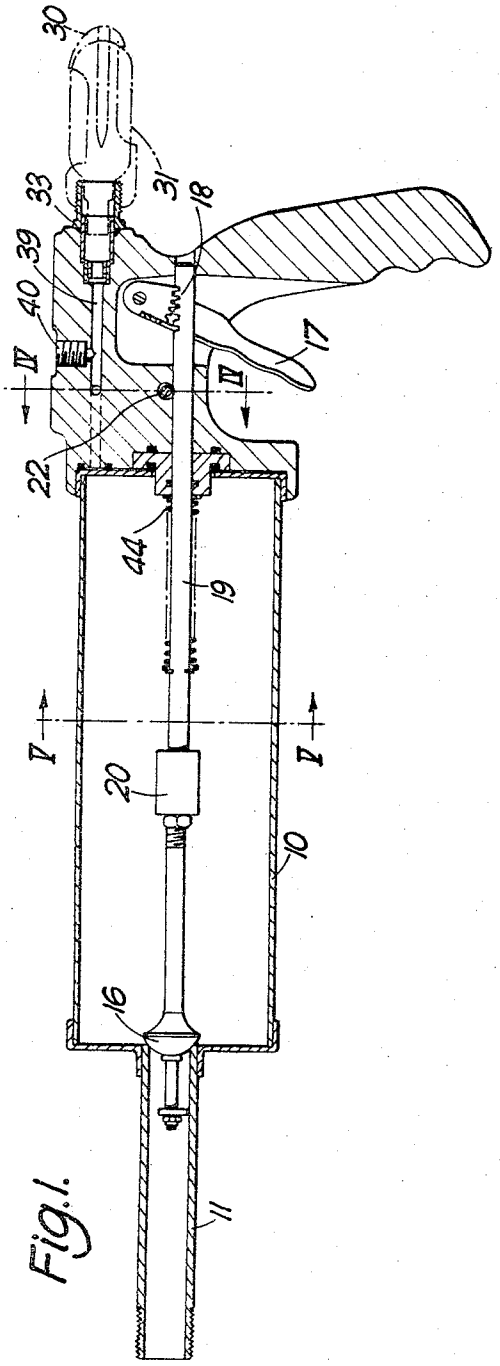


Fig. 1.

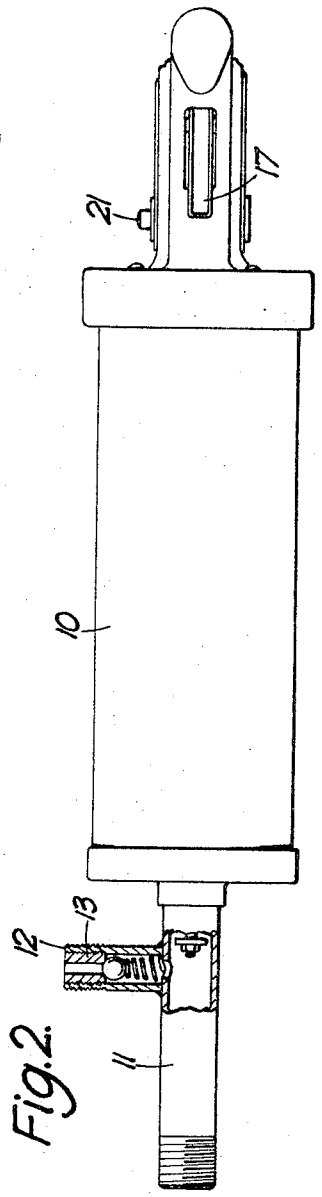


Fig. 2.

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Fig. 4.

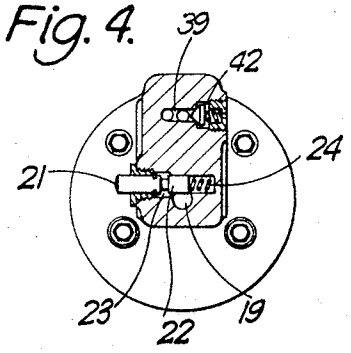


Fig. 3.

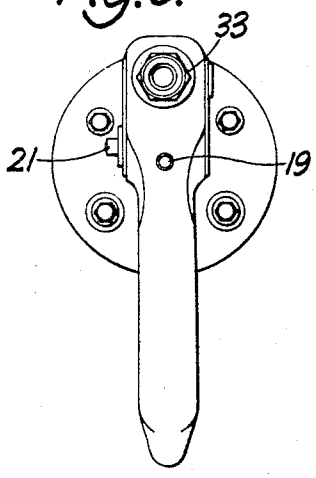


Fig. 5.

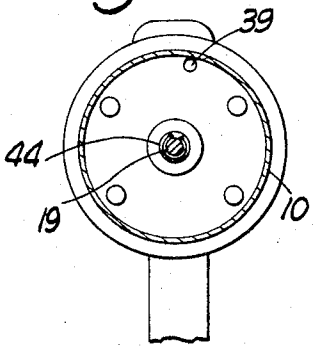
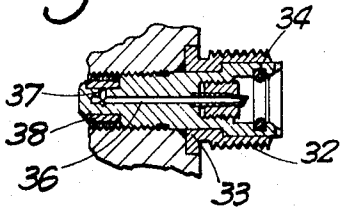


Fig. 6.



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3,426,774

HYDRAULIC RAMS

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Claims priority, application Great Britain, Oct. 25, 1965, 45,117/65
U.S. Cl. 134—166 2 Claims
Int. Cl. B08b 3/02, 9/00; B67b 7/24

The invention relates to hydraulic rams for use in clearing blocked pipes, drains and other conduits and of the kind in which a sudden application of gas pressure is employed to impart a shock to a column of water (or other liquid) against the blockage, the ram comprising a cylinder with an outlet by which gas pressure within the cylinder may be applied to the column of water.

The invention provides a hydraulic ram of the above kind having incorporated in the ram a cartridge or bottle capable of producing or releasing sufficient gas under pressure for a single operation of the ram and means whereby said gas pressure may be suddenly applied at the outlet.

In a more specific form the invention provides a hydraulic ram of the kind in which to clear a blocked conduit a sudden release of gas pressure is employed to impart a shock to a column of water (or other liquid) against the blockage, the ram comprising a cylinder in which gas is held under pressure and a valve controlled outlet by which the gas pressure may be rapidly released and applied to the column of water, characterised in that the cylinder is charged with gas pressure from a cartridge or bottle incorporated in the ram and containing sufficient gas for a single operation of the ram.

The last-mentioned form of the invention may have an inlet to the cylinder, means for holding a gas-containing cartridge in sealing relation with the inlet and means for piercing the cartridge to release the gas into the cylinder. The cartridge may contain carbon dioxide and for example be of the kind commonly employed for making soda water in the home.

In another more specific form of the invention an explosive cartridge is employed to produce the gas and there are means for firing the cartridge into the cylinder.

The ram according to the invention may also be used for leak testing under static pressure installations such as central heating installations or household plumbing. For this purpose the installation is filled with water, the outlet is sealed thereto, the gas pressure is developed in the cylinder and applied to the installation. The loss of pressure is then an indication of leakage.

A specific embodiment of a ram according to the invention will now be described, by way of example, with reference to the accompanying drawings in which:

FIGURE 1 is a section through the ram,

FIGURE 2 is an under-plan of the ram shown in FIGURE 1,

FIGURE 3 is an end view of the ram,

FIGURE 4 is a section on the line IV—IV in FIGURE 1,

FIGURE 5 is a section on the line V—V in FIGURE 1, and,

FIGURE 6 is a section showing the cartridge sealing and piercing device.

The ram comprises a cylinder **10** having an outlet pipe or manifold **11** which may be inserted directly or through a pipe extension into a blocked pipe to be cleared. Suitable sealing means such as expansion plugs (not shown) may be provided between the outlet pipe or extension and the blocked pipe. Alternatively or in addition adaptor plugs may be used. Although the ram will normally be

used as a portable device to be connected into a blocked system as and when required, it may be permanently connected into a system which is particularly liable to blockage.

Thet pipe **11** has an inlet **12** for water to provide a fluid column in the outlet and blocked pipe. There is an automatic non-return valve **13** in the inlet. The inlet is intended for a hose connection to a water tap.

The outlet **11** is controlled by a valve member **16** rapidly operable by a trigger **17** acting through a rack and pinion **18** on a rod **19** to which the valve member **16** is attached, the rod being adjustable in length by means **20**. To ensure that the trigger is not operated unintentionally there is a locking device **21** comprising a rod **22** engageable in a notch in rod **19**. The rod **22** has a neck **23** and can be moved endwise against a spring **24** to bring the neck into the notch and so to release the rod **19** for operation.

At the top of the cylinder there is a holder **30** for a CO_2 cartridge or bottle **31**. The holder comprises a tubular cap, open at one side, screwed onto a thread **32** on a nipple **33** (see FIGURES 1 and 6) screwed into the body of the ram. Within the nipple there is an O-ring **34** which surrounds and makes sealing engagement with, the neck of the bottle. Also within the nipple there is a tubular piercer **35** which pierces the end of the bottle when the bottle is forced against it by the cap. The piercer communicates with a passage **36** leading to an outlet (or outlets) **37** surrounded by an elastic sleeve **38** which serves as a non-return valve. Gas passing along passage **36** can lift the sleeve and pass into a passage **39** leading into the cylinder **10**. The construction is similar to that embodied in soda water siphons to be charged in the home. A connection **40** is provided in the passage **39** for a pressure gauge or indicator. There is also, in the same passage a pressure relief or safety valve **42** set, in this example, to lift at 180 to 200 p.s.i. The capacity of this valve should at least equal the maximum discharge rate of the bottle.

The pressure (about 750 p.s.i.) and proportions of the cartridge and cylinder are such that a pressure of about 60 to 100 lbs./sq. inch is developed in the cylinder when the cartridge is pierced. This pressure is suitable for most purposes but if a higher pressure is desired a second cartridge may be released into the cylinder, the valve **42** ensuring safety.

In use, the outlet or extension thereof is inserted into the blocked pipe, the pipe is filled with water through the inlet and the cartridge is then pierced to allow the gas to pass into the cylinder. Finally and while the ram is supported against recoil, the valve **16** is rapidly opened so that the gas pressure imparts a shock to the liquid column.

There is a return spring **44** for the valve **16** and it is desirable that the strength of this spring is sufficient to close the valve against the pressure of the water supply to prevent the cylinder being filled with water.

If the device is to be used to effect a static leak test, the valve **16** is opened slowly after the cylinder has been charged with gas and the rate of drop of pressure is observed.

In an alternative embodiment the bottle **31** and piercing device are replaced by an explosive cartridge and firing means. The charge in the cartridge is appropriate to produce the gas pressure desired in the cylinder. With this arrangement the valve **16** may be omitted although means to prevent the cylinder filling with water are desirable.

I claim:

1. A hydraulic apparatus for use in clearing a blocked conduit through the ram effect of liquid comprising a chamber with an inlet and an outlet, a valve normally closing the outlet and manually operable for opening,

support means for a compressed gas cartridge at the inlet, the cartridge having a neck entering the inlet, means for sealing the neck to the inlet, a fixed piercer within the inlet against which a portion of the cartridge is adapted to be forced for puncturing a portion of the cartridge and for conducting the gas through the inlet into the chamber, a non-return valve at the discharge end of the cartridge preventing return of the gas through the inlet in the event of the use of two cartridges, an outlet conduit leading from the outlet, a liquid inlet connection to the outlet conduit outwardly of said outlet with a non-return valve therein, the volume of the chamber and the gas contents of the cartridge being such that a pressure of 60 to 100 lbs./sq. inch is developed in the chamber when the cartridge is pierced, and spring means to urge said valve to closed position of a strength to prevent the entry of liquid from the conduit into the chamber through its outlet.

2. A hydraulic apparatus as claimed in claim 1 wherein said chamber is elongated with said inlet and outlet at opposite ends thereof and said outlet conduit is of materially less cross section than said chamber and extends from the outlet of the latter.

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H. S. LANE, *Assistant Examiner.*

U.S. Cl. X.R.

15—406; 222—5

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,426,774 February 11, 1969

Jack Samuel Conn

It is certified that error appears in the above identified patent and that said Letters Patent are hereby corrected as shown below:

In the heading to the printed specification, line 4, "assignor to" should read -- assignor of one-half to --.

Signed and sealed this 21st day of April 1970.

(SEAL)
Attest:

Edward M. Fletcher, Jr.
Attesting Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents