

No. 777,934.

PATENTED DEC. 20, 1904.

C. J. BELLAMY.
MECHANISM FOR HANDLING FABRICS.

APPLICATION FILED MAY 20, 1904.

NO MODEL.

4 SHEETS—SHEET 1.

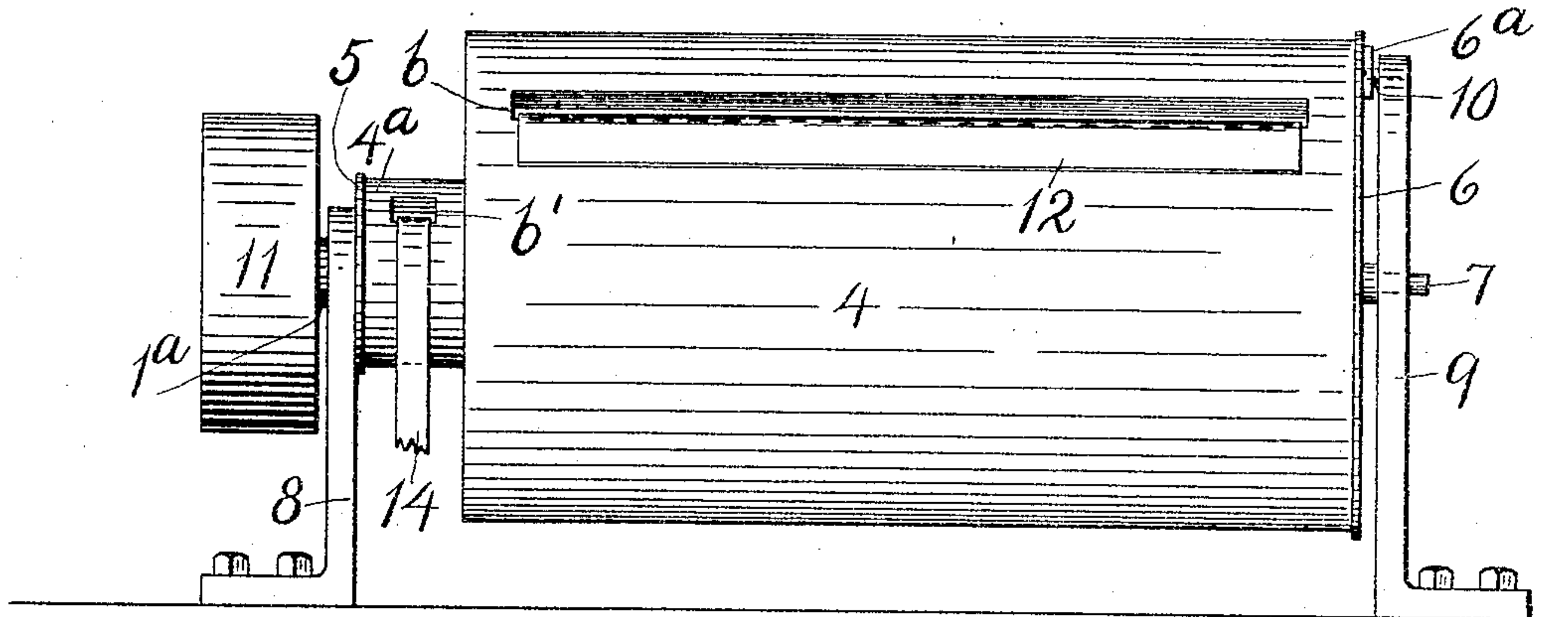


FIG. 1.

FIG. 2.

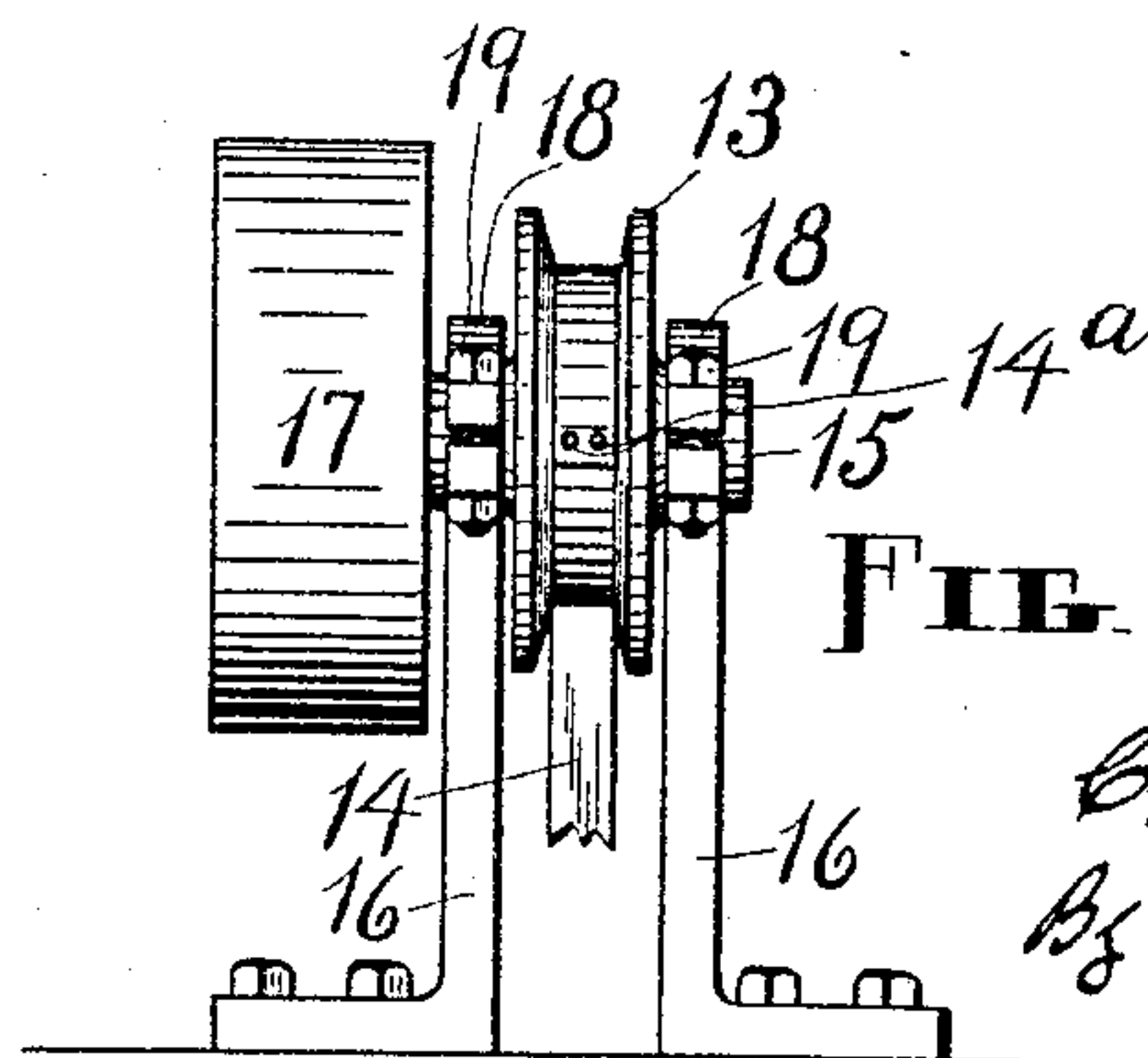
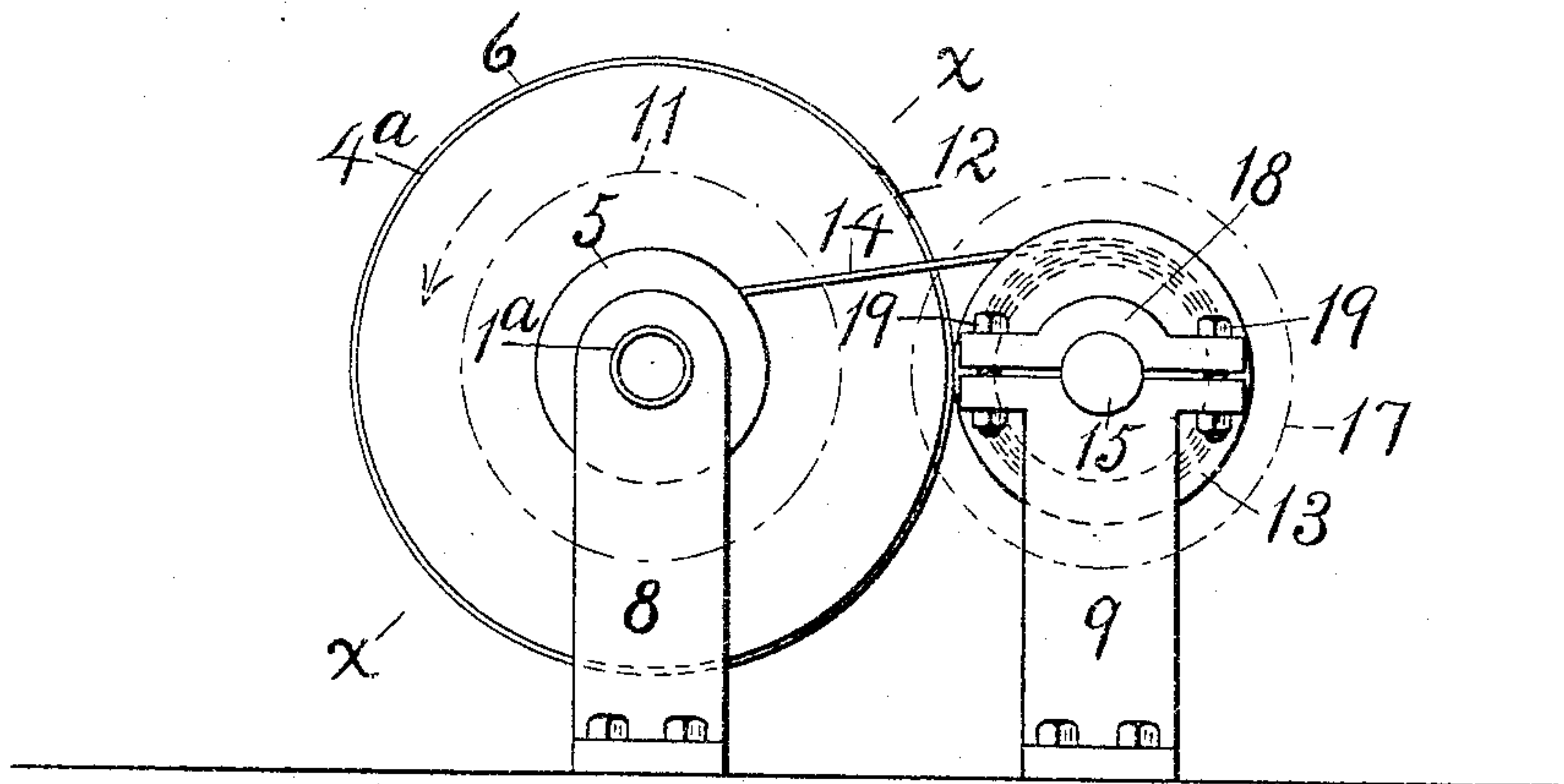


FIG. 3.

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4 SHEETS—SHEET 2.

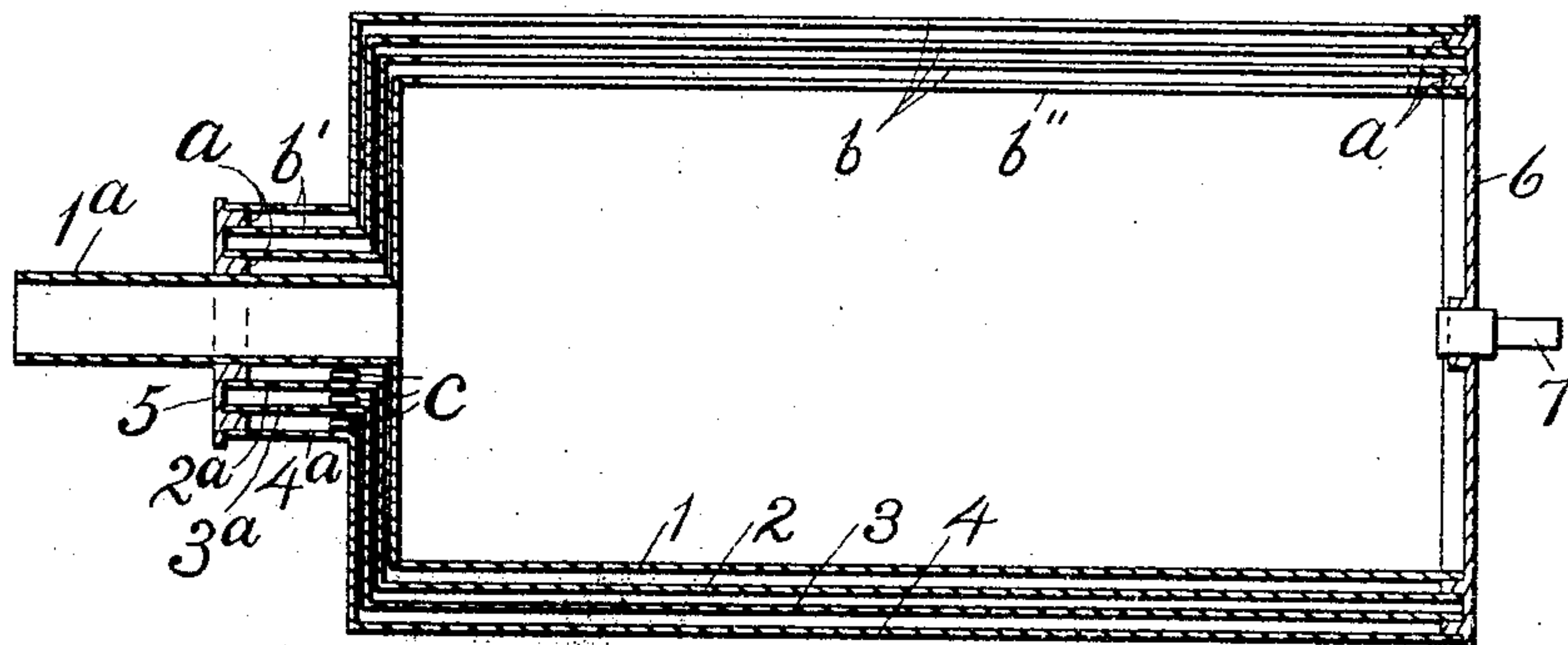


FIG. 4.

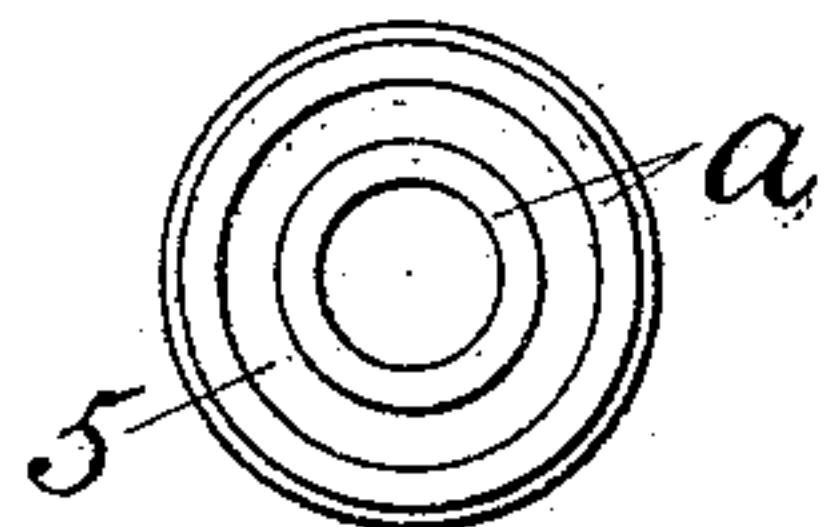


FIG. 5.

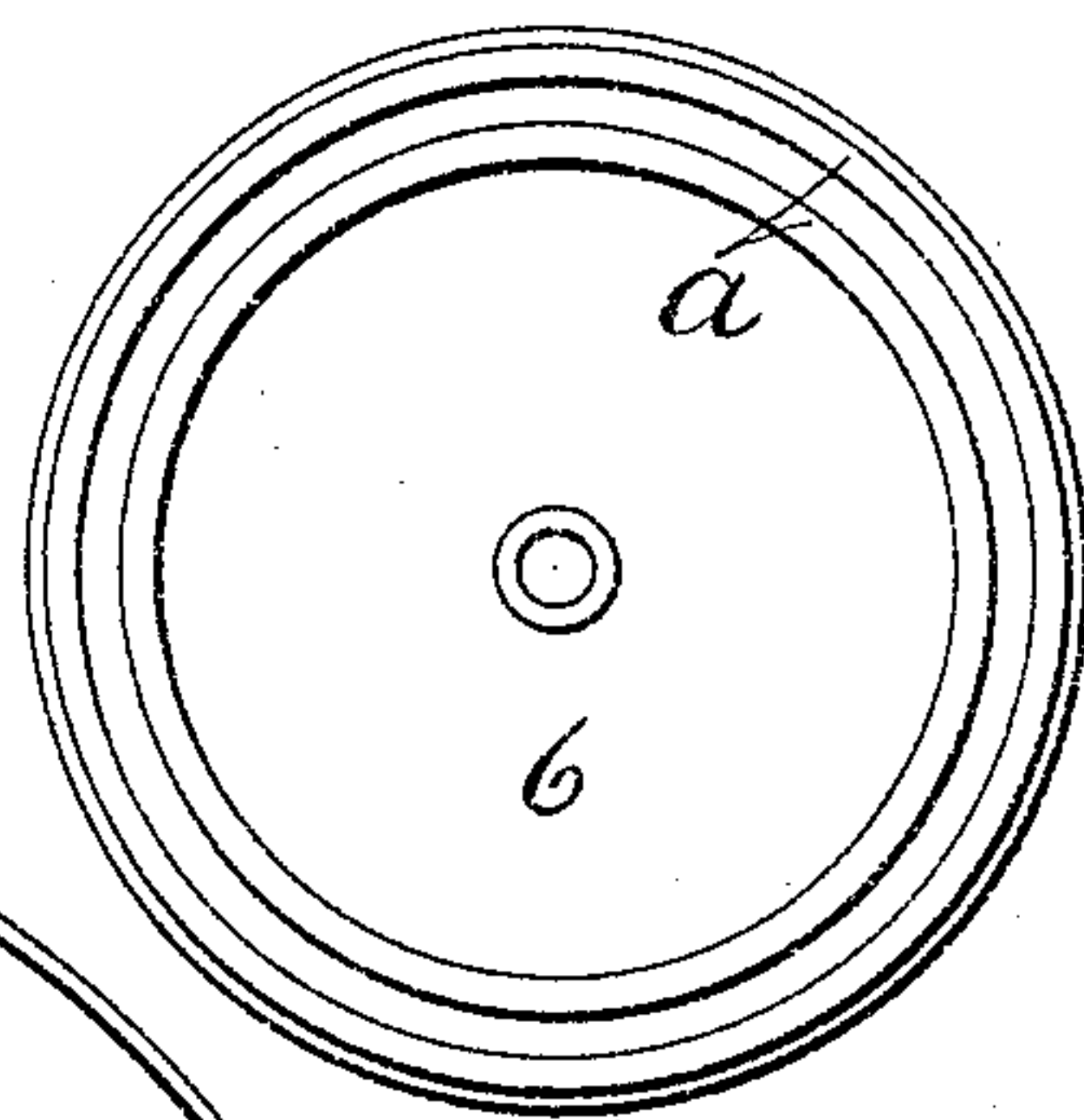


FIG. 6.

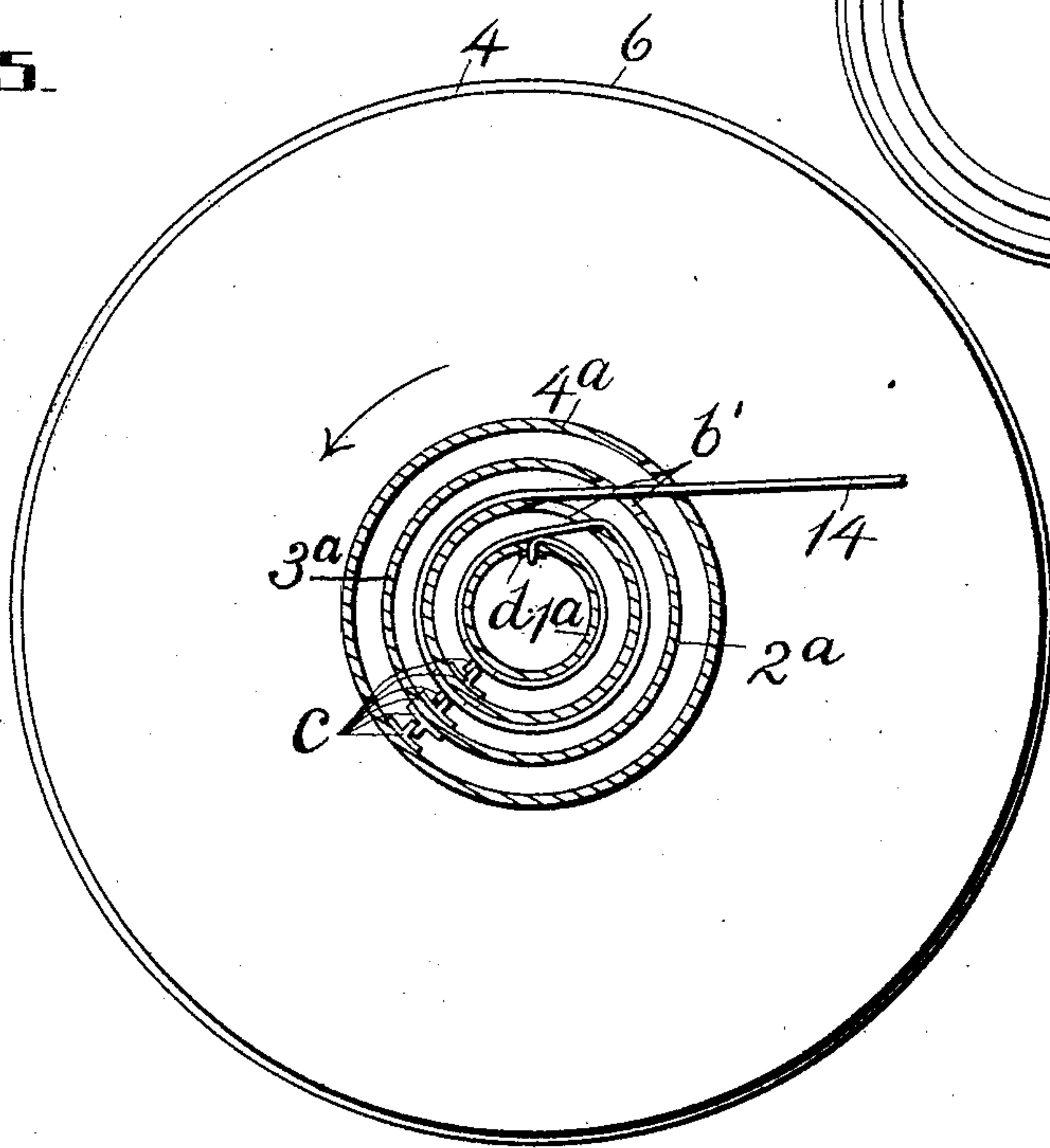


FIG. 7.

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4 SHEETS—SHEET 3.

FIG. 8.

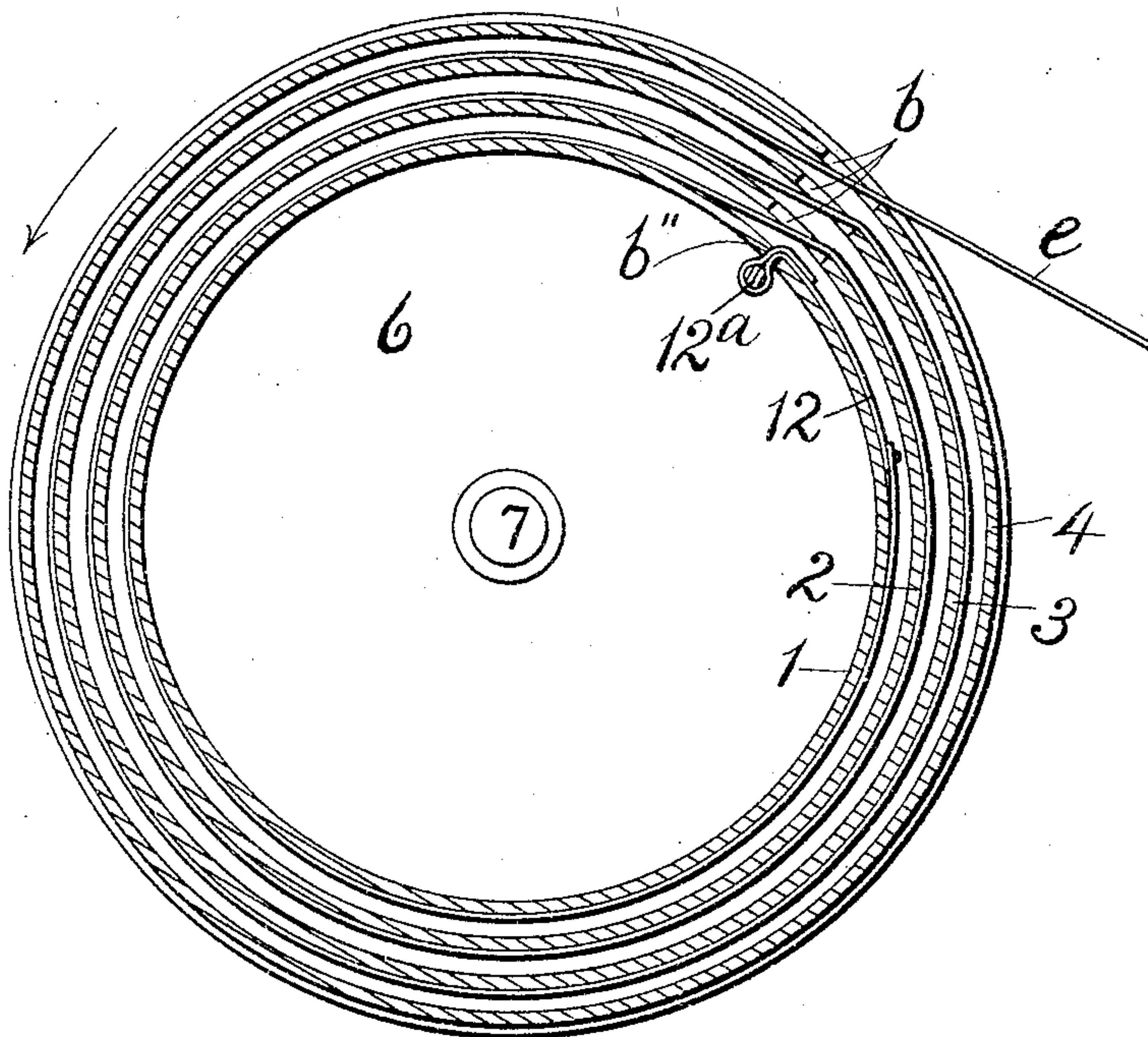


FIG. 9.

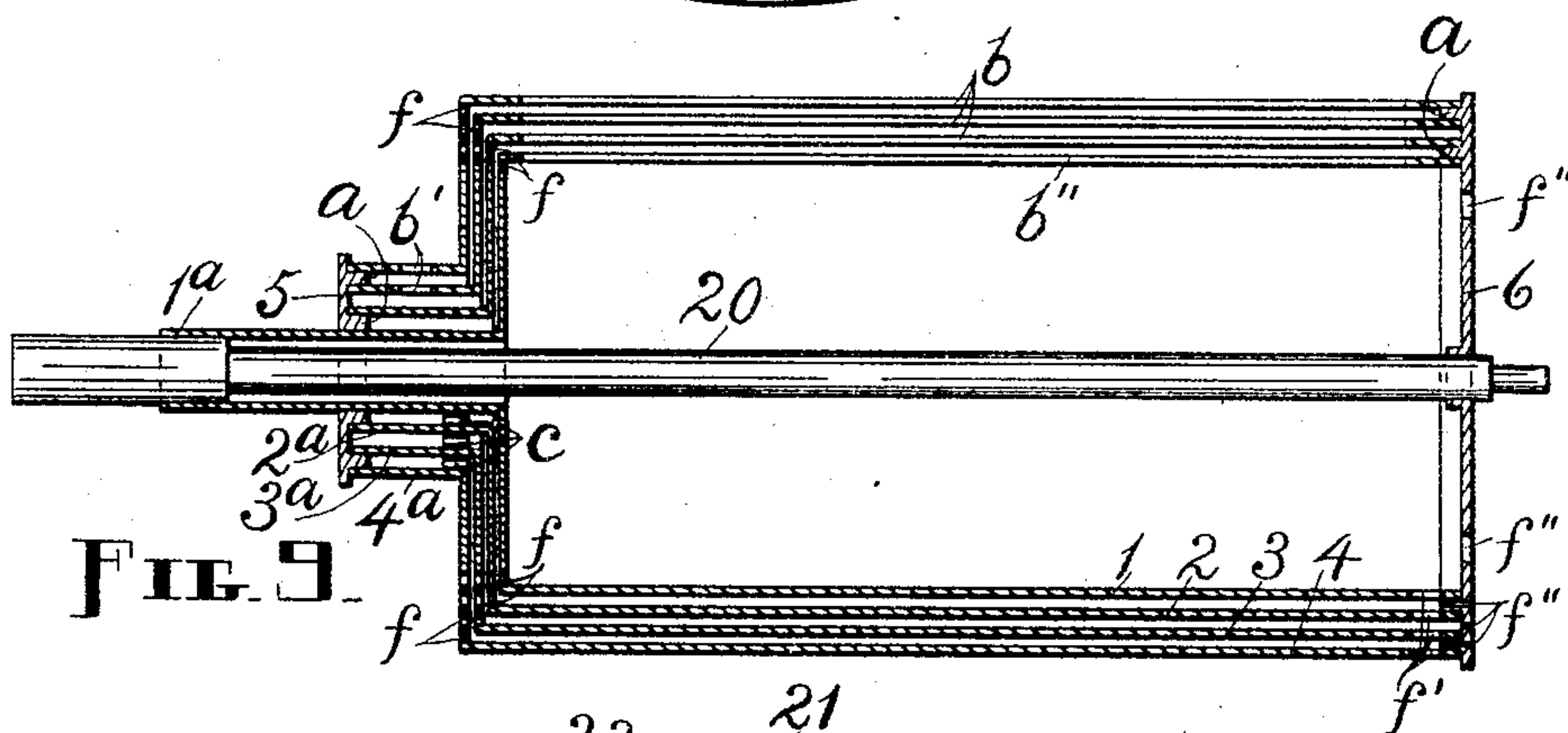
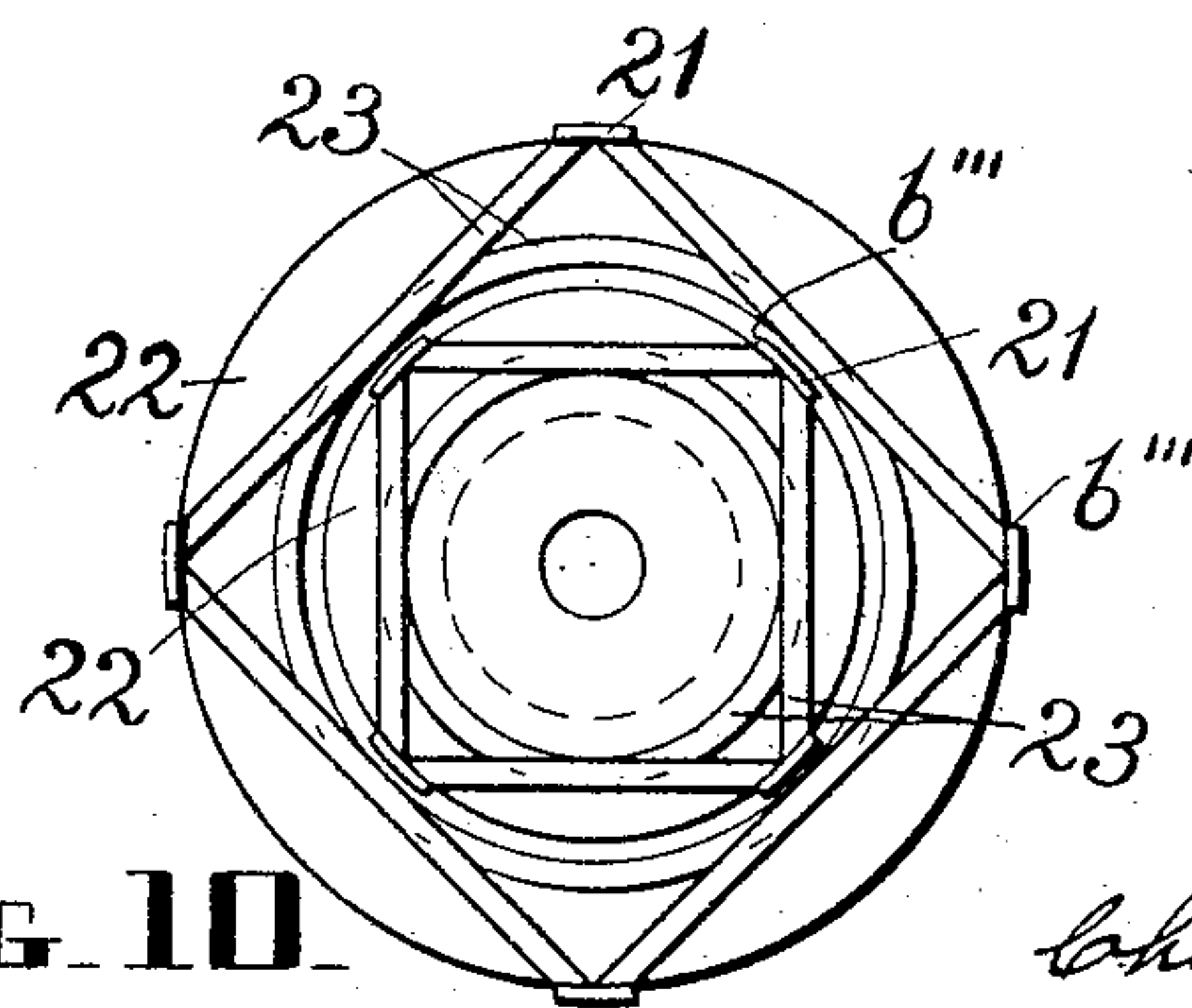


FIG. 10.



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4 SHEETS—SHEET 4.

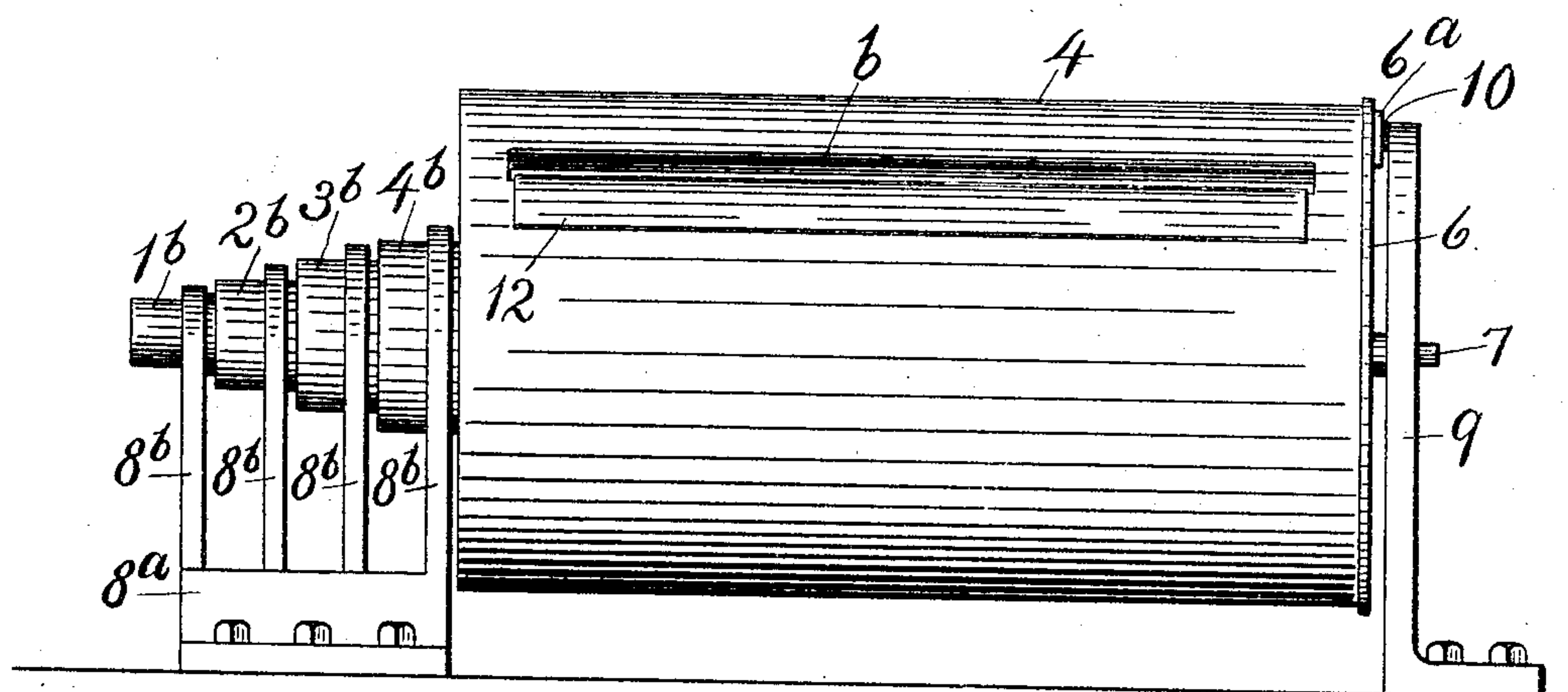


FIG. 11.

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MECHANISM FOR HANDLING FABRICS.

SPECIFICATION forming part of Letters Patent No. 777,934, dated December 20, 1904.

Application filed May 20, 1904. Serial No. 208,951.

To all whom it may concern:

Be it known that I, CHARLES J. BELLAMY, a citizen of the United States of America, residing at Springfield, in the county of Hampden and Commonwealth of Massachusetts, have invented a new and useful Method of and Mechanism for Handling Fabric, of which the following is a specification.

My invention relates to improvements in methods of and mechanisms for handling flexible material, particularly fabric such as paper, cloth, silk, and the like, in which and by which the material when wound is arranged in substantially concentric separated sections in such a manner that no portion of the material comes into contact with any other portion of the same; and it consists in the method by which such arrangement is brought about and in certain peculiar means or mechanism for handling the material at various stages of the process, all as hereinafter set forth; and the objects of my invention are, first, to provide a method and means for successfully handling flexible material in continuous strips, which requires time exposure to air, heat, or other like influences before it is ready to fulfil the purpose for which intended, and to furnish a package of such material in convenient form for future use or for repacking in some other form; second, to provide mechanism which with one species of operation reels up the flexible material to meet the above-mentioned requirements, leaving it in condition to be unrolled when desired, and with other species of operation where required operates the rotary members of the machine, so that the material can be drawn off without undue strain thereon, and, third, to provide a practicable and efficient machine embodying the elements essential to the successful carrying out of the improved method.

A further object is to equip a machine of the class specified above with simple but effectual devices for conveniently and quickly operating and controlling the rotary members thereof.

The handling of long strips of freshly-printed paper may be cited as an instance of one of the uses for which my invention is especially adapted.

Still another object of my invention is not only to arrange the flexible material so that it occupies a comparatively small compass without contact with itself while being exposed to air, heat, or other elements, but when desired to increase the effect of the elemental action on the material and to afford means for this purpose.

I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a front view of a machine capable of handling fabric in accordance with the above-mentioned method, the auxiliary apparatus for rotating the drums in a reverse direction being omitted; Fig. 2, an elevation of the working end of the machine, including the aforesaid auxiliary apparatus; Fig. 3, a front view of said apparatus; Fig. 4, a longitudinal section of the drums on lines *xx*, Fig. 2; Fig. 5, a view of the inner face of the small cap; Fig. 6, a view of the inner face of the large cap; Fig. 7, an enlarged cross-section through the hubs of the drums looking toward the latter; Fig. 8, an enlarged cross-section through the drums looking toward the large cap; Fig. 9, a longitudinal section through the drums, showing a modified form of construction; Fig. 10, an end view of two associated reels which are adapted to be used in place of drums, and Fig. 11 an elevation showing the hub of each inner drum projecting beyond the hub of each adjacent outer drum.

Similar figures and letters refer to similar parts throughout the several views.

My method consists in securing the forward end of the material required to be drawn into the package to an interior member and then through the medium of certain concentric rotary members winding such material around a common center in such a manner that no portion thereof touches another portion, the package when complete having more or less of a spiral formation, but the major portions of the different layers or thicknesses have a uniform outline, there being, in fact, no lack of general uniformity except at the points where two layers connect. In forming the package the material is led from the forward end, as stated, and in disembodying the pack-

age the material is led from the opposite end, the package being reduced one layer after another until the material of which the same was composed has passed into another form or condition. After the package has been formed, provided it is desired to accelerate the elemental effect, a more or less rapid rotary motion is imparted to said package for such length of time as may be required. The drying of ink may not be hastened by this method or this particular step in the method rather; but for driving off certain kinds of moisture from fabric or paper and for many other purposes such step added to the method of winding possesses points of great value.

The apparatus or machine with which the aforesaid method is carried into effect consists, essentially, of a plurality of rotary members with means to operate them in proper sequence for winding and means to reverse said members in proper sequence for unwinding, the latter means not being required, or at least not being necessary, however, when the rotary members are light enough and the material wound thereon strong enough to operate them without tearing itself.

Referring to the drawings, particularly at this time to Figs. 4, 7, and 8, a series of rotary members is shown, consisting of drums 1, 2, 3, and 4, provided at one end with hubs 1^a, 2^a, 3^a, and 4^a, respectively. For the sake of convenience in description the ends of the drums where the hubs are will be designated as the "closed" ends and the opposite ends as the "open" ends. A cap 5 is placed over the outer ends of all of the hubs except the inner one, and a cap 6 is placed over the open ends of all of the drums. The hub 1^a from the inner drum 1 extends through and beyond the cap 5, and the cap 6 is provided with a central trunnion 7. The cap 5 is provided with flanges *a* on its inner face, which serve as supports and guides for the contacting ends of the hubs 2^a, 3^a, and 4^a, while said cap, hubs, and the aforesaid closed ends of all of the drums are supported, directly and indirectly, by the hub 1^a. The cap 6 is provided with similar flanges *a* on its inner face which support and guide the open ends of all of the drums. The apparatus thus far described is mounted between supports 8 and 9, which respectively afford bearings for the hub 1^a and the trunnion 7. The cap 6 may be prevented from rotating when desired by means of a pin 10 extending from the top of the support 9 into a boss 6^a on the outer face of said cap. A driving-pulley 11 is tight on the projecting end of the hub 1^a, to which power is applied from any convenient source for the purpose of rotating the members during the process of winding. Each of the drums, with the exception of the inner one, is provided with a longitudinal slot *b*, and each of the hubs, with the exception also of the inner one, is provided with a longitudinal slot *b'*. The slots *b* are

long enough to accommodate the maximum width of whatever material the drums are adapted to handle and should be sufficiently wide to permit said material to pass through the same without touching except on the edges, which form supports or bearing-surfaces for the under side of the material, as will be hereinafter more fully explained.

A tab 12, preferably of some stout textile material, has its inner end securely attached to the drum 1 and is of sufficient length to extend out of and beyond the slots *b*, as shown. In the present instance I secure the tab 12 to the drum 1 by forming a longitudinal slot *b''* in said drum and a sheath in said tab, which sheath is inserted in said slot and a rod 12^a introduced into said sheath inside of said drum. The material to be wound or reeled is fastened, by means of pins or in any other suitable manner, to the free or exposed end of the tab 12. Within the spaces between the hubs and extending into each other's paths of travel are projections *c*, firmly attached to the outer periphery of the hub 1^a, the inner and outer peripheries of the hubs 2^a and 3^a, and the inner periphery of the hub 4^a.

In order to overcome momentum and steady the rotary members while reeling, as well as to afford adequate means for assisting in the unwinding of the material on the drums, there may be employed a pulley 13, connected by a chain, rope, or belt 14 with the hubs. The pulley 13 is tight on a shaft 15, journaled in uprights or supports 16 16 and having a driving-pulley 17 fast on one end. In order to retard the pulley 13 to whatever extent may be desired, friction is produced on the shaft 15 by means of bearing-boxes 18 18 and nuts 19. One end of the belt 14 is made fast at 14^a, Fig. 3, to the pulley 13, and the other end of said belt enters a slot in the hub 1, where it is held by one or more pins *d* on the inside of said hub, as shown in Fig. 7. The length of the belt 14 is sufficient to enable it to be wound around the hubs in the same manner as the fabric is wound upon the drums. Power from any suitable source is applied to the driving-pulley 17 for the purpose of reversing the motion of the drums and assisting in unwinding the fabric thereon, as will presently appear.

The operation of the machine is as follows: Assuming that the arrangement of the projections *c* relative to each other is such that when the drums are rotated in the direction of the arrows in Figs. 2, 7, and 8, each inner drum can make an approximately complete revolution before the next outer drum is brought into action. To wind or reel a strip of freshly-printed paper, for example, attach the forward end of such strip printed side up to the exposed end of the tab 12 and cause the driving-pulley 11 to revolve in the direction of the arrow in Fig. 2. This operation results first in rotating the hub 1^a and the drum 1 one

full revolution, less the thicknesses of the projections *c* between the hubs 1^a and 2^a, before the drum 2 is set in motion, and in winding a layer of paper *e* nearly around the outside of said drum 1, the tab and layer being drawn in through the slots *b*. The contact of the projection *c* on the outside of the hub 1^a with that on the inside of the hub 2 next causes the last-mentioned hub and the drum 2 to make a full revolution, less the thicknesses of the projections between the hubs 2^a and 3^a, before the drum 3 is disturbed, the drum 1 making at this time its second revolution, although no more paper is wound on said drum 1, but a layer is wound on the outside of said drum 2, as said paper is drawn through the slots *b* in the drums 3 and 4. At the third revolution of the drum 1 and the second of the drum 2 the drum 3 takes on a layer of paper in precisely the same manner as in the other two cases, and another revolution of the drums 1, 2, and 3 completes the reeling operation by winding a layer of paper around the drum 4. The motive power is now disconnected unless it is desired to continue the rotation of all of the drums for the purpose of more rapidly drying the paper, which may be done whenever found necessary or desirable. In Fig. 8 all of the drums except the outside one have received their layers of paper. It will be seen upon reference to the drawings, when considered in connection with the foregoing description, that no portion of the paper comes into contact with any other portion and only the under or inside surface of said paper comes into contact with the drums. This is true both in winding and unwinding. It is also true in all cases that the longitudinal edge of each slot *b*, which is driven against the paper in winding and supports it in unwinding, alone comes into contact therewith. So it is clear that the freshly-printed matter on the paper cannot be rubbed, smutted, or blurred. The paper is now in the form of a package and may so remain as long as desired.

At the beginning of the reeling operation the major portion of the belt 14 is wound on the pulley 13; but immediately the hubs begin to wind said belt onto themselves in substantially the same manner as the paper *e* is wound onto the drums, and since said pulley is under restraint afforded by the bearings for the shaft 15 as the belt causes the pulley to revolve while being unwound therefrom it acts as a brake on the hubs and cylinders, preventing any excess of motion that might otherwise be due to momentum. In Fig. 7 the belt 14 is shown as being wound around the hubs 1^a and 2^a. The hub portion of the belt is drawn freely in and out of the slots *b* like the tab and paper operated by and with the drums. When the rotary motion of the drums is to be continued after the reeling operation has been completed, the belt 14 should be disconnected from the pulley 13; other-

wise further motion of said drums in the direction of winding would be prevented.

As there would in some cases be danger of tearing the paper if it alone were depended upon to rotate the drums backward to unwind in the opposite direction to that necessary for reeling, I prefer to actuate said drums in the reverse direction by means of the belt 14. To do this, the driving-pulley 17 is rotated so as to rewind the belt on the pulley 13, (such belt, if detached for the reason stated in the preceding paragraph, being again connected with said pulley 13,) which action results in first rotating all of the hubs and drums one revolution backward next all except the outer hub and drum, since at the end of the first revolution the projections *c* between the hubs 4^a and 3^a part company and change their relation to each other, then the hubs 2^a and 1^a and the drums 2 and 1, and finally only the inner hub and drum, when the operation is complete and the driving-pulley 17 is stopped. One drum after another, beginning with the outside one, comes to a stop when dropped from the combination until all are stationary. As the drums are rotated backward, the paper *e* is first unrolled from the drum 4, next the drum 3, then the drum 2, and finally the drum 1. Said paper leaves the slots *b* without touching the edges of the same except with its under side. The paper is led from the drums as paid out and packed in whatever form may be desired, being detached from the tab 12 at the end of the unwinding operation.

The drums may be loosely mounted on a tight shaft 20, Fig. 9, which takes the place of the trunnion 7 and supports the hub end of the apparatus, or the hub 1^a may be tight on such shaft, which is permitted to revolve and has the driving-pulley thereon, or said shaft, with the pulley thereon, may be permitted to revolve once in either direction independently of said hub 1^a, projections *c* being provided for both the shaft and the inside of the hub 1^a. In the last instance the belt 14 should be secured to the shaft 20 instead of the hub 1^a and the inner end of the tab 12 to said shaft instead of the drum 1, as this arrangement increases the capacity of the machine.

In place of drums for the rotary winding and unwinding members reels may be used, such reels consisting of any number of longitudinal bars for the support of the fabric. In Fig. 10 two reels are shown in proper relative position. Each of these reels consists of four supporting-bars 21 for the fabric, such bars being attached at one end to a head 22, to which the necessary slotted hub or equivalent member is connected, and adapted at the other end to engage the flanged cap 6. A frame 23 supports the bars 21 of each reel inside of the projecting ends of such bars which engage the cap-flanges *a*. An edge, as

b''' , of one of the bars 21 of each reel serves to support the fabric in the same manner as the corresponding edge of a slot b .

In order to provide for a free circulation of air throughout the interior of the drums, perforations may be made in the hub ends of said drums, as shown at f in Fig. 9, in the sides of the drums outside of the field adapted to be occupied by the fabric, as shown at f' in such view, and in the cap 6, as shown at f'' in said view, or otherwise, as may be deemed most expedient, the number and location of such perforations not being material for the purposes of this case, the essential thing being to permit air to circulate freely in the drums. A forced draft might be employed with the drums either when in motion or stationary. Usually if the drums are not to be used for accelerated drying purposes none of the perforations f f' f'' need be provided. A reel similar to those shown in Fig. 10 is well adapted for the circulation of air in and through the same and around the material thereon.

In Fig. 11 I show the drums supported at one end, as before, and separate supports for the hubs at the other end. In this case each smaller hub extends beyond the adjacent larger one and may have power applied thereto to rotate the corresponding drum a predetermined distance in either direction. The hubs 1^b , 2^b , 3^b , and 4^b are mounted in as many arms 8^b , rising from a support 8^a . The opposite ends of the drums may also be provided with hubs, which hubs may be mounted in the manner just explained, or the drums themselves may be so mounted at one or both ends, hubs being dispensed with.

It should be borne in mind that the retarding and reversing chain, rope, or belt might be connected with the drums direct instead of operating in connection with the hubs; furthermore, that a number of comparatively narrow strips of material might be reeled upon and reeled off of a series of long drums at a time, there being a single wide tab or a number of narrow ones provided to which the strips of material could be fastened. Although the hubs could be dispensed with it is believed they add materially to the machine by decreasing friction and reducing length of belt and size or sizes of pulleys and gears if any of the latter be here used.

In the event that the reeling parts are very light or the tensile strength of the reeled material is considerable the latter may be unreeled by drawing on its end without assistance from any chain, rope, or belt.

Any number of drums or reels may be employed and various retarding devices for such members as well as actuating means for the belt 14 in unwinding may be substituted for the device and means shown and described, mechanism whereby the belt outside of the hubs is controlled and operated by a straightaway pull be-

ing an instance of such substitution. These and numerous other changes of minor importance in form, arrangement, and construction, including those pointed out in preceding paragraphs, may be made without departing from the nature of my invention or getting beyond the scope of the same.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. Fabric-handling mechanism comprising a plurality of concentric rotary members differing from each other in transverse sectional dimensions, each exterior member remaining stationary while the adjacent interior member is rotated for a predetermined distance.

2. Fabric-handling mechanism comprising a plurality of concentric rotary members differing from each other in transverse sectional dimensions, one of said members being an actuating member, and means to transmit motion from the actuating member to the exterior member or members, sequentially rotating it or each of them for a predetermined distance.

3. Fabric-handling mechanism comprising a plurality of concentric rotary members differing from each other in transverse sectional dimensions, one of said members being an actuating member, and means to transmit motion from the actuating member to the exterior member or members, sequentially rotating it or each of them for a predetermined distance, one end of said actuating member extending longitudinally beyond any exterior member.

4. Fabric-handling mechanism comprising a plurality of rotary concentric members differing from each other in transverse sectional dimensions, said members adapted to be rotated in progressive agglomeration from within outwardly.

5. Fabric-handling mechanism comprising a plurality of concentric rotary members differing from each other in transverse sectional dimensions and adapted to be rotated in progressive agglomeration and to have air circulate freely in and through the same.

6. Fabric-handling mechanism comprising a plurality of concentric rotary members differing from each other in transverse sectional dimensions, said members adapted to be rotated in progressive agglomeration, and means to cause or permit air to circulate in and through the same.

7. Fabric-handling mechanism comprising a plurality of rotary concentric members one of which is an actuating member, said members differing from each other in transverse sectional dimensions and adapted to be rotated in progressive agglomeration from within outwardly, the end of the actuating rotary member projecting longitudinally beyond the end or ends of the outer member or members.

8. Fabric-handling mechanism comprising a plurality of concentric sequentially-rotated

and retarded members differing from each other in transverse sectional dimensions, one of such members being an actuating member.

9. Fabric-handling mechanism comprising a plurality of concentric members differing from each other in transverse sectional dimensions, the outer member, if there be but one such, and each outer member if there be more than one such, being provided with support for a strip of flexible material adapted to extend from within outwardly.

10. In fabric-handling mechanism, the combination with a plurality of rotary concentric members differing from one another in transverse sectional dimensions, of an interiorly-fastened flexible tab, the outer member, if there be but one such, and each of the other members, if there be more than one such, being provided with support for said tab, which latter is adapted to be connected with the material to be handled.

11. Fabric-handling mechanism comprising a plurality of rotary concentric members and annular supports in which such members are mounted at the ends, said members differing from each other in transverse sectional dimensions.

12. Fabric-handling mechanism comprising a plurality of rotary concentric members differing from each other in transverse sectional dimensions, and a plate provided with annular supports on its inner face, in which said members are mounted at one end.

13. In fabric-handling mechanism, the combination with a plurality of concentric rotary members, one of which is an actuating member, said members differing from each other in transverse sectional dimensions, of a plate provided with a central opening adapted for the passage of said actuating member, and with annular supports on the inner side thereof adapted for the support of said rotary members other than the actuating member.

14. Fabric-handling mechanism comprising a plurality of rotary concentric members differing from each other in transverse sectional dimensions, the outer member, if there be but one such, and each of the outer members, if there be more than one such, being provided with support for a chain, rope or belt, one end of which is fastened interiorly.

15. In fabric-handling mechanism, the combination with a plurality of rotary concentric members differing from each other in transverse sectional dimensions, with a chain, rope or belt fastened interiorly and wrapped sequentially around the exterior members so that the application of traction to said chain, rope or belt causes the rotary members to ro-

tate separately and in the opposite direction to that taken by them in winding up the chain, rope or belt.

16. The combination, in fabric-handling mechanism, with a plurality of concentric rotary members differing from one another in transverse sectional dimensions, the outer of such members, if there be but one such, and each of them, if there be more than one such, being provided with support for a strip of fabric fastened interiorly, of a chain, rope or belt fastened at one end interiorly, said chain, rope or belt being of greater length than the sum of the circumferences of said rotary members on the line of the connection of the chain, rope or belt.

17. The combination, in fabric-handling mechanism, with a plurality of concentric rotary members differing from each other in transverse sectional dimensions, the outer member, if there be but one such, and each of the outer members, if there be more than one such, being provided with support for a chain, rope or belt, one end thereof being fastened interiorly, and means for actuating the other end thereof.

18. Fabric-handling mechanism comprising a plurality of concentric rotary members differing from each other in transverse sectional dimensions and having hub portions of transverse sectional dimensions reduced from the other portions of the same, and annular supports in which the ends of said hubs are mounted.

19. Fabric-handling mechanism comprising a plurality of concentric rotary members differing from each other in transverse sectional dimensions and having hub portions of transverse sectional dimensions reduced from the other portions of the same, which latter are provided with support for a strip of flexible material adapted to extend from within outwardly.

20. Fabric-handling mechanism comprising a plurality of concentric rotary members differing from each other in transverse sectional dimensions and having hub portions of transverse sectional dimensions reduced from the other portions of the same, which latter are provided with support for a chain, rope or belt one end of which is fastened interiorly.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES J. BELLAMY.

Witnesses:

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E. M. SEARS.