No. 821,812. PATENTED MAY 29, 1906.

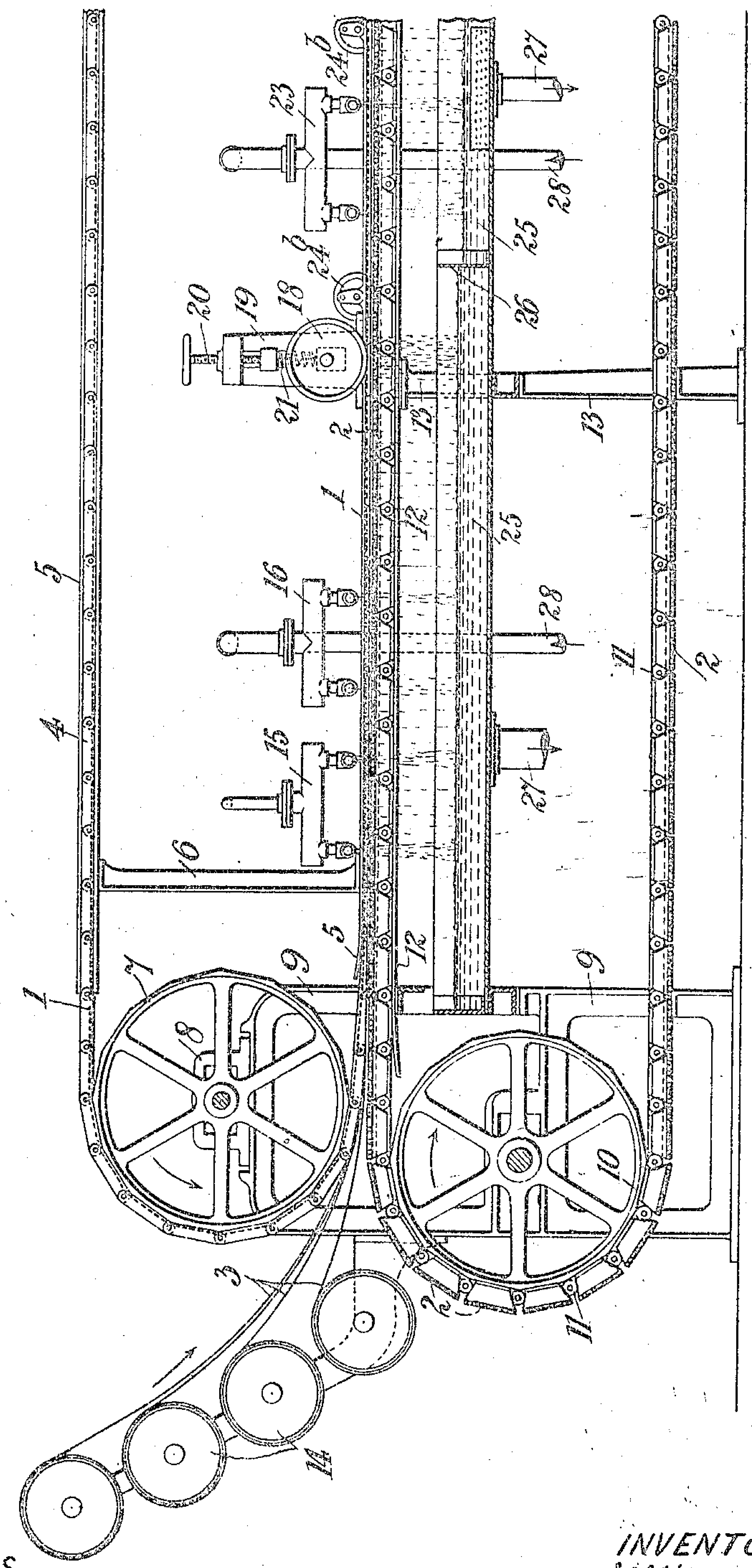
W. MATHER, J. HÜBNER & W. J. POPE.

APPARATUS FOR MERCERIZING.

APPLICATION FILED MAY 27, 1905.

4 SHEETS—SHEET 1.

Fig. 1.



WITNESSES.
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Fig. 2.

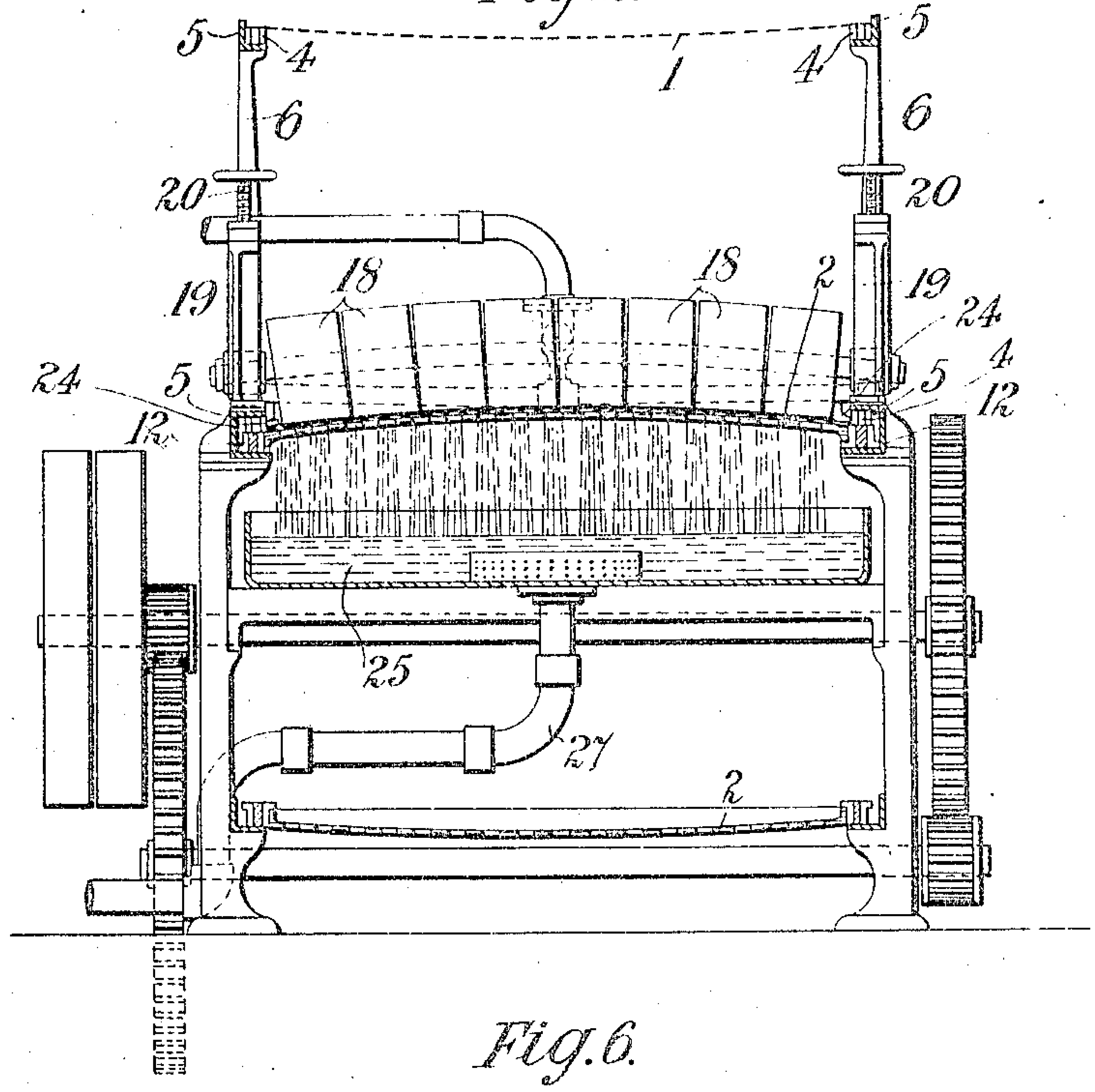


Fig. 6.

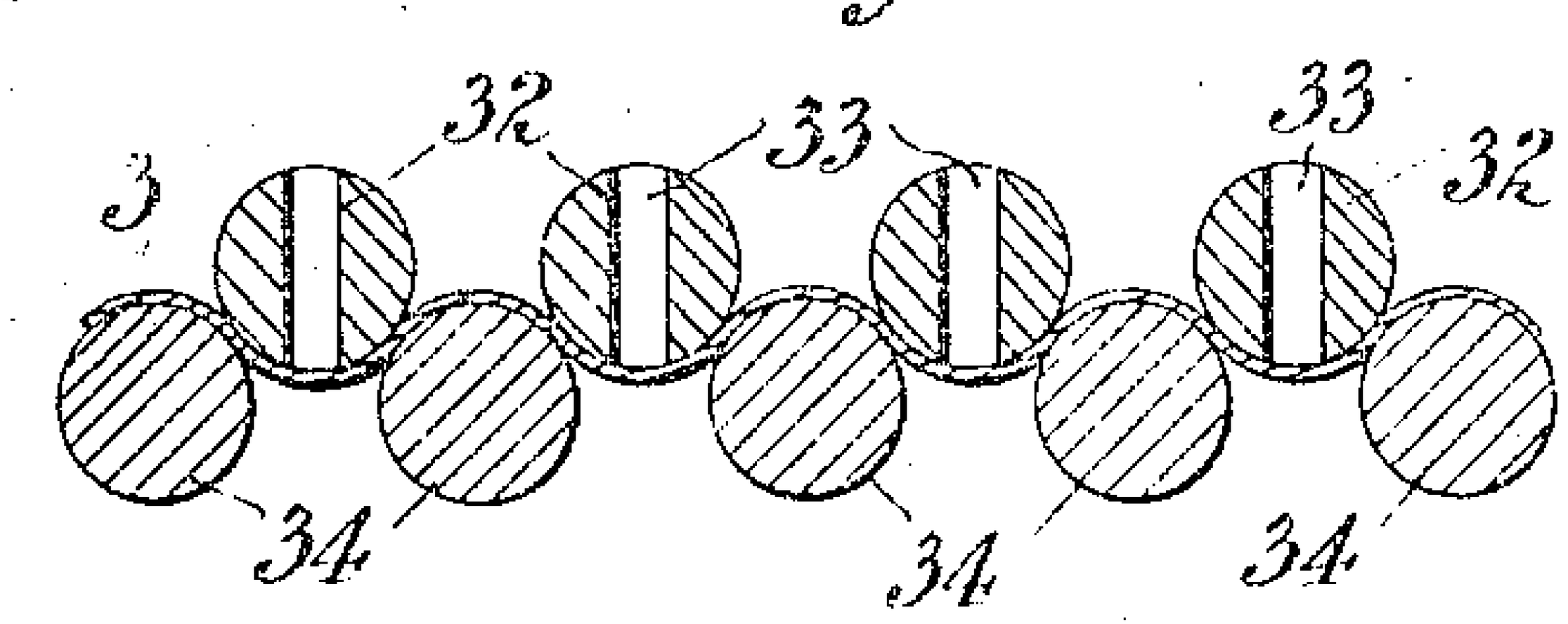


Fig. 7.

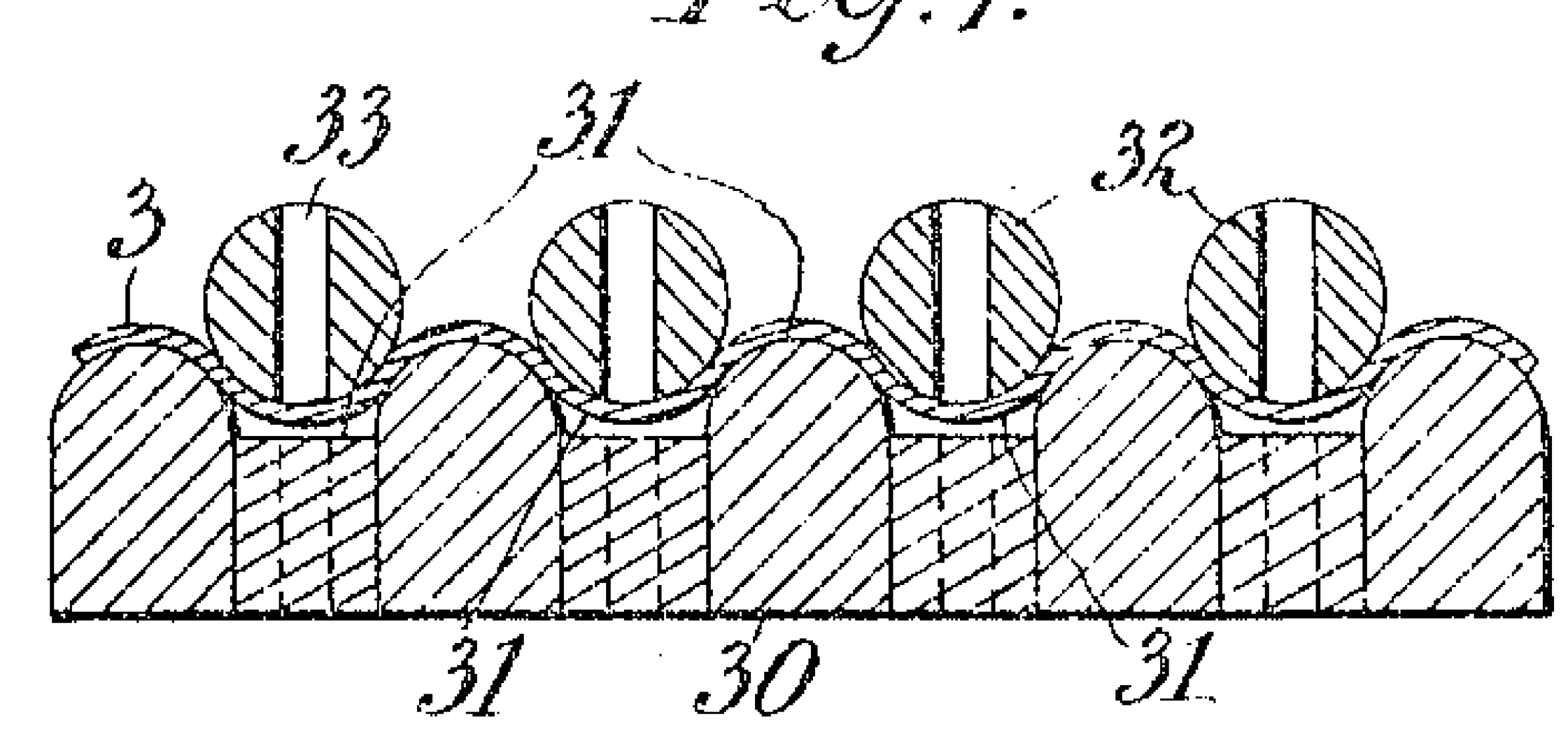
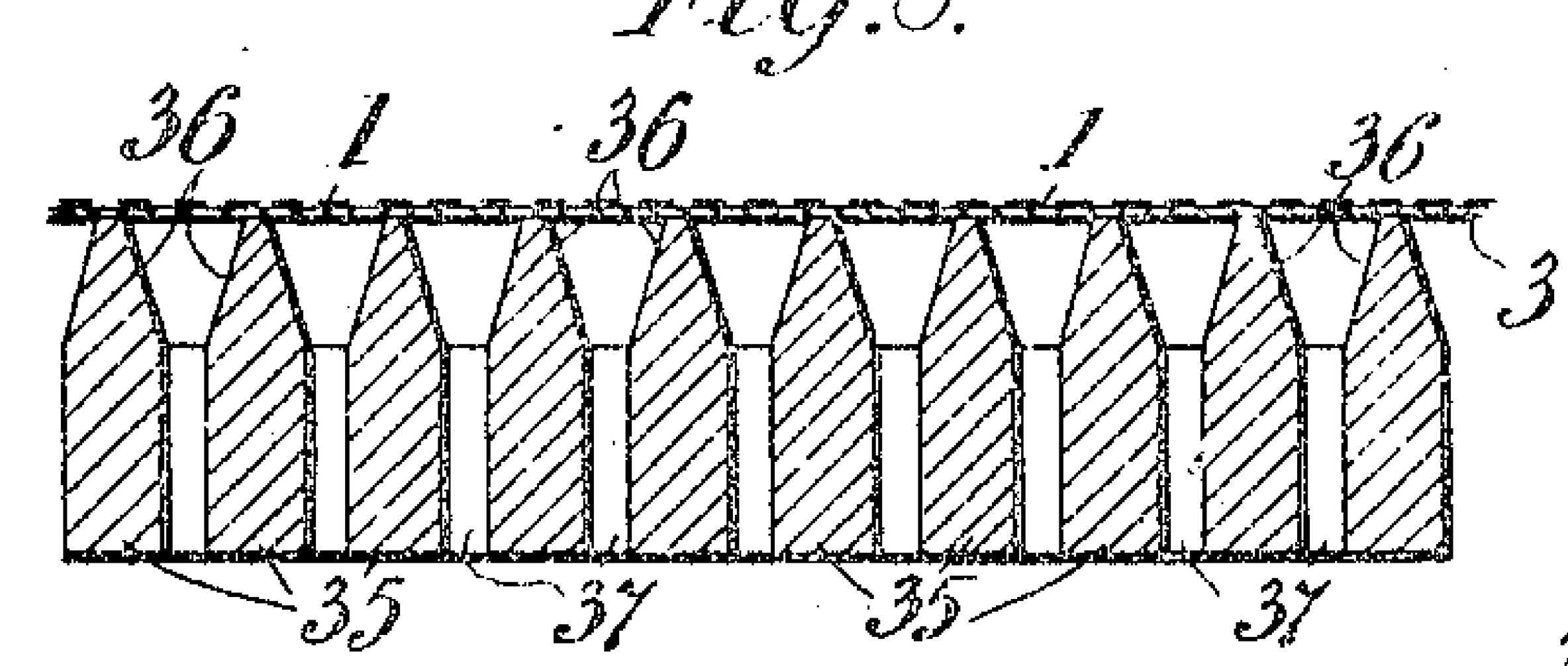


Fig. 8.



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4 SHEETS—SHEET 3.

Fig. 3.

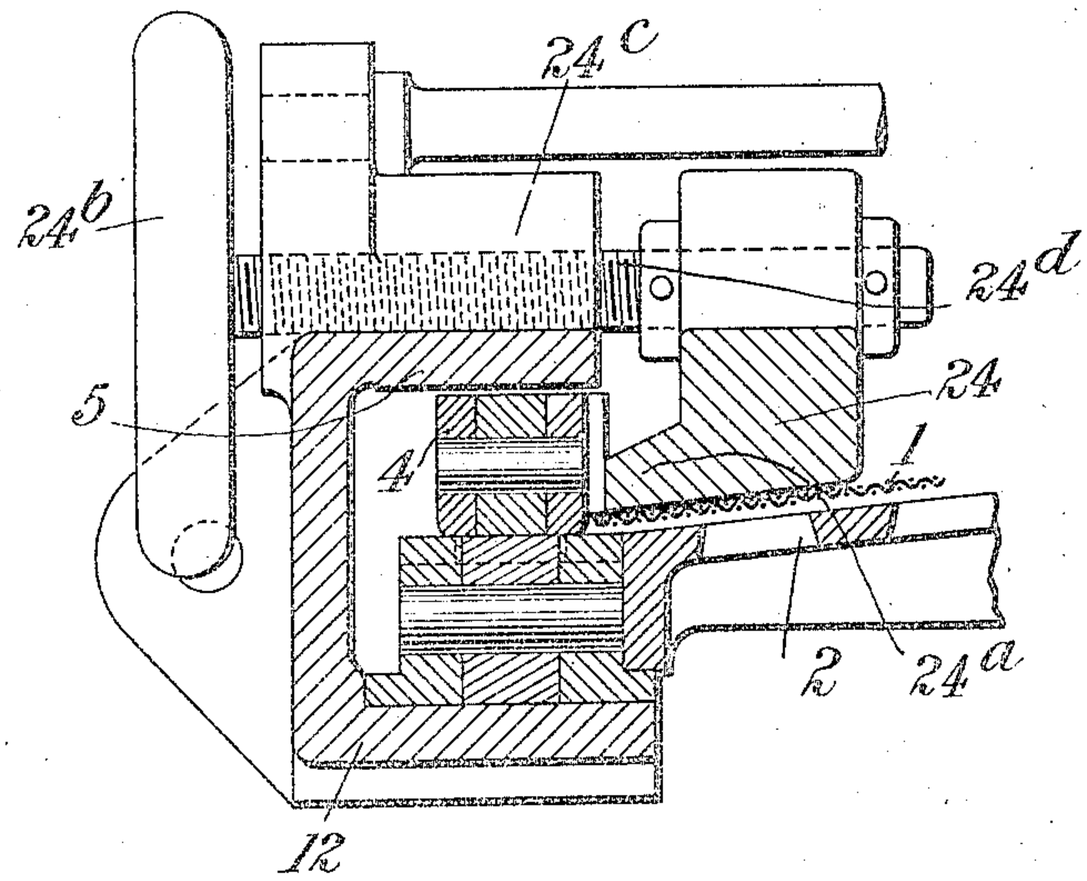


Fig. 4.

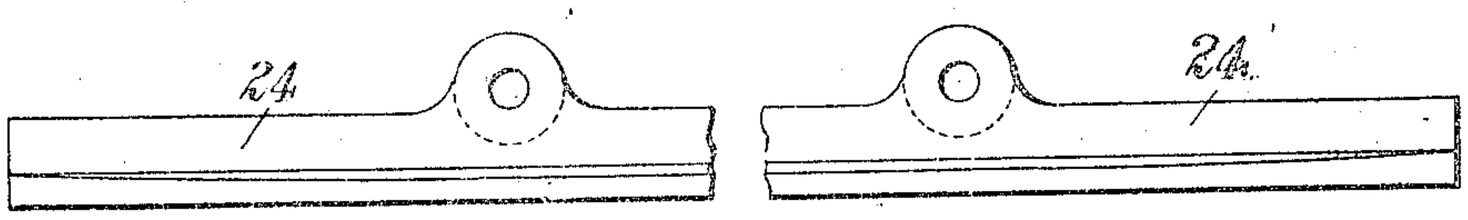
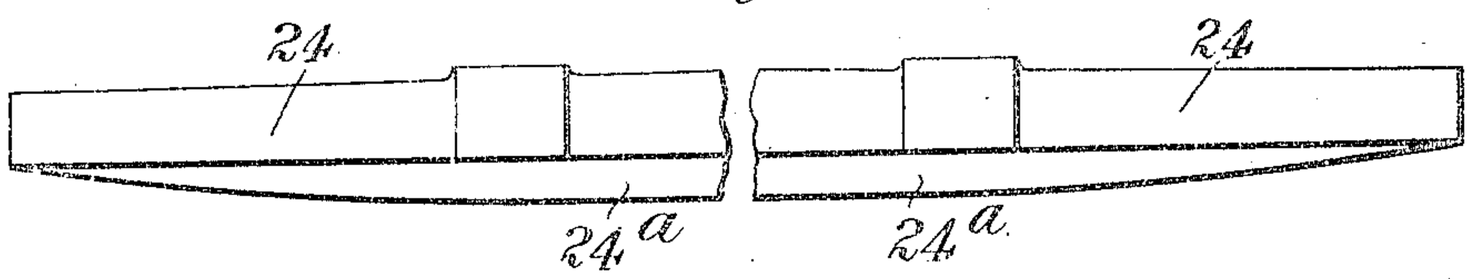


Fig. 5.



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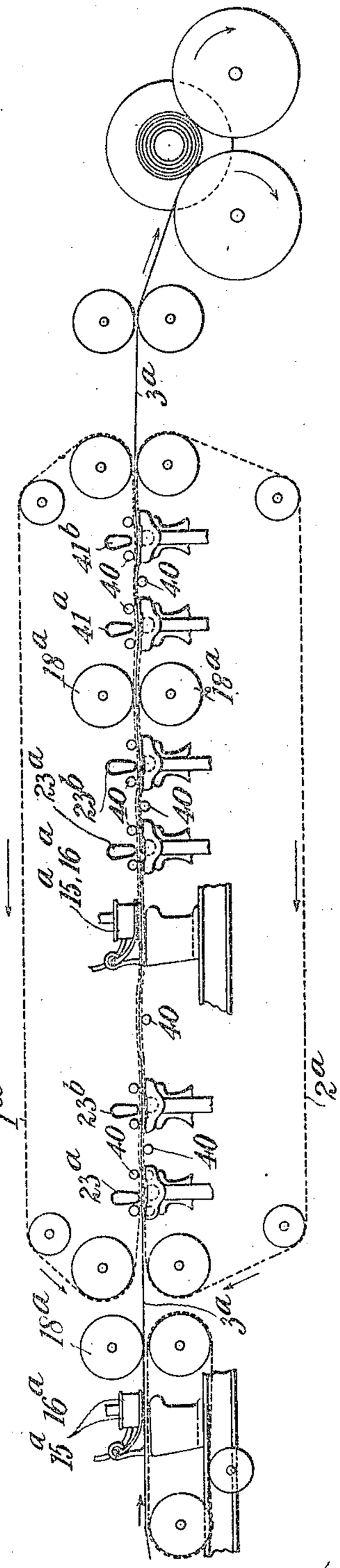
4 SHEETS—SHEET 4.

Fig. 9.



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UNITED STATES PATENT OFFICE.

WILLIAM MATHER, JULIUS HÜBNER, AND WILLIAM JACKSON POPE, OF MANCHESTER, ENGLAND.

APPARATUS FOR MERCERIZING.

No. 821,812. Specification of Letters Patent. Patented May 29, 1906.

Application filed May 27, 1905. Serial No. 262,438.

To all whom it may concern:

Be it known that we, WILLIAM MATHER, JULIUS HÜBNER, and WILLIAM JACKSON POPE, subjects of His Majesty the King of Great Britain, and residents of Manchester, England, have invented a new and useful Improved Apparatus for Mercerizing, of which the following is a specification.

The invention relates to apparatus for mercerizing fabrics and materials—such as fine muslins, lace, yarns, and the like, as well as unspun cotton—with the object of providing an apparatus in which the difficulty hitherto met with of treating materials of loose and delicate structure is overcome by providing means whereby it is prevented from contracting while under the influence of the mercerizing liquid with which it is treated while passing in a continuous manner through the apparatus.

In the accompanying drawings, Figure 1 is a longitudinal section through so much of an apparatus of our improved construction as is necessary to illustrate its working. Fig. 2 is a transverse section therethrough. Fig. 3 is a transverse section of a detailed part of Fig. 1, drawn to a larger scale. Figs. 4 and 5 are respectively a broken plan and elevation of the part shown in Fig. 3. Figs. 6, 7, and 8 are sectional views of detailed modifications of part of the apparatus, and Fig 9 is a diagrammatic view of a modified form of apparatus.

The apparatus illustrated in Figs. 1 and 2 is particularly applicable to the mercerization of loose or unspun cotton and consists of an upper pervious band or apron 1 and a lower perforated flexible bed 2, between which the sheets 3 of material are compressed during their passage through the machine, so as to prevent or minimize the contraction of the fibers.

The upper pervious band 1 may be a web of wire-gauze or may consist of a number of parallel wires, rods, laths, or the like, of any suitable material, attached at its edges to flexible linked chains 4, traveling on rails 5, carried by supports 6 on either side of the apparatus, said chains passing over pulleys 7, mounted in bearings 8, carried in frames 9 at either end of the apparatus to form an endless traveling band, said pulleys being driven in any suitable manner from any convenient source of power.

The lower perforated flexible bed may be constituted by narrow perforated sectional plates 2 of metal or other suitable material, extending across the apparatus. The plates may be curved, as shown in Fig. 2, and the upper surfaces may be either flat or provided with ridges or grooves. The plates are connected by links 11 and travel on side rails 12, as in the case of the upper band 1, similarly supported at 13, and over pulleys 10, also similarly carried on the frame 9.

The rails 5 and 12, where they meet, may be combined, as shown, in the form of a channel-section.

The material to be mercerized is passed in over guide-rollers 14 in the direction of the arrow and is immediately subjected to the action of a steaming device 15 and a saturating device 16, whereby steam and water or a weak solution of caustic from any convenient sources of supply are caused to percolate through the material while held between the band 1 and bed 2.

Squeezing-rollers 18 are provided adjustable in bearings 19 as to their pressure by a screw 20 and compression-spring 21, whereby the moisture is squeezed from the material preparatory to its being subjected to the strong caustic liquid or mercerizing agent, which is then caused to percolate through the material from a supply device 23 in connection with a convenient source of supply.

The means whereby pressure of the upper pervious traveling band 1 upon the material contained between it and the lower traveling bed 2 is obtained is shown in detail in part in Figs. 3, 4, and 5, comprises widening-pieces 24, arranged on either side of the machine, the under faces 24^a of which are curved to correspond with the curved surface of the plates 2, forming the lower bed and between which and the under faces 24^a of said widening-pieces the gauze or other flexible sheet forming the upper band 1 passes and is joined to the links 4, which form the side chains guided on the combined upper and lower rails 12 and 5 and against which chains said widening-pieces are adapted to abut, the tension-

ing or stretching of the pervious sheet 1 being obtained by an adjusting hand-wheel 24ᵇ, carried in a bearing-nut 24ᶜ on the channel-rails 12 5, and provided with a screw-threaded spindle 24ᵈ, by which means the widening-pieces may be drawn against the links of the chains on each side and the pervious sheet stretched to compress the material between down upon the curved bed and to put an even and constant pressure over its surface while undergoing the mercerizing treatment.

A tank 25, divided into sections by transverse walls 26, is arranged beneath the lower bed 2, as shown, into which the various treating liquors are received after passing through the band 1, material, and the bed 2 and from which they may be either conveyed back to their respective sources of supply by means of delivery-pipes 27, or the divided tank 25 may itself form the source of supply, the various liquors being drawn by any suitable means through the delivery-pipes 27 and supply-pipes 28 to their respective devices.

Instead of using curved plates 2, linked together to form the lower traveling bed 2, the latter may consist of transverse flat plates 30, Fig. 7, having a perforated corrugated surface 31, as shown, and with this arrangement of traveling bed the upper band instead of being formed of gauze or the like would preferably be formed of transverse parallel rods 32, having perforations 33 arranged to fit between the corrugations 31 of the lower bed, thus catching the cotton fibers between them, or this construction might be slightly modified, as shown in Fig. 6, by making the lower bed of a continuous series of parallel rods 34, spaced apart for the escape of the moisture and similar to the upper band, or the lower bed may be formed of plates 35, Fig. 8, having angular ridges 36 transversely across their upper surface, with perforations or slots 37 through the plates in the depressions between the ridges, such plates being linked together, as in the first instance, and with this latter arrangement the upper band 1 might conveniently consist of wire-gauze, as first described, which would press on the cotton fibers as they lie upon the ridges 36 of the lower plates, and so serve to hold them and prevent their contraction under the action of the caustic liquor.

In the modified arrangement of the apparatus shown in Fig. 9 the steaming, saturating, and caustic-liquor-supply devices 15ᵃ 16ᵃ and 23ᵃ 23ᵇ, respectively, are arranged in the same order as in the apparatus first described; but the two first-mentioned devices are arranged so that the steaming and saturating takes place before the cotton passes between the upper and lower pervious traveling surfaces 1ᵃ 2ᵃ and, further, the cotton is squeezed between squeezing-rollers 18ᵃ to remove as much of the superfluous moisture as possible, and the material may also be subjected to a washing liquor from supply devices 41ᵃ 41ᵇ at the close of the mercerizing operation. In this case a fine-wire-gauze or the like traveling band or apron 2ᵃ is substituted for the lower traveling bed, the upper band 1ᵃ being also of gauze, the cotton or fabric under treatment being held between them by means of an arrangement of adjustable tension-roller 40, which cause the bands and the confined cotton 3ᵃ to travel through the apparatus with an undulating motion and whereby the compression on the fibers is kept up throughout the mercerizing treatment.

Each form of apparatus described may consist of any number of sections arranged successively after the manner shown diagrammatically in Fig. 9, so that the preliminary treatment or the steaming and washing may be repeated between each treatment by the mercerizing liquor to obtain a larger output of the apparatus.

What we claim is—

1. In apparatus for mercerizing and in combination perforated plates, links for joining said plates to form an endless flexible pervious bed, an endless flexible pervious surface and means for pressing the surface upon the bed to hold the material under treatment therebetween.

2. In apparatus for mercerizing and in combination, curved perforated plates, links for joining said plates to form an endless flexible pervious bed, an endless pervious flexible band, linked chains jointed to the sides of band, said guides upon which said bed and band are respectively adapted to travel, and rollers for pressing the band upon the bed to hold the material to be treated therebetween.

3. In apparatus for mercerizing and in combination corrugated perforated plates, links for joining said plates to form an endless flexible pervious bed, parallel rods linked together to form an endless pervious surface and means for compressing the material undergoing treatment between the surface and the bed.

4. In apparatus for mercerizing and in combination parallel rods having a space between each, links joining same to form an endless pervious bed, similar perforated rods linked to form an upper endless pervious surface, and means for compressing the material undergoing treatment between the surface and the bed.

5. In apparatus for mercerizing and in combination, perforated plates having angular transverse ridges on the upper side, links joining same to form an endless pervious bed, a wire-gauze band forming a pervious

endless upper apron, and means for pressing the gauze band upon the ridges of the plates forming the bed, to compress the material under treatment between said apron and the bed.

6. In apparatus for mercerizing and in combination, a lower endless pervious surface forming a bed, an upper pervious endless surface, means for compressing the material to be treated between the bed and the surface, and means comprising a steam-supply device, a saturating-liquid-supply device and a mercerizing-liquor device arranged to successively treat the material while held between the surface and the bed.

In testimony whereof we have hereunto set our hands in the presence of two subscribing witnesses.

WILLIAM MATHER.
JULIUS HÜBNER.
WILLIAM JACKSON POPE.

Witnesses to the signature of William Mather:

EDWARD HOPKINSON,
GEORGE PALGRAVE SIMPSON

Witnesses to the signatures of Julius Hübner and William Jackson Pope:

ALBERT EDWIN LEICESTER,
GEORGE PALGRAVE SIMPSON.