May 9, 1933. W. A. FRANK 1,908,339

PIPE CLEANING AND SCRAPING EQUIPMENT

Filed July 30, 1932

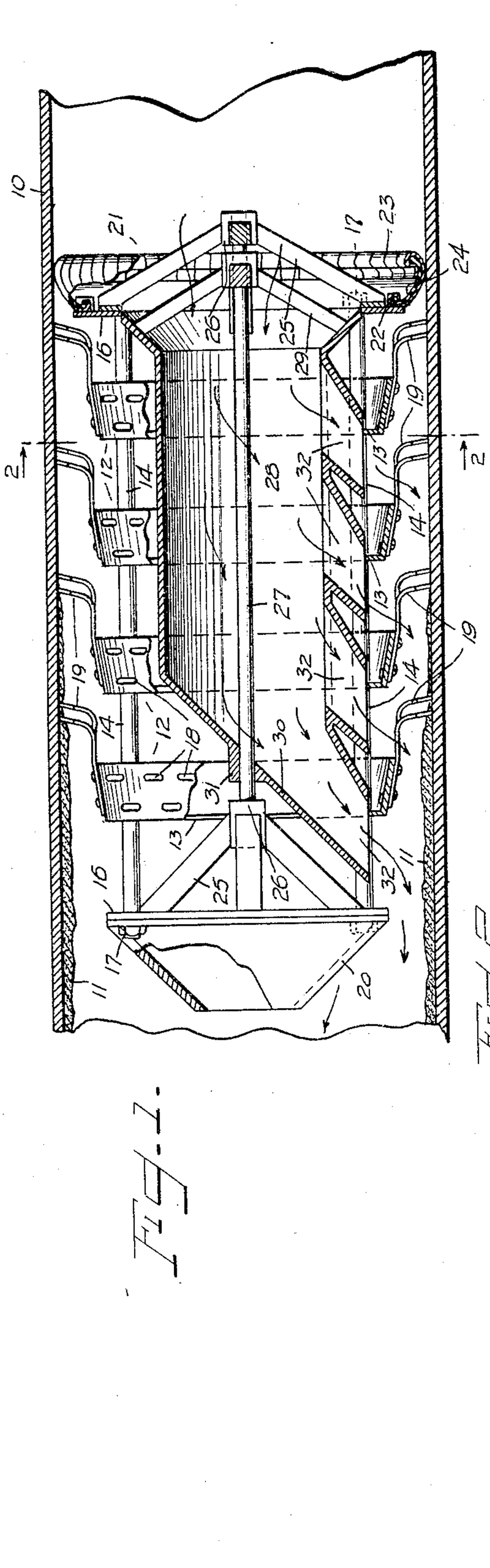

FIG. 1

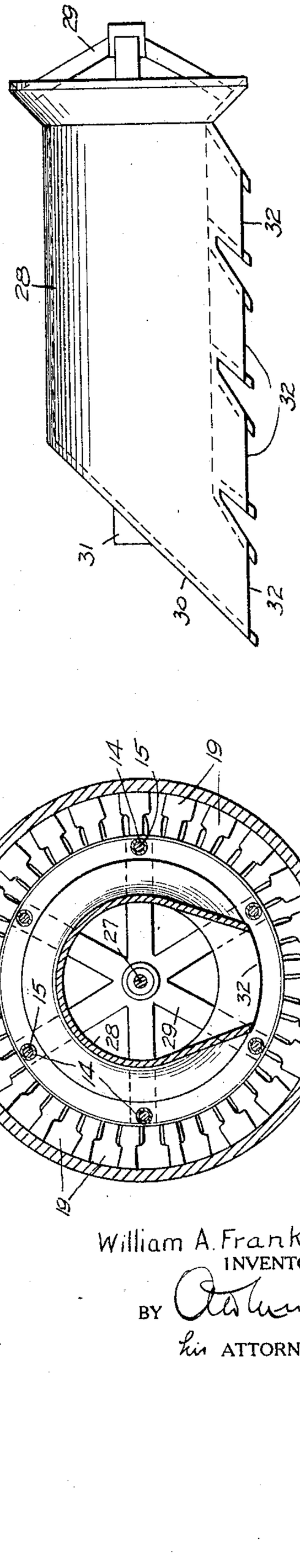

FIG. 2

FIG. 3

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Patented May 9, 1933

1,908,339

UNITED STATES PATENT OFFICE

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PIPE CLEANING AND SCRAPING EQUIPMENT

Application filed July 30, 1932. Serial No. 627,042.

This invention relates to improvements in pipe cleaning and scraping equipment used to remove scale and other deposits which accumulate on the interior wall of a pipe and has particular application to a water main in which a head of water is maintained and utilized as a propelling agent for the device and a carrying medium for the material removed from the pipe.

It has been found in practice that pipe cleaning devices of this character are often impeded in their progress through a water main or other pipe construction by the large accumulation of loosened material on the lower side of the pipe in advance of the scraper, the accumulation of this material having a tendency to crowd the device in an upward direction and to interfere with its purpose.

With the foregoing in mind it is the principal object of my invention to provide the cleaning and scraping equipment with means embodied therein for diverting a jet or jets of water in a downward and forward direction in advance of the scraping elements, whereby a constant circulation of water is set up and directed towards the lower wall of the pipe, keeping the loosened material in motion until it has been picked up and carried along in the normal flow of the water.

I accomplish this object by means of the embodiment of my invention, described in the following specification, set forth in the appended claims and illustratively exemplified in the accompany drawing, in which, Figure 1 is a substantially longitudinal sectional view of a pipe and cleaning equipment; Figure 2 is a substantially transverse sectional view taken on lines 2—2 of Figure 1; and Figure 3 is a side elevational view of the nozzle used to divert a certain portion of the water in the main towards the lower side of the latter and in advance of the scraper elements.

Referring to the drawing, 10 denotes a section of pipe in which the accumulation of scale and other foreign matter 11 is illustrated in advance of and intermediate the scraping equipment. The cleaning machine is of the general type described in applicant's United States Letters Patent No. 1,866,556 issued July 12, 1932, and comprises a plurality of axially spaced scraper heads 12 each thereof being a slightly tapered annular member provided with an inwardly directed flange 13 at its leading and smaller end. The heads 12 are held in spaced relation by means of spacing sleeves 14 arranged over tie rods 15. The ends of the rods are threaded and pass through openings in annular plates 16 arranged at opposite ends of the machine. When nuts 17 are screwed down over the threaded ends of the rods 15 against the plates 16 the rigid skeleton frame of the device has been completely set up.

In accordance with well known construction, each of the heads 12 is provided with double rows of slots 18 which accommodate a series of spring steel scrapers 19, each thereof comprising an angular member, one arm of which is attached to the lateral flange and projects rearwardly, while the other arm is directed outwardly in yieldable contact with the inner surface of the pipe. The scraper heads 12 are disposed so as to bring the scrapers of adjacent heads in staggered relation, the free ends of the scrapers being flared as illustrated particularly in Figure 2.

The forward ring or plate 16 carries a cone-shaped guide 20 which is truncated on a plane parallel with the base or ring and has its open end disposed in the direction of travel of the machine through the pipe. The rear ring or plate 16 carries a piston 21 comprising a channel ring 22 having the open side arranged against the ring 16, the outer wall of the latter ring 22 being shorter than the inner side wall so as to leave an

annular slot entirely around the device. Into this slot the angular ends of steel fingers 23 are inserted and attached. The mid portions of the fingers 23 are curved outwardly and then inwardly to brush against the inline to be cleaned and scraped and are rected towards the trailing end of the machine and their free ends are turned back upon themselves to engage over the outer edge of a rubber cuff 24 resting against the inner surface of the fingers. The combination of the fingers 23 and rubber cuff forms a soft piston making yieldable contact with the wall of the pipe.

The front and back rings 16 are each supported on a spider 25 comprising radial arms and a hub 26, in which the ends of a shaft 27 are mounted.

Supported upon the shaft 27 and adapted to rotate freely with the latter in the hubs of the spiders 25, is a cylindrical housing 28, which is flared at the rear end to fit into the opening in the rear ring 16 and piston 21, and which is provided with a spider support 29 arranged between the flared wall and the shaft 27 just short of the rearward hub of the spider 25. The forward end of the housing comprises an angularly disposed wall 30 having a central hub 31 to embrace the shaft 27 and support the housing. The housing 28 along one side is provided with a plurality of spouts or nozzles 32 each thereof being directed downwardly and forwardly in the direction of the front wall 30 to direct a jet directly into the path of one of the scraper heads and its scrapers along the lower side of the pipe. The nozzles 32 are also arranged so that their entire discharge will be confined to the space between the end rings 16 of the machine. The weight of the housing 28 is so disposed that the nozzles will constantly maintain their position along the bottom or lower side of the machine.

As is well known in machines of this character the same are placed in the pipe line to be cleaned and scraped and are either guided and drawn through the system by means of cables, not shown, or allowed to move unaided by cables when water is admitted behind the piston 21. The fingers 23 under pressure of the head of water expand and hug closely to the wall causing the machine to begin to move forward along the axis of the pipe, a portion of the head of water being diverted into the cylindrical housing 28 and discharged through the nozzles 32 in a forward and downward direction against the lower side of the pipe, whereby any material loosened by the scraping action of the scrapers 19 will remain in motion and be prevented from accumulating along the lower side of the pipe and from crowding the scraper upwardly.

What I claim and desire to secure by Letters Patent is:—

1. In a pipe cleaning device, the combination of scraper elements for attacking the interior wall of the pipe, and a freely rotatable conduit arranged axially of the scraper elements and provided with an opening directed forwardly and downwardly into the path of the scraper elements along the bottom of the pipe.

2. In a pipe cleaning device, the combination of a series of spaced scraper elements, a piston disposed at the trailing end of the device, and a conduit swinging freely on its longitudinal axis between the piston and the leading scraper element and having radially and forwardly directed spouts disposed one behind the other along a longitudinal line of the conduit, whereby the force of liquid entering the trailing end of the conduit will be directed downwardly and forwardly along the bottom of the pipe and in advance of the scraper elements.

3. In a pipe cleaning device, the combination of a frame comprising annular end plates and connecting rods, scraper sections supported on the rods and spaced axially along the rods, a piston arranged at the trailing end of the frame and carried by an end plate, and a conduit mounted to rotate freely and axially of the frame and provided with radially disposed forwardly directed nozzle portions aiming towards the path in front of the scraper sections, whereby the motion of liquid flowing in the pipe will be directed constantly towards and against the bottom of the pipe to carry away the matter scraped from the wall of the pipe.

4. In a pipe cleaning device, the combination of a series of scraper heads spaced longitudinally of each other and provided with radially disposed scraper fingers, an annular plate at each end of the device supporting longitudinally disposed rods upon which the heads are mounted, a spider carried by each plate and provided with a central hub, a shaft supported at its opposite ends in the hubs, and a conduit mounted on the shaft to swing freely on its longitudinal axis between the annular end plates and provided with radially and forwardly directed spouts disposed one behind the other along a longitudinal line of the conduit, the latter being closed at its forward end by an inclined wall forming a side of the leading spout, the trailing end of the conduit being flared outwardly to join the inner wall of the end plate, and a piston carried by the latter plate for advancing the cleaning device along the pipe and for directing a portion of the head of water into and through the conduit.

5. A pipe cleaning device, as claimed in claim 4, in which the forwardly inclined wall of the conduit is provided with a hub

to embrace the shaft and the flared or trailing end of the conduit is provided with a spider and hub connection to embrace the shaft to rotatably support the leading and trailing end of the conduit and allow the spouts because of their weight to be maintained in a depending position at the bottom of the pipe.

In testimony whereof I affix my signature.

WILLIAM A. FRANK.