

[54] **HYDRAULIC RAM**
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[73] Assignee: **Three Bond Co., Ltd.**, Tokyo, Japan
[22] Filed: **Oct. 15, 1973**
[21] Appl. No.: **406,152**

[30] **Foreign Application Priority Data**
May 22, 1973 Japan..... 48-60603

[52] **U.S. Cl.**..... **4/255**; 15/406; 134/166 C;
137/516.15; 251/340; 222/5; 222/518;
141/19; 141/327; 401/187; 401/190
[51] **Int. Cl.**..... **E03d 11/00**
[58] **Field of Search** 4/255; 15/405, 406, 407;
134/166 C; 137/68, 240, 625.38, 625.33,
516.15; 251/340; 222/5, 518; 141/91, 327,
19; 401/187, 196

[56] **References Cited**
UNITED STATES PATENTS
265,991 10/1882 Swank et al. 137/625.38
373,461 11/1887 Kees 15/407
1,806,270 5/1931 Thompson 15/407
1,854,518 4/1932 Little 137/516.15
2,757,685 8/1956 Fritsch 137/516.15
3,426,774 2/1969 Conn 134/166 C

Primary Examiner—Henry K. Artis
Attorney, Agent, or Firm—Donald D. Mon

[57] **ABSTRACT**
This 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 against the blockage.

6 Claims, 4 Drawing Figures

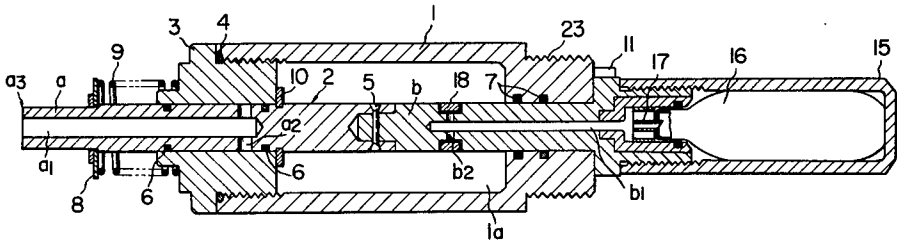


FIG. 1

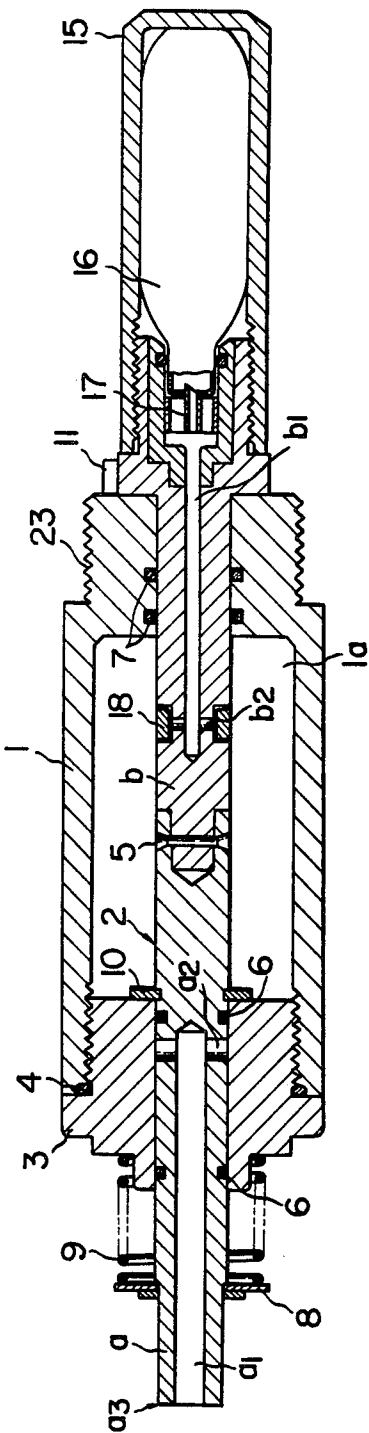


FIG. 2(a)

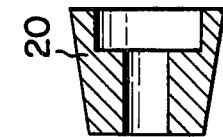


FIG. 2(b)

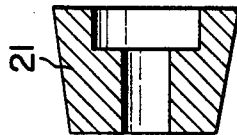
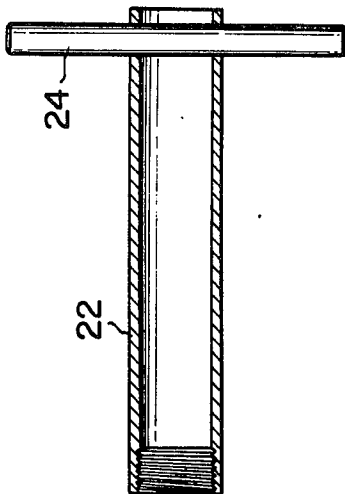


FIG. 3



HYDRAULIC RAM

Heretofore, in conventional hydraulic rams as described in U.S. Pat. No. 3,426,774, pressure gas is conducted to a nozzle through a check valve, and opening said check valve by a trigger or pushing pin, to apply said pressure gas to the blocked conduit, pipe or other portion. However, said conventional hydraulic ram is a complicated construction due to said check valve, so that it is costly. Moreover, it is necessary to exert a strong force to open said check valve in opposition to said gas pressure.

Therefore, an object of the present invention is to provide a hydraulic ram of simple and inexpensive construction without employing a check valve.

Another object of the present invention is to provide a hydraulic ram easily operable by a relatively weak force and capable of employing high pressure gas for effectively clearing blocked pipes, etc.

Another object and feature of the present invention will be apparent from the following description with reference to the accompanying drawings in which:

FIG. 1 is a section through the ram of an embodiment of the present invention;

FIGS. 2a and 2b are a section of attachment means showing two examples; and

FIG. 3 is a section of joint pipe.

A shaft 2 is inserted slidably through a closed cylinder or pressure chamber 1, as shown in FIG. 1. A cap 3 is screwed to said cylinder 1 and is hermetically sealed to it by O-ring 4. Said shaft 2 consists of a front section *a* and a rear section *b*, and they are connected by pin 5 each to the other. The front section *a* and rear section *b* are inserted into said cap 3 and cylinder 1 respectively, and sealed by O-ring 6 and 7 ("second" and "first" seals, respectively). Washer 8 is fixed to front section *a* at a projected part extending beyond cap 3. Compressed spring 9 is inserted between said washer 8 and cap 3 to bias said cylinder 1 rearwardly (to the right in FIG. 1). Stop 10 is fixed to the inner part of said front section *a*. Key 11 engages shaft 2 to prevent its rotation.

Sleeve 15 closed at one end, is screwed to the rear end of said rear section *b* shaft 2. Gas bomb 16 is inserted into said sleeve 15. Sleeve 15 and its threads are sometimes referred to as "means to mount the gas bomb". Rear section *b* of shaft 2 has a piercing pipe 17 for breaking the mouth of bomb 16 and releasing the gas contained in the bomb. The pipe 17 communicates the pressure chamber 1a of cylinder 1 through bore b1 extending axially of said rear section *b*, and bore b2 extending radially of said rear section *b*. Rubber valve 18 is provided at the outlet of said bore b2. The right hand end of the shaft is sometimes referred to as its "first end", and the left hand end, the "other end".

Front section *a* of shaft 2 an axially-extending bore a1 and a radially-extending bore a2. Bore a2 opens at the peripheral surface of front section *a* of shaft 2 in front of stop 10 (i.e., to the left thereof in FIG. 1), so that said bores a1 and a2 communicate with pressure chamber 1a (sometimes called a "cavity") when said cylinder 1 advances sufficiently to the left in FIG. 1 relative to shaft 2. The cavity extends around the shaft, and receives gas under pressure to be discharged to clear a blockage. Bores a1 and b1 are sometimes respectively called "second conduit" and "first conduit," respectively. Said bore a1 opens to the front end of front section *a* of shaft 2 so that it forms nozzle a3. The

opening of bore a2 on the periphery of the shaft is sometimes called a "valving aperture".

Attachments 20 and 21, shown in FIG. 2, are to mount on said nozzle a3. The outer surface of said attachments 20, 21 conforms to the inlet of a pipe, conduit, or drain which is blocked and is to be cleared by a burst of gas from this ram.

Rear periphery of cylinder 1 includes a thread 23 to engage a matching internal thread pipe 22 has a handle 24 extending transversely across its axis.

In use, gas bomb 16 is inserted into the sleeve 15, and the sleeve 15 is screwed on cylinder 1 by its thread 23. The mouth of said bomb 16 is ruptured by the pipe 17, and pressure gas is introduced into pressure chamber of cylinder 1. Then, joint pipe 22 is connected to said cylinder 1 through its thread 23, and attachment 20 or 21 is mounted on said nozzle a3 and engages the inlet of pipe to be vented.

Then handle 24 is pushed forward (toward Nozzle a3), and said cylinder 1 moves forward against the force of spring 9. When said bore a2 of front section *a* of shaft 2 communicates to the pressure chamber of cylinder 1, pressure gas flows through bores a2 and a1, and exist through nozzle a3, parting a shock against blockage, and clearing the pipe, conduit, etc.

In the present invention, the construction of apparatus is simple because it does not employ a check valve, and gas pressure is balanced in the axial direction. This invention is not to be limited by the embodiment shown in the drawings and described in the description, which is given by way of example and not of limitation, but only in accordance with the scope of the appended claims.

I claim:

1. A ram for releasing gas under pressure to clear a clogged conduit, comprising: an axially extending central shaft; a peripheral cylinder surrounding said shaft, said shaft projecting at both of its ends from said cylinder, said cylinder forming a cavity around said shaft for the reception of gas under pressure; means on a first end of said shaft to mount a gas bomb, including piercing means to pierce the gas bomb and release its contents, said shaft including a first conduit extending from said piercing means to said cavity and second conduit means extending from the other end of the shaft to a valving aperture on the peripheral wall thereof; a first seal making a fluid-tight sliding seal between the cylinder and the shaft, and located between the cavity and the said first end; a second seal making a fluid-tight sliding seal between the cylinder and the shaft and located between the cavity and the other end of the shaft and also between the valving aperture and the cavity when the shaft is in a first axial position whereby to isolate the second conduit from the cavity in that position, the shaft and the cylinder being relatively slidable so the valving aperture can communicate with the cavity in a second axial position.

2. A ram according to claim 1 in which spring means opposed between the shaft and the cylinder bias the shaft toward said first position.

3. A ram according to claim 1 in which the means to mount the gas bomb comprises a sleeve threadedly attachable to the shaft.

4. A ram according to claim 1 in which a joint member comprises a tube adapted to surround and project beyond the gas bomb and bear against the cylinder to

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provide handle means for shifting the cylinder relative to the shaft.

5. A ram according to claim 4 in which spring means opposed between the shaft and the cylinder bias the shaft toward said first position.

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6. A ram according to claim 5 in which the means to mount the gas bomb comprises a sleeve threadedly attachable to the shaft.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 3,879,771
DATED : April 29, 1975
INVENTOR(S) : YASUJI NAKANE

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

Col. 1, line 34, "ring" should read--rings--
Col. 1, line 43, before "shaft" insert --of--
Col. 1, line 55, "a" should be italicized
Col. 1, line 55, after "2" insert --has--
Col. 1, line 57, "short" should read --shaft
Col. 1, lines 64-65, cancel "respectively"
Col. 2, line 2, "aperature" should read --aperture--
Col. 2, line 9, after "thread" insert --on a--
Col. 2, line 9, after "22" insert --. Pipe 22--
Col. 2, lines 19-20, "Nozzle w3" should read --nozzle a3--
Col. 2, line 24, "exist" should read --exists--
Col. 2, line 29, after "direction." insert --It does not
exert any resistance to operation. Only
spring 9 must be overcome. Therefore this
ram is easily operable by a relatively weak
force to release high pressure gas for
effective clearing of blocked pipes and the
like.--
Col. 2, line 29, "This" begins a new paragraph

Signed and Sealed this

fourth Day of November 1975

[SEAL]

Attest:

RUTH C. MASON
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents and Trademarks