

(No Model.)

B. F. WARREN.

APPARATUS FOR CLEANING OUT PIPE LINES.

No. 329,605.

Patented Nov. 3, 1885.

Fig. 2

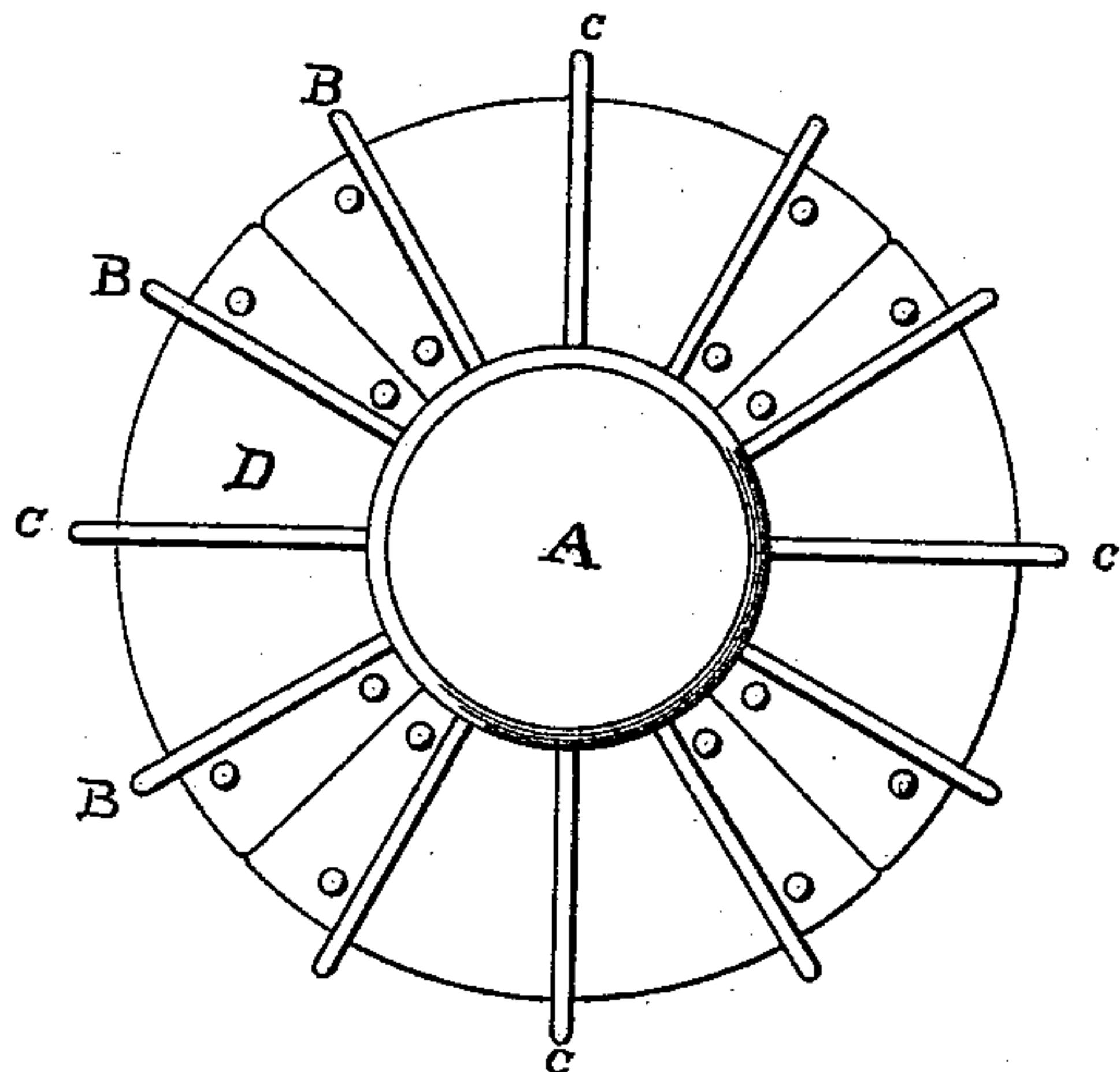


Fig. 1

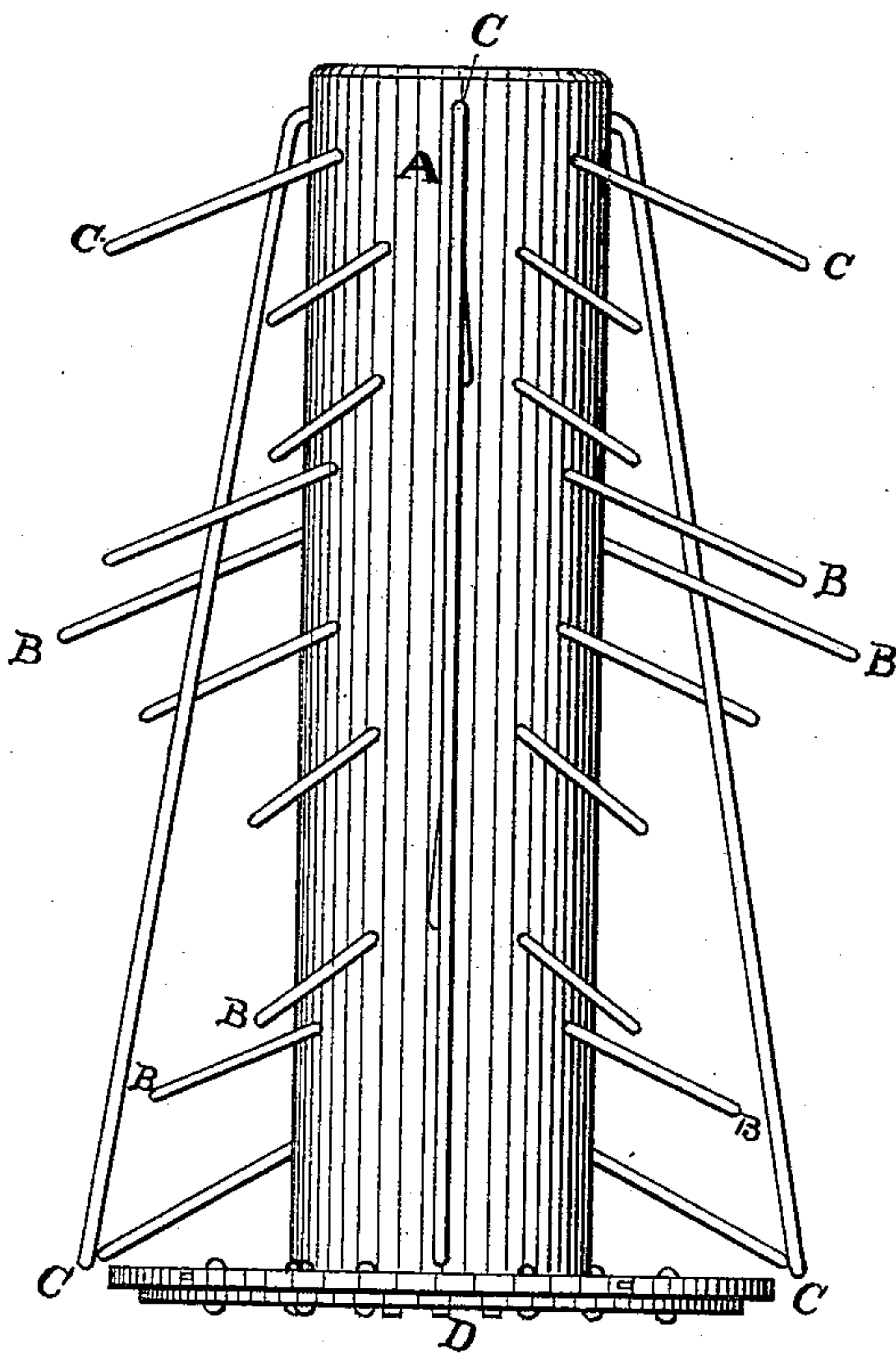
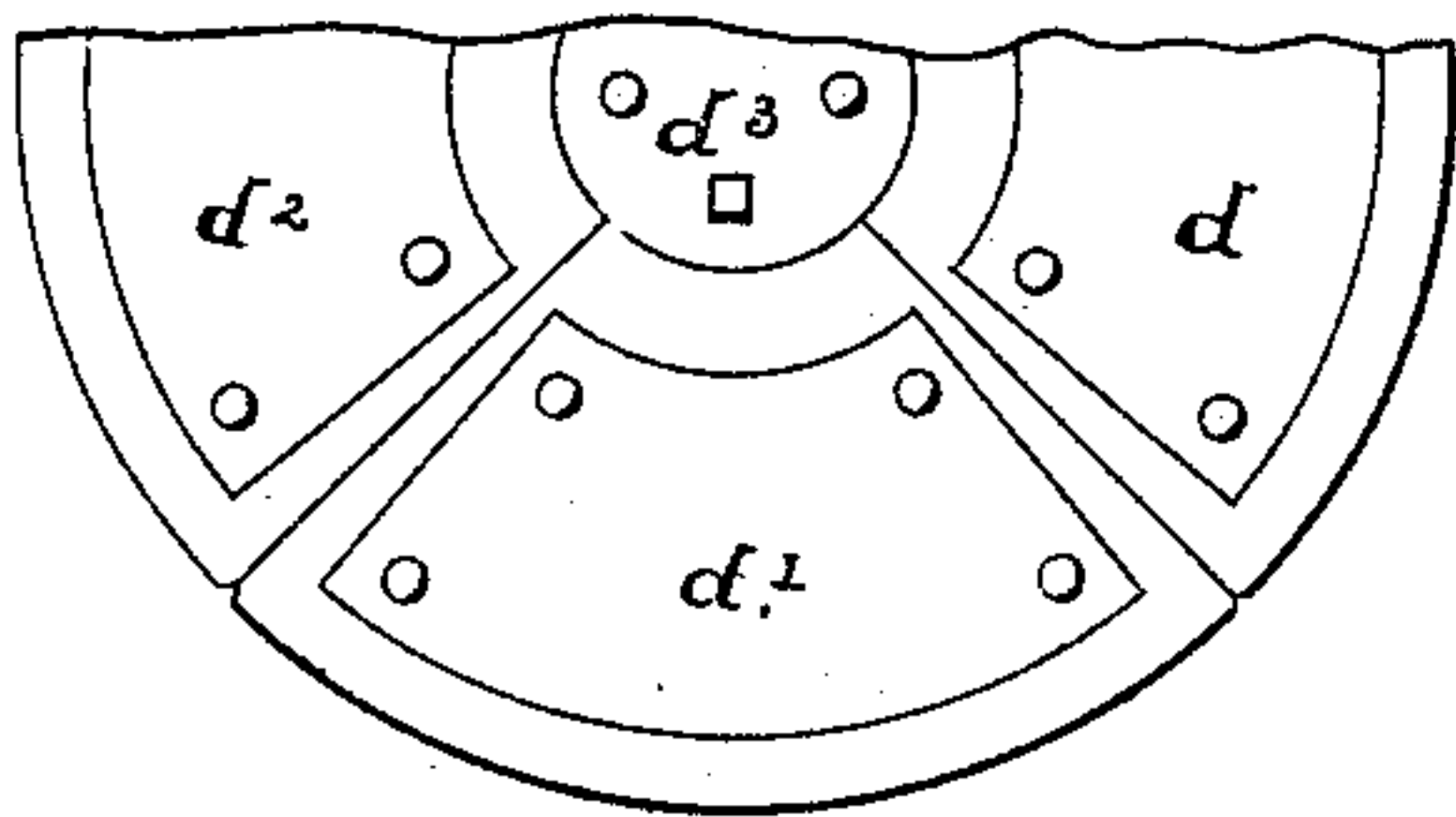


Fig. 3



WITNESSES:

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APPARATUS FOR CLEANING OUT PIPE-LINES.

SPECIFICATION forming part of Letters Patent No. 329,605, dated November 3, 1885.

Application filed February 12, 1884. Serial No. 120,438. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN F. WARREN, of the city and county of Philadelphia, in the State of Pennsylvania, have invented certain
5 new and useful Improvements in Apparatus for Clearing Out Pipe-Lines for Transporting Petroleum, of which improvements the following is a specification.

It has long been known that the walls and
10 tubing of oil-wells become gradually coated with accumulations of paraffine, which obstruct not only the operation of the well, but the flow of the oil into it, and several patents have been taken out for devices intended to
15 remove such obstructions.

The more recent construction and use of pipe-lines through which petroleum is transported a long distance has developed a similar accumulation of paraffine or analogous accretions upon the interior surface of these pipes,
20 and when the obstruction thus occasioned has become so serious as to sensibly diminish the carrying capacity of the line it is necessary to clean out the pipes. It is of course impossible practically to do this in any of the ways
25 that might be availed of under ordinary circumstances where the pipes could be readily taken up, or disconnected and connected again at short intervals. It is equally manifest that
30 the devices above referred to for scraping the vertical walls or continuous straight tubing of an oil-well are not available in a pipe-line, not only on account of the great length of its sections, but because, while in general approximately horizontal, the pipe-line is necessarily
35 adapted to the irregularities which are met with in its course—as, for example, in carrying it across a stream or a wide ravine.

It is the object of my invention to provide
40 an apparatus which will effectually remove the accumulations of paraffine or analogous accretions from the interior surface of a pipe-line and insure its discharge at the open end without any necessity of taking up the pipes
45 or disconnecting the line between the extremities of a section. In attaining this object I found it necessary to have a detached apparatus which could be put into one end of a section of the pipe-line and left without any
50 attachment or connection with anything else, to work its own way, under the pressure of

the flowing column, through the pipes to the other end of the section, removing as it goes the accretions from the surface of the pipe; and in order to perform its duty this detached
55 or independent apparatus must be capable of traversing, and must be permitted to traverse, the entire length of the section through all the irregularities of its position. It must be large enough to scrape the interior of the pipe.
60 effectually, yet not liable to be lodged or stopped in its course, and it must be adapted or enabled to permit the detached accretions to be swept along before it and kept moving forward in advance of it, instead of mass-
65 ing up and clogging or becoming jammed in the bore of the pipe and impeding or obstructing the progress of the apparatus.

In the accompanying drawings I have represented my improved apparatus in a form
70 which I have found practically efficient, and which embodies the essential features of my invention.

Figure 1 is a side view of the apparatus. Fig. 2 is an end elevation from the front, and
75 Fig. 3 is a sectional view of the rear side of the disk.

This apparatus consists, essentially, of a core or spindle, A, constituting the body of the apparatus, scrapers B, arranged around the
80 body and extending out therefrom so as to act upon the interior surface of the pipes, guides C, for keeping the body in position lengthwise centrally in the pipe, and a disk or head, D, properly braced and secured to the rear end
85 of the core or body, as shown. These several parts of the apparatus have respectively the following characteristics, which severally conduce to the effect of their combined operation and give the desired result. The core or body
90 is light and strong, and should be for a six-inch pipe about two and a half inches in diameter and about nine inches long. It may be made of wood; or it may be a cylinder of sheet metal closed at both ends. The scrapers
95 or cleaners are arranged around the core in such manner that they extend to and act upon the interior of the surface of the pipe, so as to scrape it and detach or loosen the paraffine, and their free ends should be capable of yield-
100 ing, when necessary, to pass any contraction or bend or other irregularity in the pipe.

They are made of stout elastic wire attached to the core and arranged spirally around it, as shown in the drawings, their number being greater or less, according to the thickness of the accretions to be removed, and constituting in effect a brush or swab. The guides, also made of iron, are strong, light, and elastic, so that while they project from the core or body, so as to bear against the surface of the interior of the pipe, their free outer ends will yield and bend down readily, so as to accommodate themselves to any contraction or irregularity in the pipe, and will spring out again after passing such contraction or irregularity, and thus always tend to keep the core and scrapers in a substantially horizontal position or central in the bore of the pipe. The disk or head is made of flexible material—such as leather—and re-enforced or braced by sectional backings or plates, d d' d'' , Fig. 3, separated from each other, as in the instance shown, and by a central plate, d^3 , all being secured to the outside of the disk. The disk is quartered by simple slits cut between the sectional backing-plates and extending from the outer edge of the central plate, d^3 , to the circumference of the disk, in order that either of the sections into which the disk is thus divided may yield backward, so as to allow the apparatus to pass any obstruction that would otherwise stop it, while, on the other hand, the plates give the disk sufficient stiffness to withstand the pressure of the column of oil upon it from behind. This disk is of a diameter less than that of the interior of the pipe—for example, about five and a half inches in diameter for a six-inch pipe—and is secured to the rear end of the body or core with its backing-plates outward, as shown in Figs. 1 and 3.

The operation of the apparatus is as follows: It is put into the pipe at the head of the section to be cleared with the front end foremost, so that it will travel in the direction of the flow of the oil, the guides, as already stated, tending to keep it in substantially a horizontal position or central in the bore of the pipe, the disk at the rear end also tending to prevent its getting far out of line in the pipe. The pressure of the flowing column of oil now acting upon the disk or head of the apparatus forces it forward, and the scrapers or swabs loosen and detach the paraffine as they are forced along under the pressure of the oil

column upon the disk, the guides also acting to loosen the paraffine, which is flaky when detached, and is held in suspension in the oil. As there is an annular space between the disk and the interior of the pipe, and open spaces between the guides and scrapers, the oil, being under pressure, will flow around the disk through this annular space faster than the apparatus moves forward, and this annular and comparatively rapid flow of the oil in advance of the disk serves to wash the detached paraffine along ahead of the apparatus, preventing its lodging and clogging by carrying it off gradually, and thus clearing the way for the apparatus, as the apparatus loosens and detaches the paraffine from the pipe.

If the apparatus meets a contraction or a bend in the pipe, the guides and scrapers will yield, as already described, so as to pass it, and then will immediately resume their extended positions; so, also, if the disk encounters an obstruction either of its sections will bend back under the resistance, so that it will pass the point of difficulty, and the pressure of the column of oil will then force the deflected section of the disk forward again to its place, and the apparatus will resume its clearing action. In this way I have successfully operated this apparatus through a pipe-line section of nine miles in length. It is of course to be understood that in constructing a pipe-line due care should be taken to have the pipes free from any such solid obstruction as would be impassible to the apparatus, the obstructions with which my clearing apparatus is adapted to deal being such only as may be accidentally carried in with the oil or incidentally occasioned by the use of the line.

Having thus described the nature and object of my invention, what I claim as new, and desire to secure by Letters Patent, is—

An improvement in apparatus for cleaning out a pipe-line for transporting petroleum, such apparatus consisting of the core or body, the head or disk, the wire guides, and scrapers, combined with a pipe containing flowing liquid and operating in combination, substantially as and for the purposes described.

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Witnesses:

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