

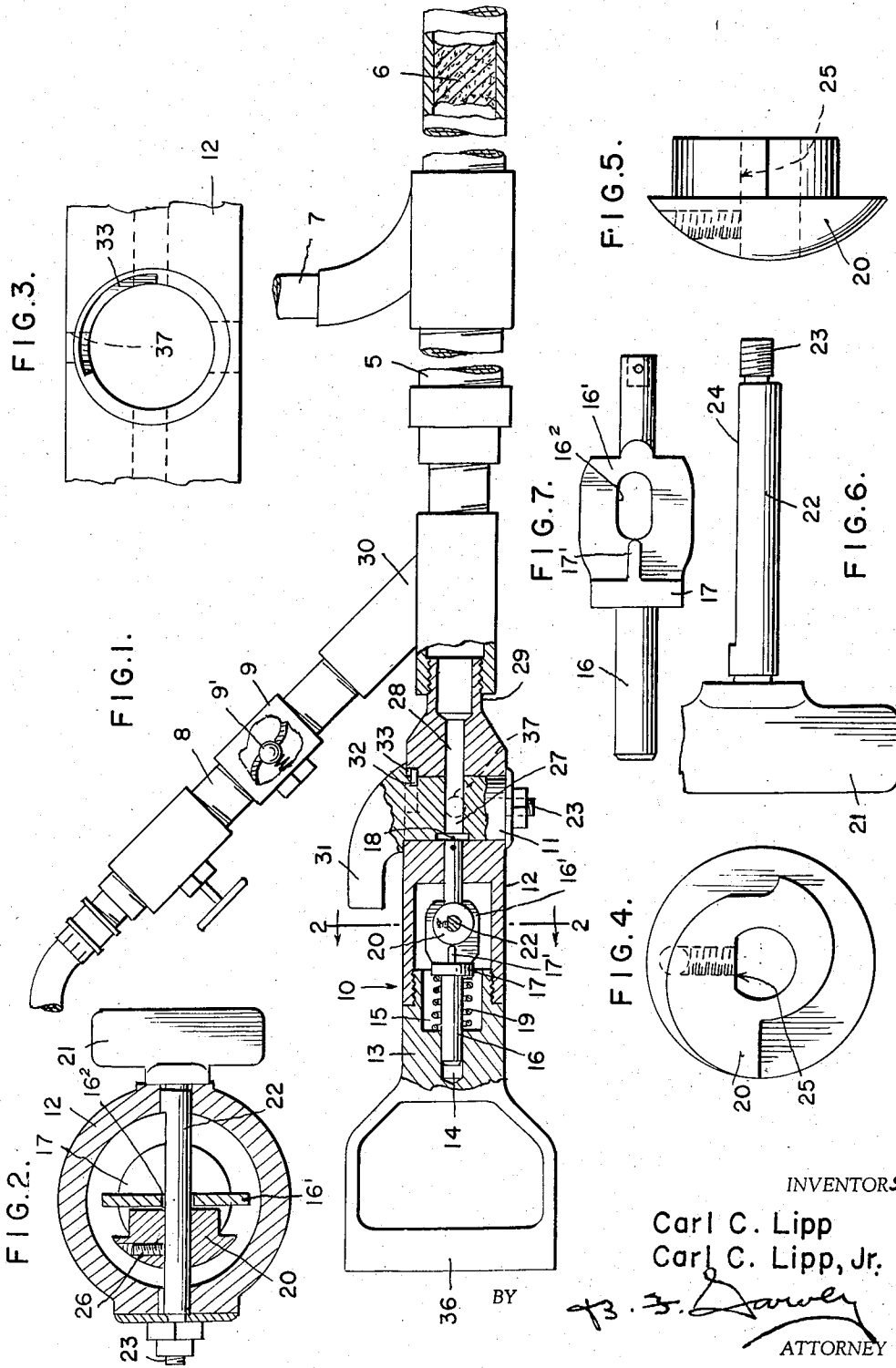
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C. C. LIPP ET AL

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APPARATUS FOR RELIEVING WASTE STOPPAGE IN PIPES BY PERCUSSION

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INVENTORS

Carl C. Lipp  
Carl C. Lipp, Jr.

BY *J. J. Sawyer*  
ATTORNEY

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## APPARATUS FOR RELIEVING WASTE STOPPAGE IN PIPES BY PERCUSSION

Carl C. Lipp, Washington, D. C., and Carl C. Lipp, Jr.,  
Bethesda, Md.; Allan L. Kamerow and Stanley H.  
Kamerow, executors of said Carl C. Lipp, deceased

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This invention is an apparatus for relieving waste stoppage in pipes by percussion, the result of many experiments made over a period of the past few years in conjunction with ballistic experts, to overcome shortcomings in prior art devices as exemplified in such patents as Leslie, No. 1,275,571, August 13, 1918, Dezendorf, No. 1,388,854, August 30, 1921.

It is an object of this invention to provide an apparatus, which tests have shown, will positively clear obstructions from pipes, including hard or soft grease deposits, dirt, stones and roots.

Other objects of the invention are to provide water tight percussion apparatus which permits firing of cartridges under water and reloading without water loss; to provide a percussion method which contemplates a solid liquid head from the locus of stoppage to the cartridge or other detonating agent; to provide a percussion method wherein shock from the detonated agent passes through liquid in the pipe for impingement with the stoppage to move the latter in toto or to disintegrate it, with a sequential liquid flow for flushing the pipe; to provide apparatus in which successive detonating charges may be used for relieving stoppages without liquid loss; and to provide apparatus which is readily adaptable to stopped lines of various diameters and lengths and may be quickly and easily engaged with and disengaged from the lines even by persons without special skills.

Other objects of the invention will be manifest from the following description of the present preferred form of the invention, taken in connection with the accompanying drawings, wherein:

Fig. 1 is a longitudinal sectional view of a percussion unit or assembly constructed in accordance with this invention, illustrating its application with a system of piping;

Fig. 2 is a cross sectional view taken on the line 2—2 of Fig. 1, looking in the direction of the arrows;

Fig. 3 is a fragmentary elevational view of the cartridge casing;

Fig. 4 is an end elevational view of the firing cam; and

Fig. 5 is a side elevational view of the same;

Fig. 6 is a fragmentary elevational view of the cam operating unit; and

Fig. 7 is an elevational view of the firing pin unit.

In order to illustrate the application of this invention, there is shown in Fig. 1, a system of piping which includes a waste pipe 5, shown with stoppage 6 lodged therein, the waste pipe being in communication with a vent 7 which extends upwardly and is in communication with the waste pipe. A valved liquid supply pipe 8 is also in communication with the waste pipe 5 and is connected with a suitable source of supply. A valve chamber 9 is also mounted in the liquid supply pipe 8 and includes a spring-loaded ball valve 9'. Water may be introduced through the auxiliary chamber from a garden hose or other suitable supply conduit where it is not feasible to use the regular liquid supply pipe. The percussion unit or assembly 10 of the present invention is detachably

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connected to one end of the waste pipe 5 after the fashion illustrated in Fig. 1. The percussion assembly includes a cartridge carrying chamber 11 rotatably mounted in the assembly casing 12. The assembly also includes a housing 13 provided with an axial recess 14, which communicates with a recess 15 of larger bore, and a firing pin unit 16. Said unit comprises a cylinder, the aft end of which is slidably mounted in the recess 14, the forward end of the cylinder being slidably mounted in an axial bore in the casing 12 as shown to advantage in Fig. 2. An intermediate part of firing pin 16 issues into a flat plate 16' which is provided with an elongated recess 16<sup>2</sup>. The aft terminal of the plate is formed to provide a circular abutment plate 17. The extreme forward end of the firing pin cylinder is recessed to receive a firing pin 18. A coil spring 19 is convoluted on the rear cylinder body portion of the firing pin, interposed between a fixed part of the housing 13 and the abutment 17. A cam 20 is also part of the assembly and is mounted in the casing 12 as illustrated to advantage in Figs. 1 and 2. The firing pin includes a rib 17' which normally engages the periphery of the cam to retain the coil spring compressed until the cam is rotated. Rotation of the cam is effected by turning a key 21 mounted on one end of a shaft 22, the free end of the latter terminating in a reduced threaded portion 23. A longitudinal portion of the shaft periphery is removed to provide a flat face 24 which complements a wall 25 in the bore of cam 20. The shaft 22 is trained through the casing 12 and cam 20 and secured by a nut or the like to threads 23 as shown in Fig. 2. The flat face 25 of the cam bore is secured to the flat face 24 of shaft 22 by a set screw 26 as also shown to advantage in Fig. 2. When key 21 is turned to release rib 17', the entire firing pin unit (see Fig. 7) moves forward while cam shaft 22 remains stationary in elongated recess 16<sup>2</sup>. Movement of the firing pin unit effects contact of pin 18 with a cartridge mounted in bore 27 of the chamber 11 and the cartridge is exploded through opening 28 of casing 12. The extreme forward end of the casing is reduced and screw threaded, as indicated at 29 for engagement with a plumbing fitting such as the Y 30 in Fig. 1. The chamber 11 is rotated by a handle 31, the extent of rotation being controlled by a chamber carried lug 32 mounted in an arcuate slot 33 formed in casing 12. The Y fitting is used to connect the water supply pipe 8 to the waste pipe 5. After the cartridge has been discharged, it may be ejected through an opening 37 formed in the casing. The aft end of the housing 13 is formed to provide a handle 36 for convenience in manipulating the assembly.

Loading of cartridge chamber 11 is effected by rotating handle 31 through approximately a 90° angle to expose cartridge bore 27. After the shell is placed in the bore, the handle is rotated back to its initial position to align bore 27 with opening 28, thereby completing the loading cycle. This procedure is repeated for each firing of the gun.

In operating this invention, after the percussion assembly has been connected to the system as illustrated in Fig. 1, water or other liquid is supplied to the pipe 5 through the supply pipe 8. The water or other liquid enters the waste pipe and also the vent 7 and will form a solid column from the locus of the waste or stoppage 6 to the discharge end of the cartridge to positively eliminate air pockets. While the waste pipe is being filled with liquid, the chamber 11 is in a closed or inoperative position, preventing water from passing through the chamber. In actual practice, the handle 31 is periodically oscillated after liquid has been permitted to enter the waste pipe until there is drippage of the liquid through the opening 37. This indicates a capacity load of liquid in the system and the handle 31 may then be operated so as to

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bring the cartridge head into actual alignment with the firing pin 16. Turning of the key 21 rotates the cam 20 and permits the free end of the firing pin to be projected against the cartridge head under the expansive action of the spring 19. Detonation of the cartridge sends shock waves through the liquid in the waste pipe 5 and into engagement with the waste or stoppage 6. If the waste is not dislodged or disintegrated with the first charge, the cycle is repeated as often as is necessary, until the waste moves in toto or is disintegrated, following which the liquid flushes the waste through the pipe in an obvious manner.

While the device of the present invention has been used on plumbing jobs to clear waste and sewer lines from 1" to 8" in diameter and up to nearly 1000 feet in length, we are nevertheless aware that stoppage release in pipes may be effected in larger diameter pipes without departing from the spirit and scope of this invention as covered in the appended claims.

What we claim is:

1. A system for removing waste stoppage from pipes comprising, in combination, a percussion assembly in communication with one end of a pipe in which waste is lodged, the assembly including a chamber adapted to receive a percussion agent, means for detonating the percussion agent, and means in communication with said pipe for establishing a solid column of liquid in said pipe between the waste stoppage and said percussion agent for transmitting shock waves through the liquid, against the waste, for dislodging the latter and permitting flow of the liquid through the pipe aft of the waste.

2. Apparatus for relieving waste stoppage in pipes including a percussion assembly engageable with a pipe carrying waste, the assembly comprising a firing pin, a cartridge chamber, disposed between the firing pin and pipe and having a bore normally aligned with the pipe and adapted to receive a cartridge, the chamber being rotatable in a plane parallel to the longitudinal axis of said assembly to expose the bore for loading, and means in communication with said pipe for establishing a solid liquid column from the locus of waste in the pipe to the cartridge.

3. Apparatus for relieving waste stoppage in pipes including a percussion assembly engageable with a pipe carrying waste, the assembly comprising a cartridge carrying chamber, means for establishing a solid liquid column

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from the locus of the waste to the cartridge, and a firing pin, the chamber being rotatable in successive cycles to load the chamber, set it in firing position and permit expulsion of the loaded shell against the solid liquid column.

4. Apparatus for relieving waste stoppage in pipes including a percussion assembly engageable with a pipe carrying waste and embodying a percussion charge carrying chamber, a liquid supply pipe connected to the waste pipe for establishing a solid liquid column in the waste pipe from the locus of the waste to the percussion charge carrying chamber, and a firing pin assembly operatively connected to said percussion charge carrying chamber for exploding the charge into the pipe against the solid liquid column for transmitting shock waves through the liquid against the waste, for dislodging the latter and permitting flow of the liquid through the pipe aft of the waste.

5. Apparatus for relieving waste stoppage in pipes, as set out in claim 4, wherein said percussion charge carrying chamber is disposed between the firing pin assembly and the waste pipe and has a bore normally aligned with the pipe, the chamber being further provided with a handle for rotating the chamber in a plane parallel to the longitudinal axis of said assembly to expose the bore for loading.

6. Apparatus for relieving waste stoppage in pipes, as set out in claim 5, wherein the firing pin assembly includes a spring actuated firing pin, a cam engaged with said firing pin for normally maintaining the latter in inoperative position, and a key connected to said cam for rotating the same to release the firing pin and detonate the percussion charge.

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