(No Model.) 2 Sheets—Sheet 1.

F. MESSMER.

AIR PUMP.

No. 562,903. Patented June 30, 1896.

Fig. 2.

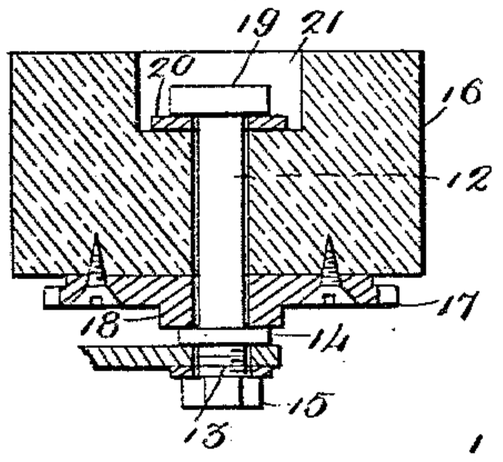
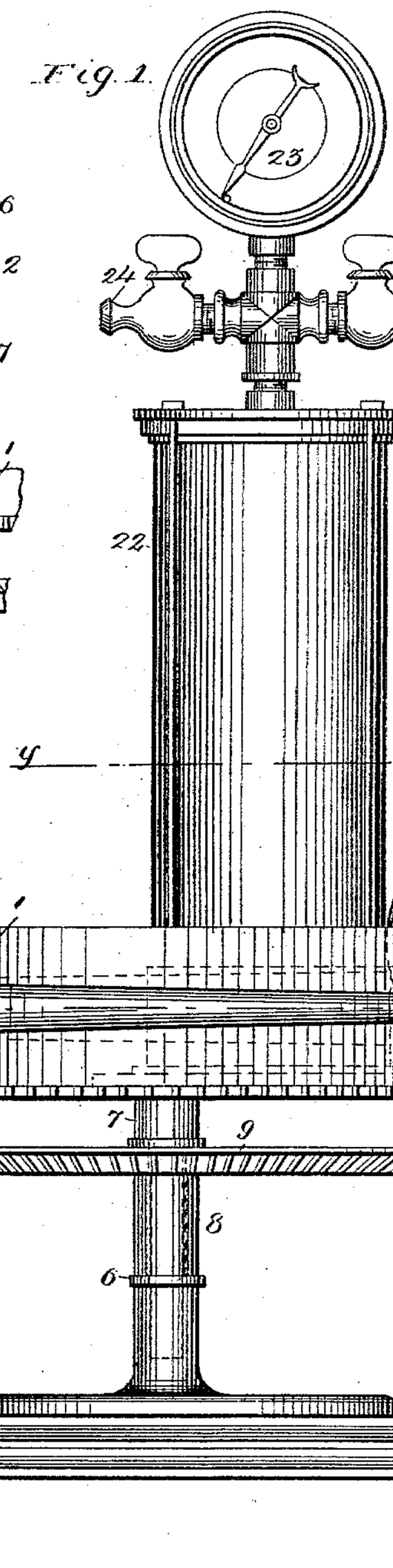


Fig. 3.

Fig. 1.



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(No Model.) 2 Sheets—Sheet 2.

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AIR PUMP.

No. 562,903. Patented June 30, 1896.

Fig. 4.

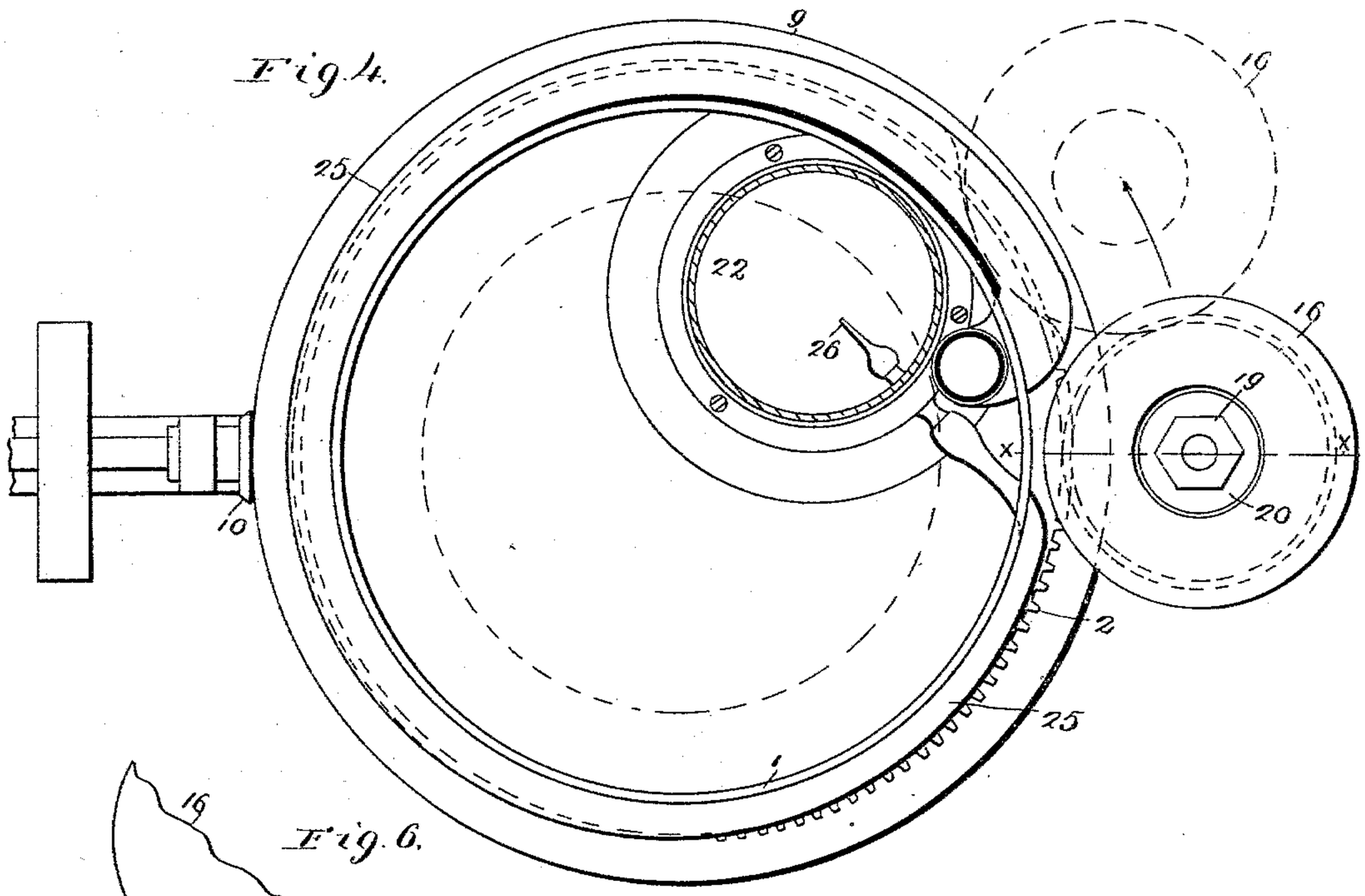


Fig. 6.

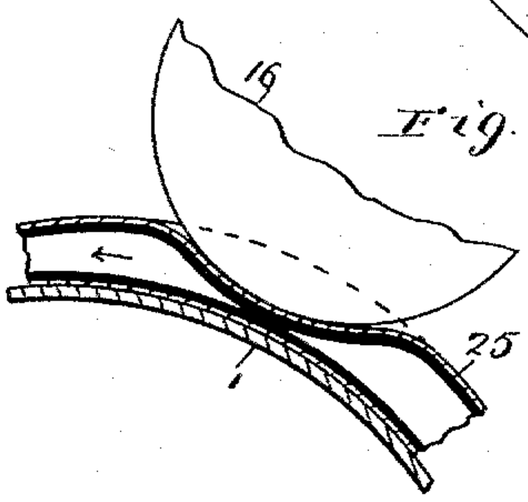
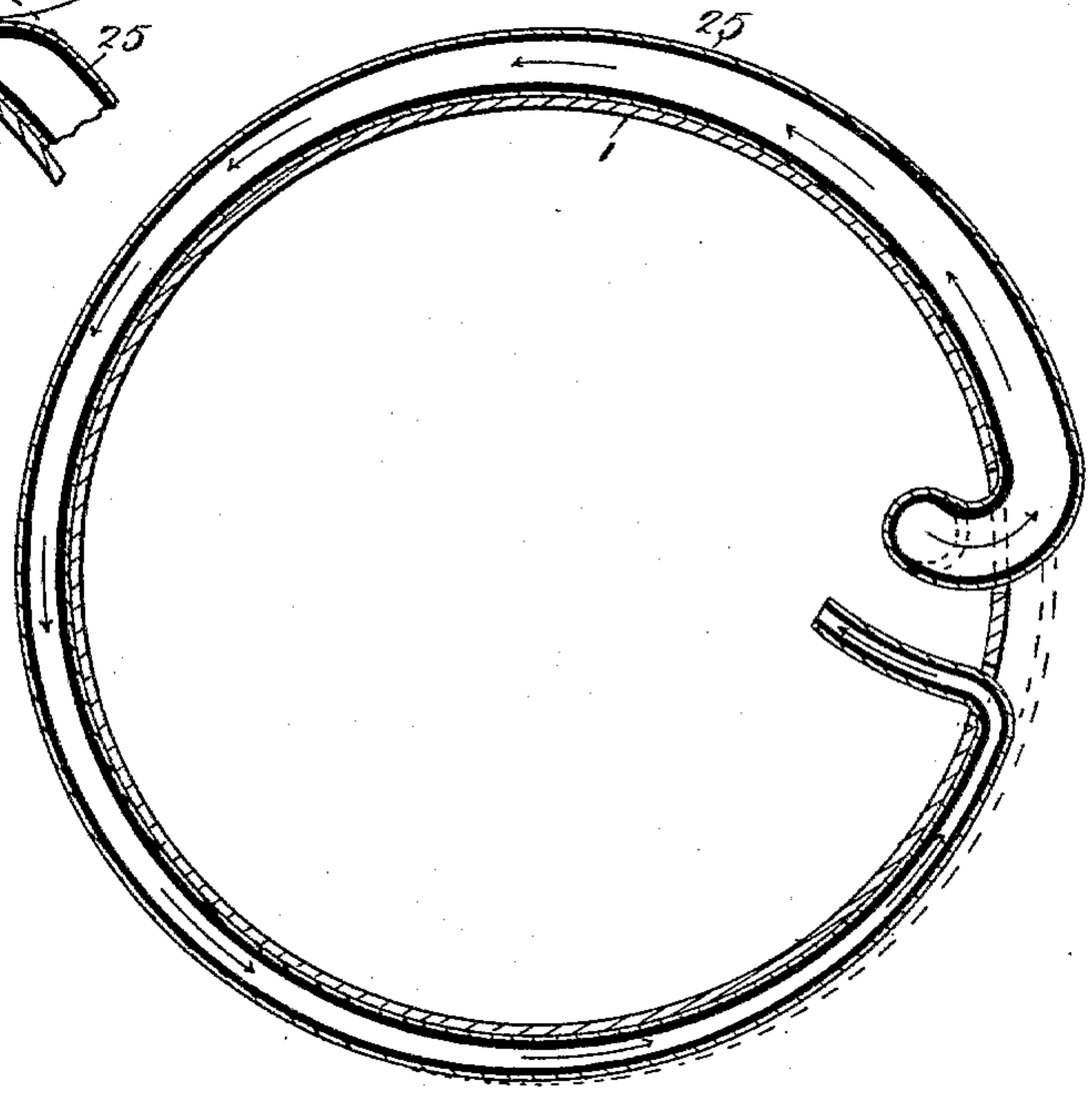


Fig. 5.



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UNITED STATES PATENT OFFICE.

FERDINAND MESSMER, OF ST. LOUIS, MISSOURI.

AIR-PUMP.

SPECIFICATION forming part of Letters Patent No. 562,903, dated June 30, 1896.

Application filed October 28, 1895. Serial No. 567,189. (No model.)

To all whom it may concern:

Be it known that I, FERDINAND MESSMER, a citizen of the United States, residing at St. Louis, in the State of Missouri, have invented certain new and useful Improvements in Air-Pumps, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

My invention has relation to improvements in air-pumps; and it consists in the novel arrangement and combination of parts more fully set forth in the specification, and pointed out in the claims.

In the drawings, Figure 1 is an elevation of my invention. Fig. 2 is a section of the hose-compressing pulley or disk, taken on the line *x x* of Fig. 4. Fig. 3 is a sectional vertical detail of the supporting-base, the stationary spindle carried by it, and the hub portion of the disk revolving about the spindle. Fig. 4 is a section on line *y y* of Fig. 1. Fig. 5 is a section taken through the air-hose on the line *z z* of Fig. 1; and Fig. 6 is a sectional detail of the hose, illustrating the compression-disk in contact therewith.

The object of my invention is to construct an air-pump which will accomplish its purpose with a minimum number of parts; one from which the discharge of air shall be practically continuous; one which shall combine simplicity with durability, and one presenting other and further advantages to be presently described.

Referring to the drawings, 1 represents a cylindrical casing along the base of whose outer periphery is disposed a circular rack 2, the said casing being supported on a stationary spindle 3, whose lower end is screwed into the socket 4 of a suitable supporting-base 5. Embracing the stationary spindle 3 and confined between a washer 6 and shoulder 7, forming a part of the spindle, is the tubular hub 8 of a rotatable bevel-gear disk or wheel 9, to which rotation can be imparted by a bevel-pinion 10, driven from any suitable source of power. At a convenient point on the upper face of the bevel-gear disk 9 is secured an arm or bracket 11, the free end of which carries a spindle 12, the latter having a screw-threaded end 13, by which it may be screwed to said arm, a collar 14 and terminal nut 15 serving to retain the spindle firmly in place. About the spindle 12 is adapted to revolve a pulley or disk 16, to the bottom of which is secured a toothed circular plate or disk 17, having a pivotal depending shoulder or bearing 18, adapted to rest against the collar 14. A terminal head 19 and and washer 20, confined within the depression 21 of the pulley, secure the latter in position on the spindle 12. Located at the bottom of the casing 1, and adjacent to the peripheral wall of the same, is an air-storage cylinder 22, provided with the usual pressure-indicator 23 and discharge cocks or valves 24. Into the interior of the cylinder, and passing through the walls of the same a slight distance above the bottom thereof, is introduced the inner or discharge end of a tapering rubber hose or pipe 25, which, as it leaves the air-cylinder, passes through an opening in the side wall of the casing 1, encircling the latter along the outside thereof, the enlarged or expanded end of said pipe or hose being also passed through an opening in the side wall of the casing and extending a suitable distance above the upper edge of the same. The said hose 25 is open at both ends, the inner or discharge end being provided with a rubber lip or check-valve 26 to prevent the return of the air once discharged into the storage-cylinder 22. The hose is supported by and encircles the casing 1 in a plane parallel to the plane of rotation of the disk 9 and pulley 16, carried by it, the pulley 16 being removed from the walls of the casing 1 a distance sufficient to compress the hose and bring the inner walls of the same into actual contact, as seen best in Fig. 6.

It is apparent that as rotation is imparted to the bevel-disk 9 it will cause the toothed plate 17 to engage the teeth of the circular rack 2, turning the disk 16 about its axis or spindle and at the same time revolving or carrying the same around the casing 1 and the hose 25 supported by it. As the compression-disk 16 thus passes over the hose along the length thereof it squeezes it, as already indicated, driving before it the air contained within the same and forcing it through the valve 26 into the storage-cylinder 22. Of course as fast as the air is exhausted from the hose in the rear of the compression-disk it rushes into and fills the hose through the enlarged open end, as indicated by the arrow in

Fig. 1. The course of the air as squeezed and forced along through the hose is indicated by the arrows in Fig. 5. The lateral openings in the walls of the casing 1, through which the opposite ends of the hose are inserted, are separated a slight distance from one another, so that when the pump is not in use the compression disk or pulley 16 may be brought to a position out of contact with the hose and relieve the latter from the pressure to which it is ordinarily subjected, as seen in full lines in Fig. 4, the compressed position of the hose being indicated best in Fig. 6. The dotted position of the compression-disk and the arrow in Fig. 4 indicate the direction of travel of the disk and the position it occupies as it has begun to compress the hose.

It is seen that with my present device a new method of pumping air results, viz., that of forcing air through a yielding tube or hose by continually and successively compressing the walls of the tube along the length thereof, and in the same proportion allowing the walls of the tube to resume their normal position or size after the compressing effect has terminated. The advantages of this apparatus and the method carried out by it are apparent without any specific review or enumeration of them, it being obvious that a pump like the present may be used in various connections in the arts.

From an inspection of Fig. 1 it is obvious that even if the circular rack 2 and toothed disk 17 were omitted the compression-disk 16 would still be rotated on its axis, as it was carried around the casing, by the frictional contact between it and the hose 25; but such a construction would tend to draw too severely the peripheral surface of the hose, causing the latter to stretch unevenly and thus destroy the evenness of the tension with which it hugs the outer wall of the casing 1. To overcome this objection, therefore, I provide the positive and independent means here described for imparting rotation to the compression-disk about its axis as said disk is carried around the casing 1.

Having described my invention, what I claim is—

1. In an air-pump, a suitable yielding tapering hose or pipe, a suitable supporting-surface for the same on one side thereof, and suitable means for compressing said hose against said surface along the length of the hose and bringing the inner walls of the hose in contact or approximately so, substantially as set forth.

2. In an air-pump, a suitable casing, a yielding tapering pipe or hose supported along the walls of the same, said pipe being open at both ends, and means for compressing the hose along the length thereof, whereby the air within the hose in front of the compressing device is forced toward and through one end of the hose, and whereby the hose correspondingly expands to its normal size as the effect of the compression is removed, substantially as set forth.

3. In an air-pump, a suitable casing having a cylindrical wall, a yielding hose open at both ends and tapering gradually from one end to the other, supported by the said wall, a compression-disk placed in proximity to the hose, and means for revolving the compression-disk about the hose from the enlarged to the tapering end and compress the walls of the hose and drive before it the air contained in the hose, substantially as set forth.

4. An air-pump comprising a cylindrical casing, a stationary spindle supporting the same, a disk having a tubular portion or hub rotatable about said spindle, a circular rack carried at the base of the casing, a rotatable compression-disk carried by the first-named disk, a toothed plate forming a part of the compression-disk and meshing with the circular rack carried by the casing, a tapering yielding hose or tube embracing the walls of the casing and having its opposite ends passed inwardly through suitable openings in said walls, an air-storage cylinder carried by the casing, the tapering or narrow end of the hose being inserted into the storage-cylinder, and the expanded or enlarged end opening into the atmosphere, a check-valve carried at the end of the hose confined within the storage-cylinder, the compression-disk being removed from the walls of the casing a distance sufficient to compress the walls of the hose, and means for imparting motion to the movable parts to cause the compression-disk to travel along the length of the hose from its expanded end toward its narrow end and force the air confined within the tube into the storage-cylinder, substantially as set forth.

5. In an air-pump, a suitable casing, a yielding tapering pipe or tube supported along the walls of the same, said pipe being open at both ends, a rotatable disk placed in proximity to the outer wall or surface of the pipe, means for passing the disk along the said pipe and thus compressing the same, and independent and positive means for imparting rotation to the disk about its axis as said disk is passed along the pipe, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

FERDINAND MESSMER.

Witnesses:

EMIL STAREK,

H. A. UHL.