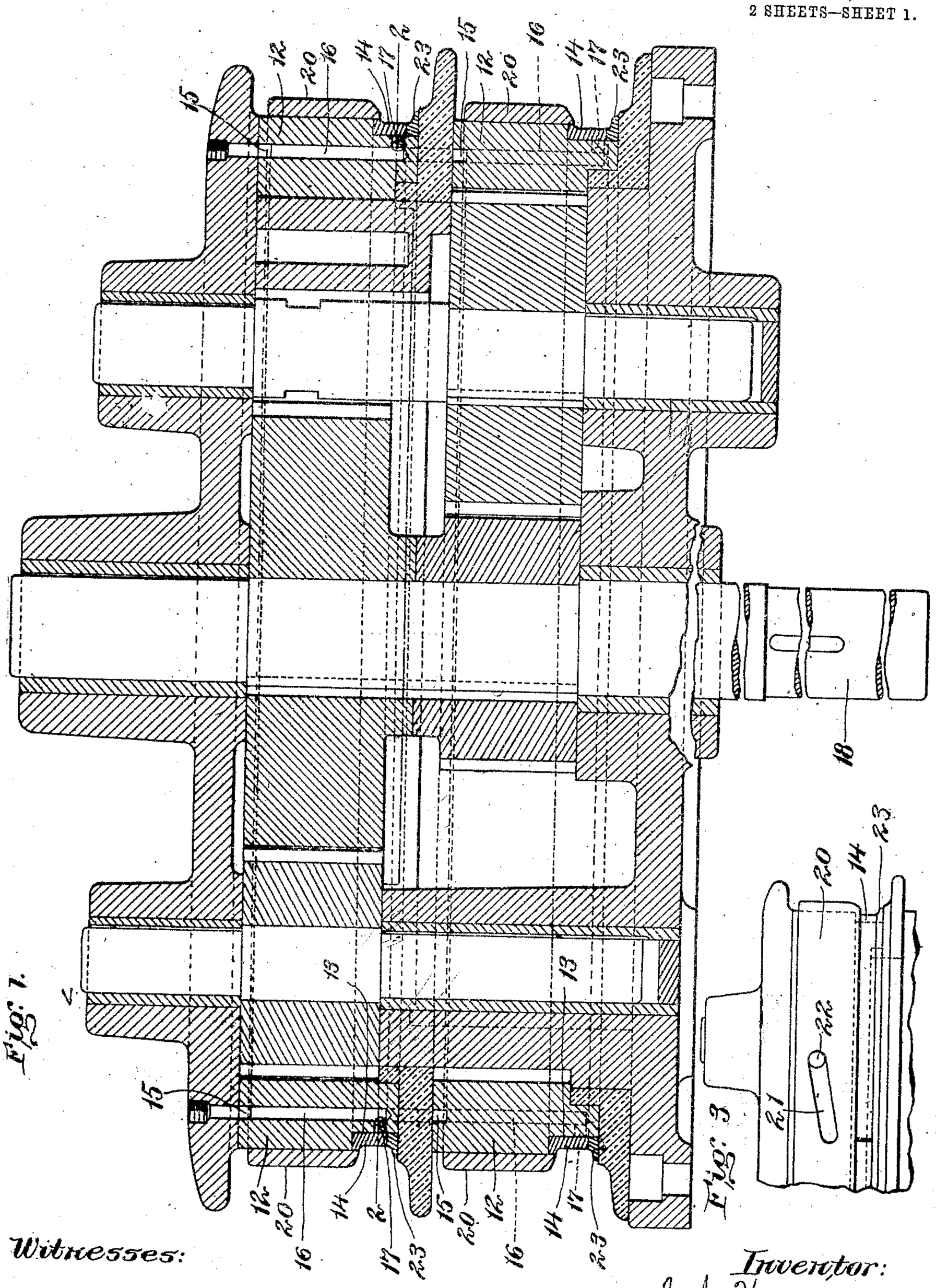
No. 827,019. PATENTED JULY 24, 1906.

J. A. HORTON.

WIRE DRAWING MACHINE.

APPLICATION FILED AUG. 9, 1905.

2 SHEETS—SHEET 1.



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2 SHEETS—SHEET 2.

Fig: 2.

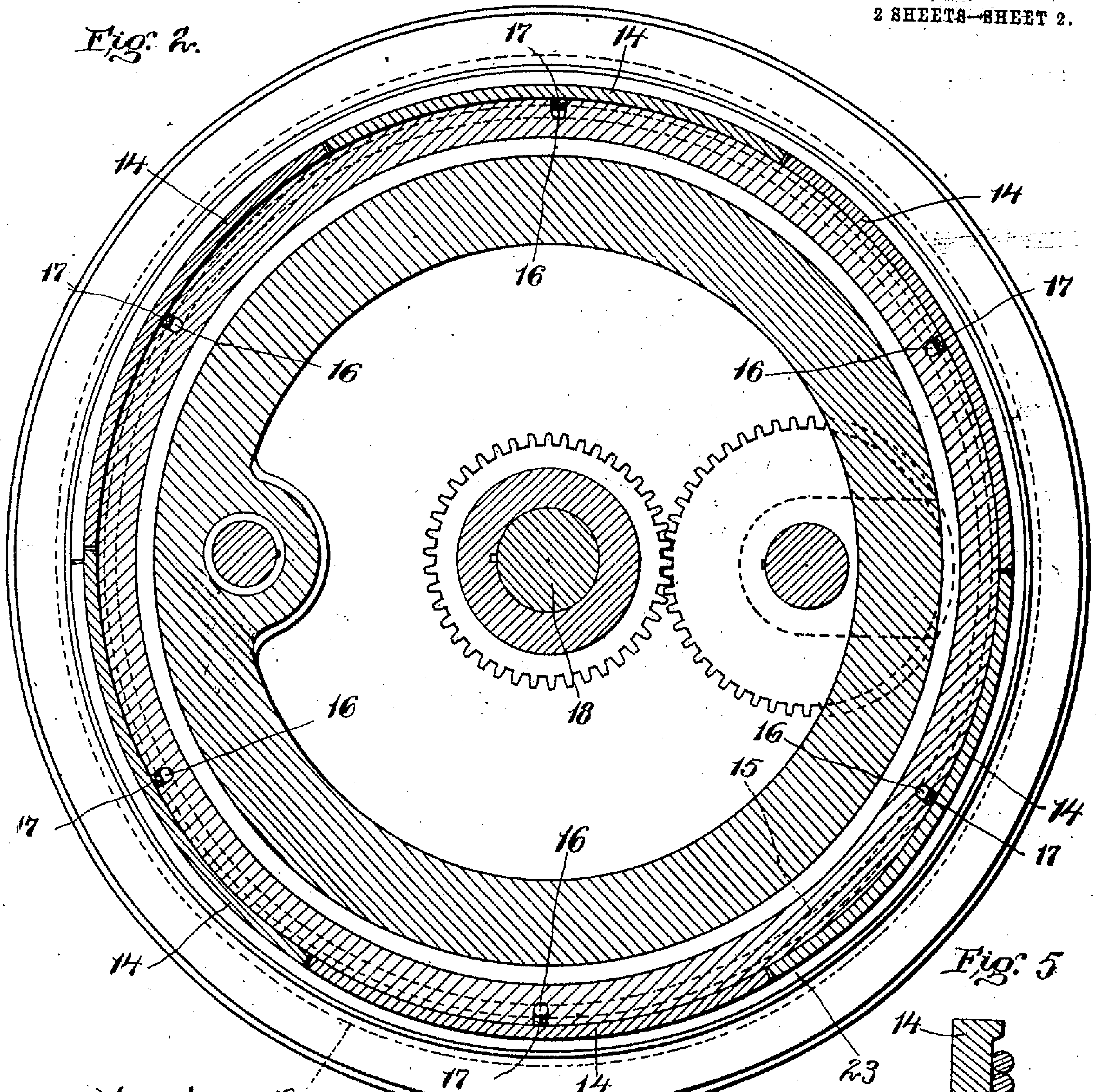


Fig: 5

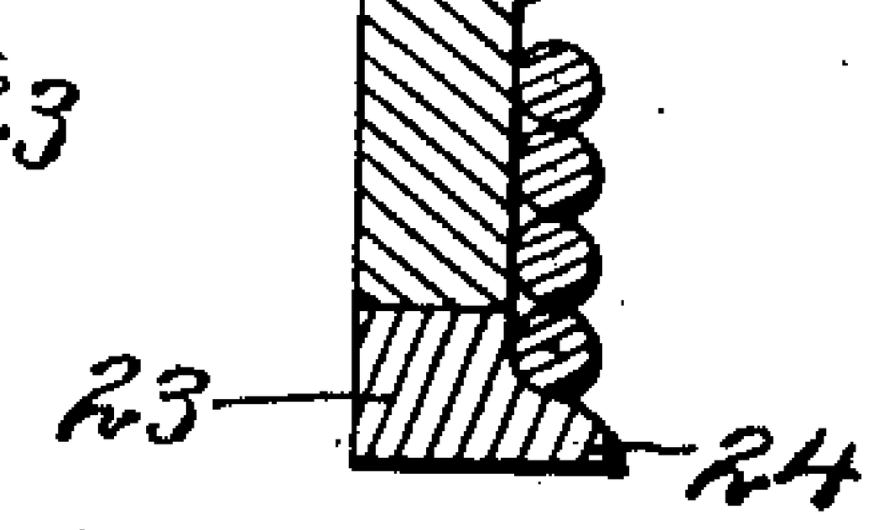
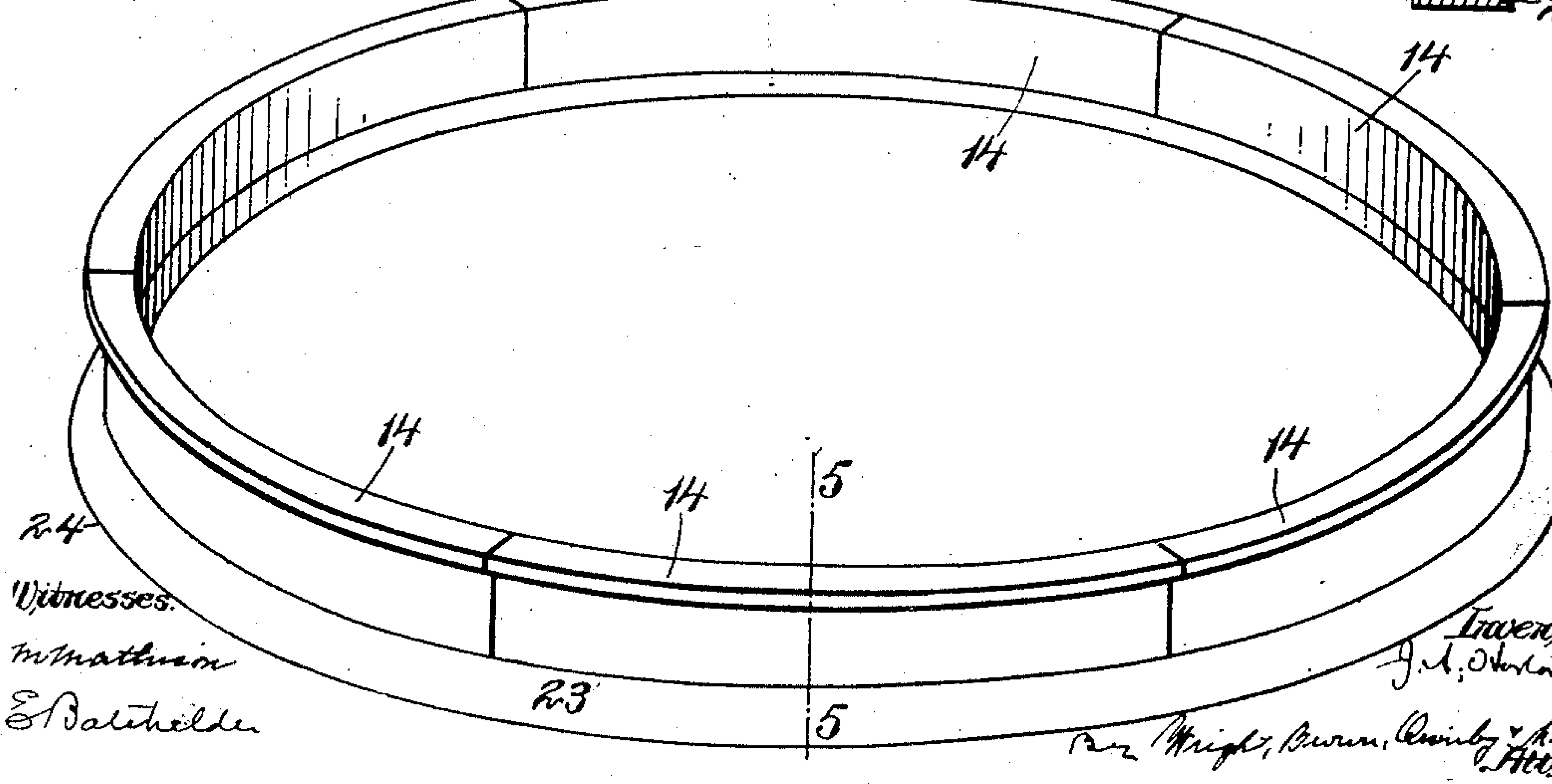


Fig: 4



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UNITED STATES PATENT OFFICE.

JAMES A. HORTON, OF PROVIDENCE, RHODE ISLAND, ASSIGNOR TO IROQUOIS MACHINE COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

WIRE-DRAWING MACHINE.

No. 827,019. Specification of Letters Patent. Patented July 24, 1906.

Application filed August 9, 1905. Serial No. 273,338.

To all whom it may concern:

Be it known that I, JAMES A. HORTON, of Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Wire-Drawing Machines, of which the following is a specification.

This invention relates to machines for drawing iron or steel wire by a continuous process, the wire passing through several dies in a series and around a corresponding series of traction or drawing drums, which draw the wire through the dies.

A type of continuous-process machine to which my invention relates is shown in Letters Patent of the United States No. 742,987, dated November 3, 1903. In the said machine each of the drums has a wire-forwarding device, preferably composed of a series of shoes loosely encircling the drum and having an automatically regulating or compensating connection therewith, whereby slippage between the wire and the wire-engaging surface of the drum is substantially avoided, such slipping being objectionable, because, first, of the inequalities caused thereby in the distribution of strains on the wire, tending to break the latter, and, secondly, because of the wear caused by the slippage on the protective coating of the wire, which coating is essential to prevent contact between the metal of the wire and the die.

It is important that the contacting surfaces of the drum and the wire-forwarding device thereon be lubricated to prevent the forwarding device from being locked to the drum by excessive friction, and it is further important that the lubrication be uniform and continuous and of such nature that the forwarding device may at all times be adapted to slip circumferentially on the drum and also be frictionally driven by the drum at the speed required by the call or tension of the wire.

In the above-named Letters Patent I have shown the said contacting surfaces uniformly and continuously lubricated by immersion in a body of lubricating liquid in which the wire and the dies are also immersed, the machine being adapted for what is known as "wet-drawing."

The present invention has for its object, first, to provide suitable means for the continuous and uniform regulation of the friction between the contacting surfaces of the drum and wire-forwarding device in a machine adapted for drawing wire in a dry condition, the wire and the dies being free from contact with the lubricant, which is confined to the frictional surfaces of the drum and wire-forwarding device and is prevented from overflowing from the crevice between said surfaces into possible contact with the wire.

The invention also has for its object to provide certain improvements in the wire-forwarding device above referred to whereby excessive friction between the said device and the body of the drum, which is due to the strain on the wire, will be prevented.

To this end the invention consists in the improvements which I will now proceed to describe and claim.

Of the accompanying drawings, forming a part of this specification, Figure 1 represents a vertical central section of a wire-drawing drum embodying my invention. Fig. 2 represents a horizontal section on line 2 2 of Fig. 1. Fig. 3 represents a fragmentary side elevation. Fig. 4 represents a perspective view of my improved wire-forwarding device detached from the drum. Fig. 5 represents a section on line 5 5, Fig. 4, showing a series of convolutions of wire on the wire-forwarding device.

The same reference characters indicate the same parts in all the figures.

In the drawings, 12 represents a drum which is adapted to rotate in a horizontal plane and is provided with a circumferential seat 13 for a wire-forwarding device adapted to engage the wire and to slip circumferentially on said seat. The wire-forwarding device is composed of a series of loose independent segmental shoes 14, collectively encircling the seat 13 and adapted to be pressed inwardly against the seat by the tension of the wire, which is wrapped in one or more convolutions about the wire-forwarding device.

The shoes are propelled by their frictional engagement with the seat 13, the amount of this friction depending on the inward radial pressure exerted on the shoes by the wire. This pressure in turn depends upon the tension of that portion of the wire which leads off from the drum into the next succeeding die. If the linear speed of this portion of the

wire is less than that of the periphery of the drum at a diameter equal to that of the wire-engaging surface of the shoes, the coil will loosen and diminish the frictional contact of the shoes with their seat. This loosening of the wire will also diminish its own friction against the shoes, but the shoes will nevertheless follow the wire, and any slip which occurs will take place between the shoes and drum rather than between the shoes and the wire, thus avoiding the abrasion of the wire. It is evident that with equal friction between the wire and the shoes and between the shoes and the drum, the first friction—namely, the outer one—will be a force acting on a longer arm from the center of rotation than the arm on which the inner friction acts. The outer friction therefore prevails over the inner friction to an extent determined by the thickness of the shoes, so that the shoes must follow the wire and slip against the drum when the wire and drum have different speeds.

To insure the proper slippage of the wire-forwarding device on the drum, means are required for the uniform and continuous lubrication of the contacting surfaces of the seat 13 and shoes 14. In a dry-wire machine it is necessary that the lubricant or friction-regulating agent be confined to said contacting surfaces and not be allowed to overflow therefrom and come in contact with the wire, because direct contact of any liquid or oleaginous lubricating material with wire being drawn by the dry process will cause the breakage of the wire. I have therefore provided the drum with friction-regulating means adapted to apply to the contacting surfaces of the drum and the wire-forwarding device a uniform restricted supply of a suitable lubricant, preferably oil, the flowage of the lubricant to said surfaces being so restricted that it is entirely taken up or consumed by the friction developed between the shoes and the seat, so that there is no overflow and no liability of contact between the lubricant and the wire.

The best means known to me for effecting a predetermined limited flow of lubricant to the contacting surfaces of the drum and shoes comprise an annular reservoir 15, formed in the upper portion of the drum and elevated above the seat 13, so that oil can flow by gravitation from the reservoir to the seat, and a a series of angular ducts 16 extending from the reservoir 15 to the seat 13, each duct having a vertical portion extending downwardly from the reservoir to a point adjacent to the seat and a horizontal portion extending outwardly from the vertical portion to the seat. In the horizontal portion of the duct 16 is a tightly-fitting plug or lubricant-retarding device 17, which is preferably a plug of soft-pine wood, driven into the horizontal portion of the duct, with the grain extending lengthwise of said portion. A lubricant, such as oil, accumulating in the vertical portion of the duct 16 will seep through the soft-pine plug 17 to a limited extent, the outer end of said plug forming a part of the shoe-engaging surface of the seat, so that the lubricant appearing at the outer end of the plug comes in contact with the inner surfaces of the shoes and is carried thereby into contact with the portions of the seat 13 located between the oil-conducting plugs, of which there may be any desired number, six being shown in the present case. It will be seen that by thus providing means for continuously and uniformly lubricating the contacting surfaces of the drum and the wire-forwarding shoe and at the same time so limiting the supply of lubricant as to prevent any overflow from said surfaces I provide for a suitable regulation of the friction between the drum and the shoes and prevent any liability of detriment or injury to the wire by contact of the lubricant therewith.

It is obvious that my invention is not limited to the particular means here shown and described for providing a limited predetermined non-overflowing movement of lubricating material to the contacting surfaces of the drum and wire-forwarding device.

In Fig. 1 I show the drum 12 as one of a tier of two similar drums, although any other suitable number may be employed, arranged in a vertical series, each drum being of annular form and having internal gear-teeth on its inner margin, which engage suitable intermediate gears supported within the annular drums and engaging driving-gears affixed to a driving-shaft 18, which is located at the center of the tier of drums. Suitable means are provided for preventing outward displacement of the wire-forwarding shoes 14, said means being in this case a ring or sleeve 20 surrounding the periphery of the drum above the shoes and vertically adjustable on the drum to permit its lower edge to engage the upper portions of the shoes. The ring 20 may have inclined slots 21, which receive studs 22, affixed to the drum, the arrangement being such that a partial rotation of the ring on the drum will cause the upper edges of the inclined slots to ride upwardly on the studs, and thus raise the ring and release the shoes.

To prevent an excessive inward pressure of the shoes 14 against their seat on the drum by the strain on the wire wrapped about the said shoes, I provide a loose continuous or uncut ring 23, which surrounds the drum below the shoes 14 and is adapted to engage the first or initial coil or coils of wire passing to the drum from the die. The ring 23 is incompressible, and therefore adapted at all times to slip loosely on the drum. Said ring therefore has no function in pulling or drawing the wire, its only function being to prevent the initial coil or coils of the wire from exerting inward pressure on the shoes 14, the

pressure of the initial coil being supported entirely by the ring 23. In consequence of this rigid or unyielding support for the initial coil or coils, the succeeding coils will be prevented from exerting excessive inward pressure on the shoes 14, and thus frictionally locking said shoes to the drum to such an extent as to cause injurious slip of the wire on the shoes. It will be observed that the shoes instead of having flanges at their lower edges to support the initial coil of the wire have flanges only at their upper edges; the coil-supporting surfaces being continuations of the coil-supporting surfaces of the ring 23, the latter having a flange 24 to support the initial coil. The shoes 14 and, if desired, the rings 23 are preferably made of a material, such as bronze, suitable for coating by attrition wire having substantially the hardness of steel.

I claim—

1. In a wire-drawing machine, a rotary drum having a peripheral seat, a wire-forwarding device adapted to slip circumferentially on said seat, and driven by frictional contact with the seat at the speed required by the call or tension of the wire, the drum having capillary ducts opening into said seat, and means carried by the drum for supplying lubricant to said ducts, said capillary ducts serving to effect a predetermined restriction or regulation of the movement of lubricant to prevent free flowage of the lubricant through said ducts, and overflow or escape of the lubricant from the crevice between the contacting surfaces of the seat and the wire-forwarding device.

2. In a wire-drawing machine, a rotary drum having a peripheral seat, a wire-forwarding device adapted to slip circumferentially on said seat, and driven by frictional contact with the seat at the speed required by the call or tension of the wire, an oil-reservoir carried by the drum, ducts extending from the drum to the seat, and capillary fillings in said ducts, the outer ends of said fillings contacting with the inner surface of the wire-forwarding device.

3. A wire-drawing drum having a loose, incompressible ring to receive the initial convolutions of the wire, and a compressible wire-forwarding device beside said ring adapted to slip circumferentially on the drum and frictionally driven at the speed required by the call or tension of the wire.

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

JAMES A. HORTON.

Witnesses:

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