

Aug. 20, 1935.

M. M. KASANOF

2,011,935

FABRIC TREATMENT AND APPARATUS THEREFOR

Filed Jan. 19, 1934

4 Sheets-Sheet 1

Fig. 1

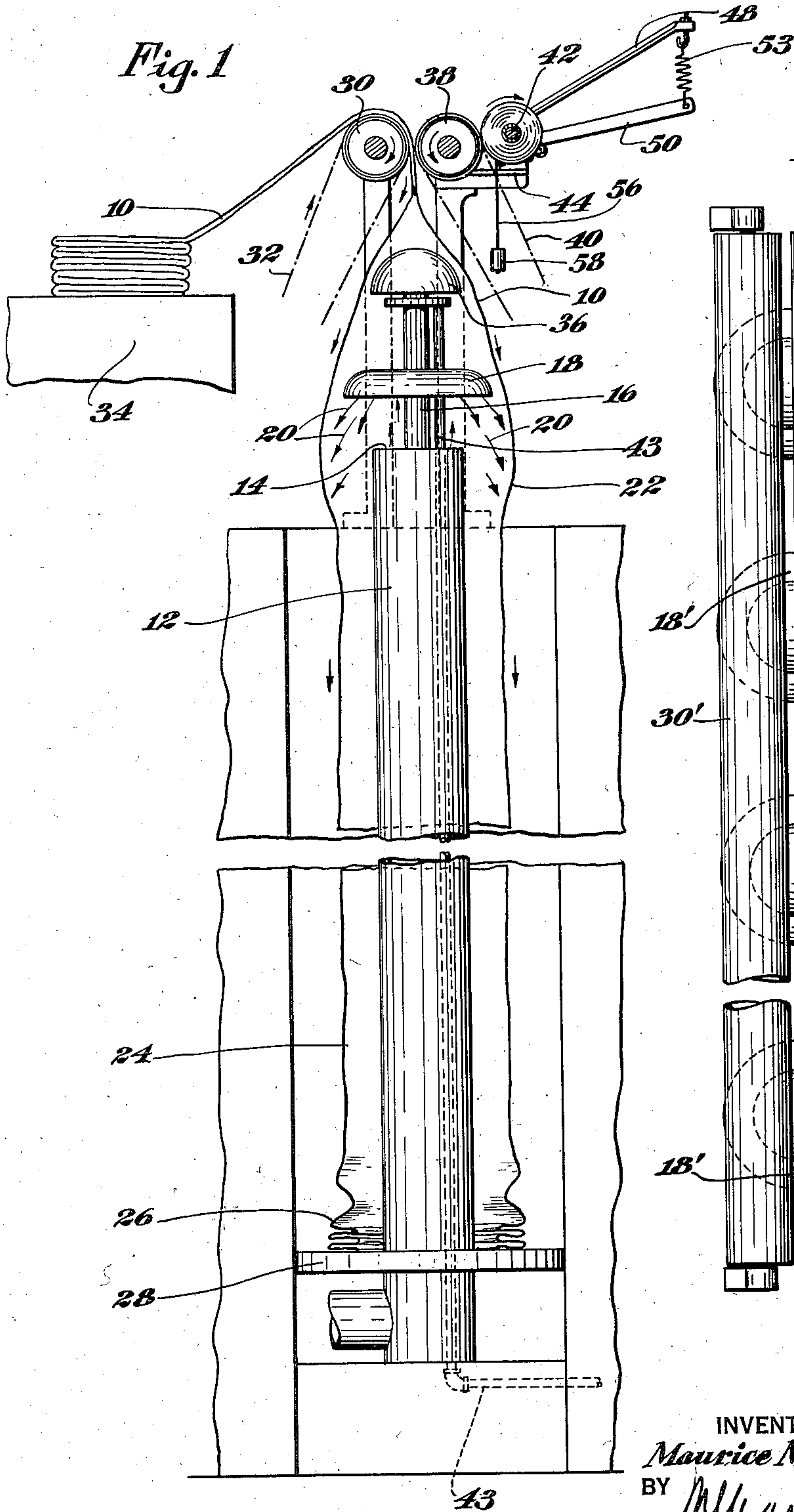
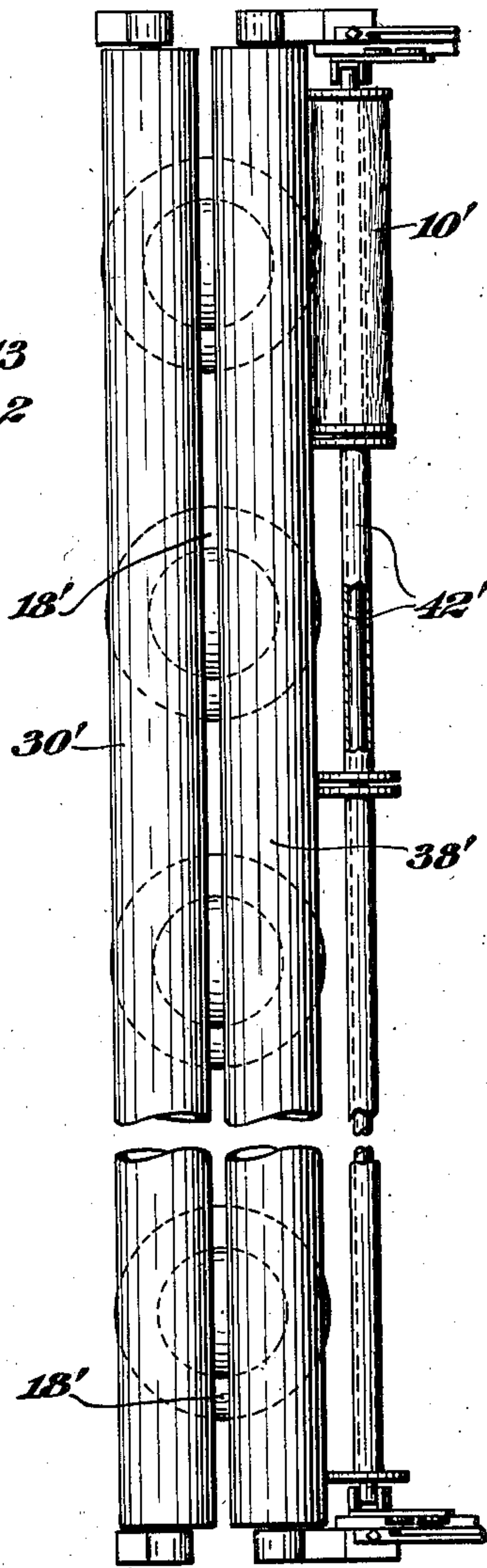


Fig. 4



INVENTOR
Maurice M. Kasanof,
BY *M. M. Kasanof*
ATTORNEY

Aug. 20, 1935.

M. M. KASANOF

2,011,935

FABRIC TREATMENT AND APPARATUS THEREFOR

Filed Jan. 19, 1934

4 Sheets-Sheet 2

Fig. 6

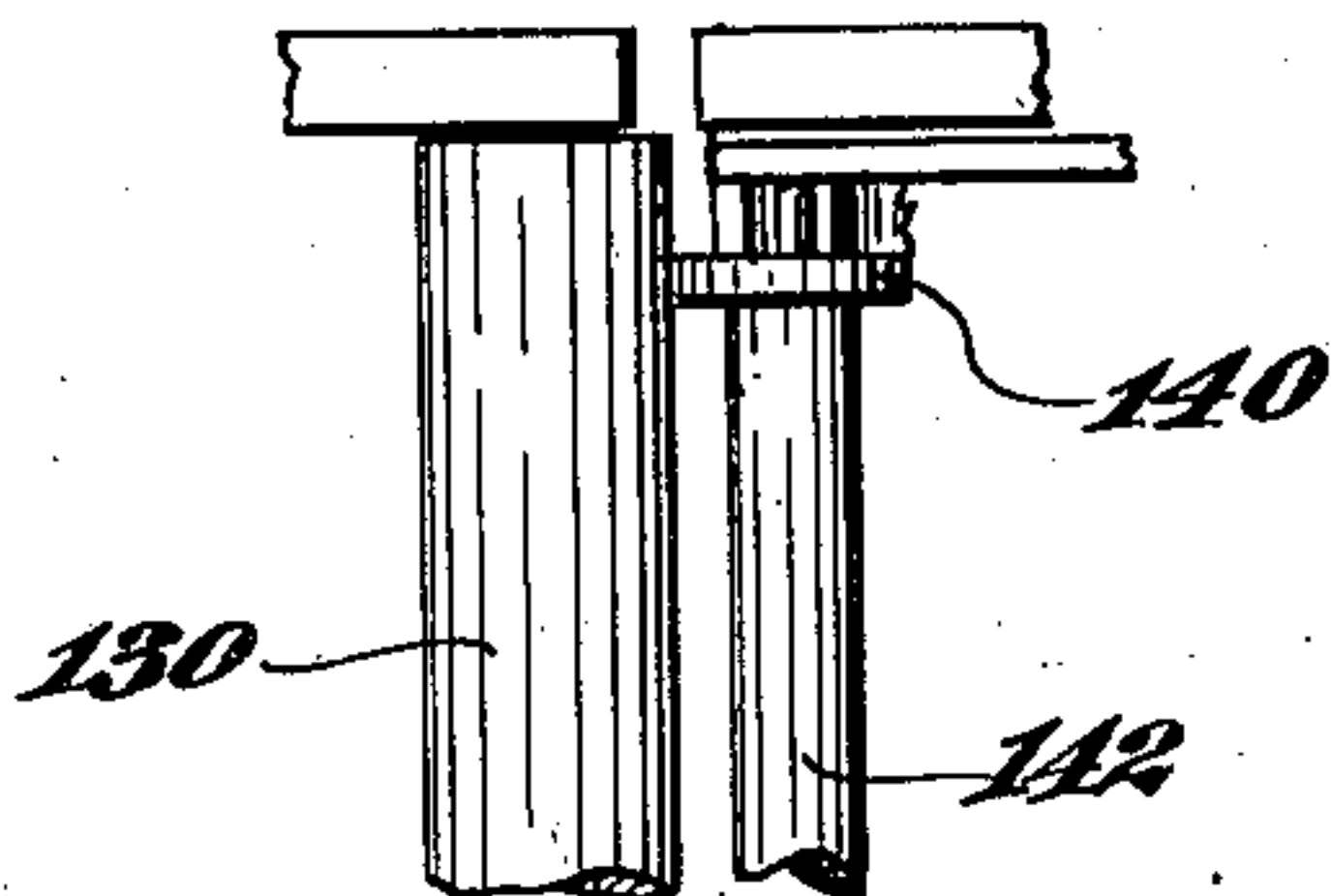


Fig. 5

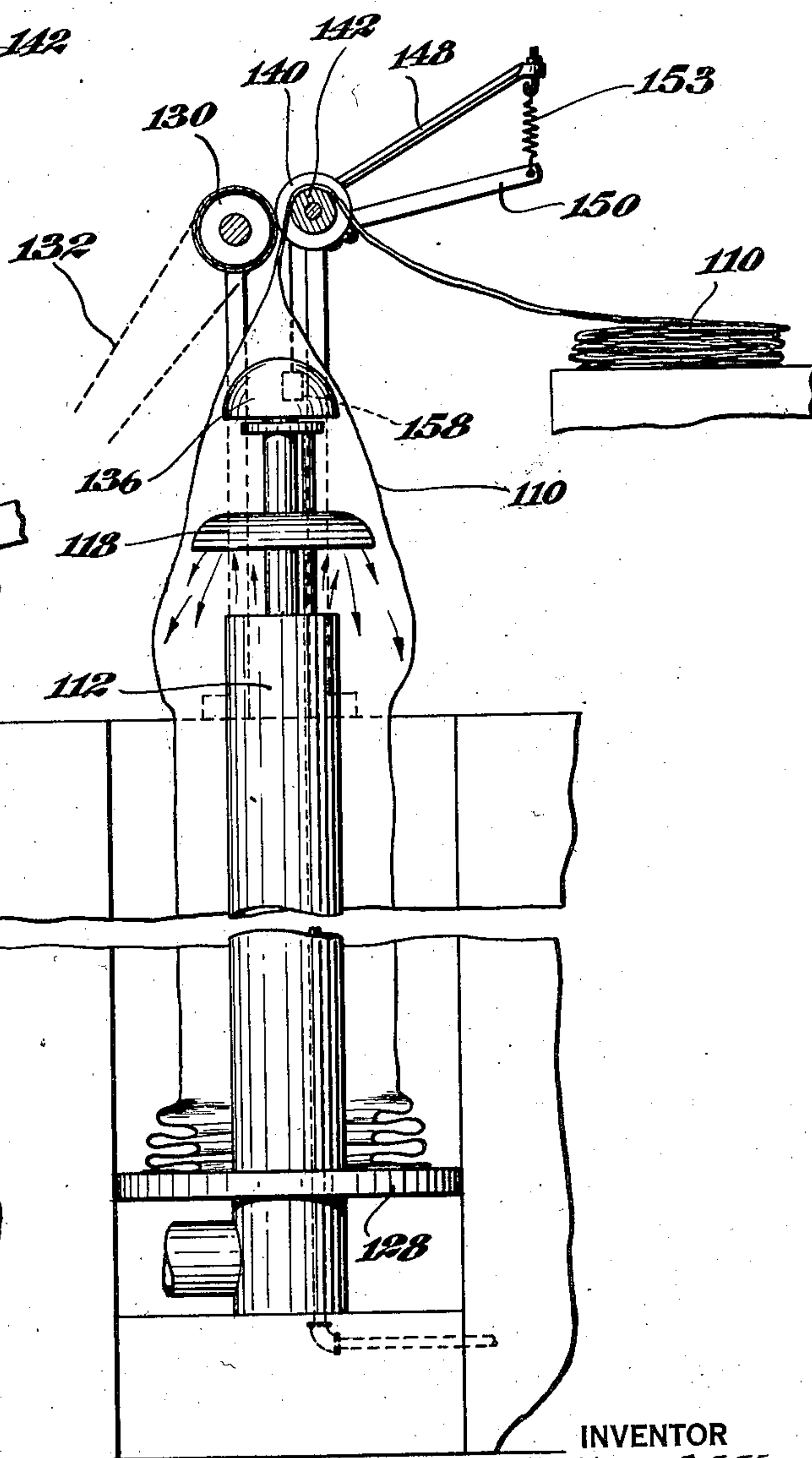
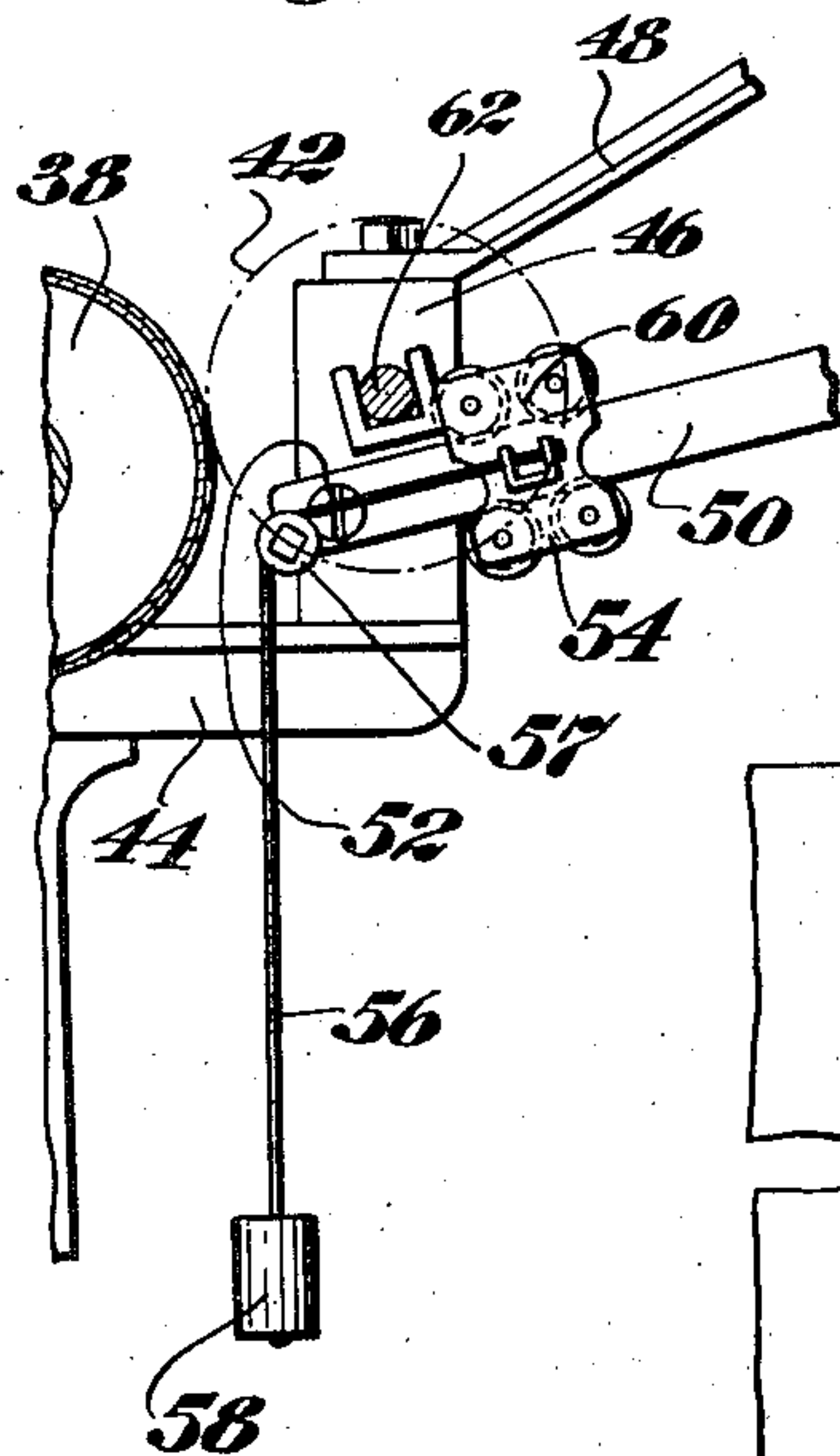


Fig. 2



INVENTOR

Maurice M. Kasanof,

BY

William F. Schubert

ATTORNEY

Aug. 20, 1935.

M. M. KASANOF

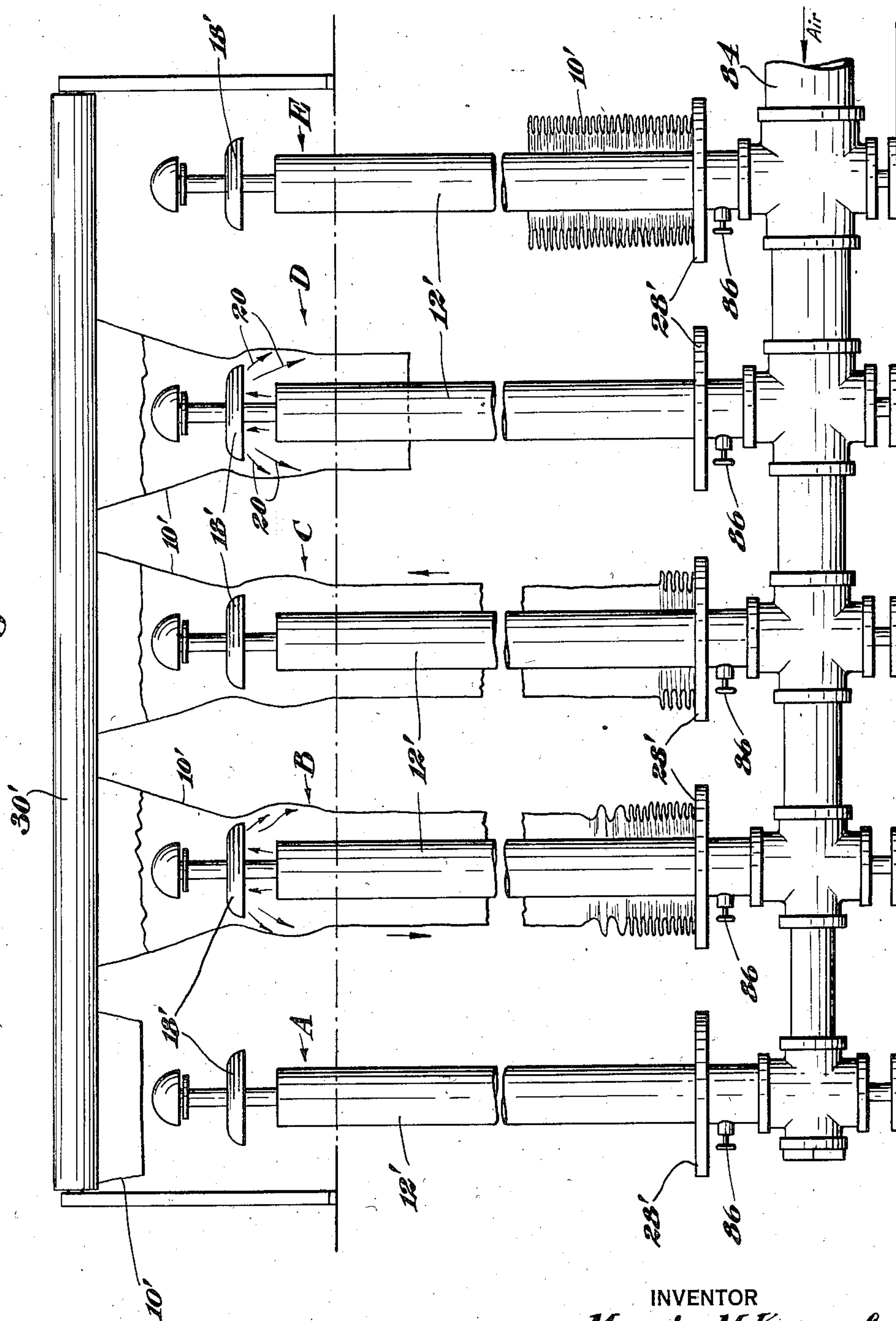
2,011,935

FABRIC TREATMENT AND APPARATUS THEREFOR

Filed Jan. 19, 1934

4 Sheets-Sheet 3

Fig. 3



INVENTOR
Maurice M. Kasanof
BY *William K. Shaw*
ATTORNEY

Aug. 20, 1935.

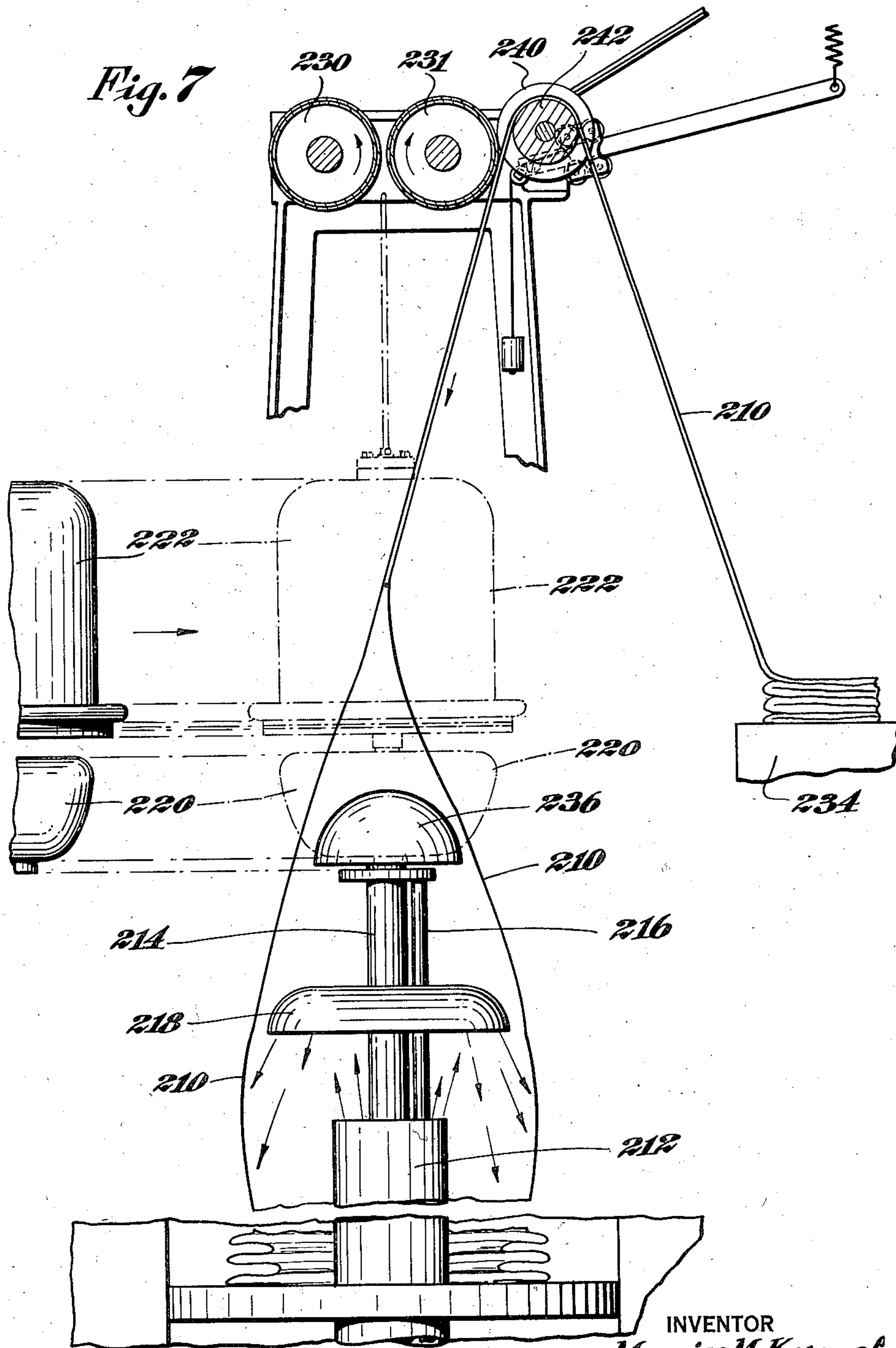
M. M. KASANOF

2,011,935

FABRIC TREATMENT AND APPARATUS THEREFOR

Filed Jan. 19, 1934

4 Sheets-Sheet 4



INVENTOR

Maurice M. Kasanof

BY

William B. Clark

ATTORNEY

UNITED STATES PATENT OFFICE

2,011,935

FABRIC TREATMENT AND APPARATUS
THEREFORMaurice M. Kasanof, New York, N. Y.; David R.
Kasanof and Abraham Kriegel executors of
said Maurice M. Kasanof, deceased

Application January 19, 1934; Serial No. 707,281

10 Claims. (Cl. 26—56)

My invention relates generally to the treatment of fabrics and coordinately relates to an apparatus whereby such treatment may be applied.

My invention contemplates the treatment of the fabric while in tubular form regardless of whether the fabric has been so knit or whether it has been knit flat and then caused to assume the tubular form either temporarily for treatment or permanently.

The treatments herein particularly referred to are those generally applied to fabrics after a dyeing or washing operation and when the fabric is wet and group themselves generally under the heads of drying, stretching or finishing and as will later appear my invention contemplates its employment either for subjecting the fabric to one character of treatment alone as for example drying or stretching or finishing, or simultaneously or successively to two or all three of said treatments, and therefore it will be understood that while, as this description proceeds, reference will be made to one or the other of the treatments, that such reference is not necessarily intended to be limited to the specific treatment mentioned.

From the standpoint of the treatment of the fabric for stretching purposes, it is one of the objects of my invention to attain this without the use of any tangible means, and more particularly, without the employment of elements which contact directly with the fabric during or for the stretching process, and this general objective I attain by subjecting the tubular fabric to the pressure action of a cushion of air directed outwardly from within the fabric tube and against the fabric structure. By the employment of this arrangement and of such a method, the amount of stretching to which the fabric is subjected, will be the resultant of factors which can be readily controlled, such as the pressure with which the air is projected against the fabric structure at the points of contact therewith. Furthermore, the application of these forces will be uniform circularly about the fabric tube, and therefore the stretching will be uniform throughout the fabric and will be of a character as will tend to rectify abnormalities in the fabric structure that are the result of any irregular treatments to which the fabric has been previously subjected. For example, in the handling of the fabric prior to the stretching process, pressure may have been applied to an area of the fabric to produce what might be termed a bulge in that area. Treatment of the fabric in the manner above set forth during the stretching process will tend to flatten out this bulge and restore the fabric when stretched to a uniformity of character throughout its entire perimeter.

Furthermore, in view of the fact that the degree of stretching is the result, as already stated, of

the pressure of the air at the point of application to the fabric structure, the degree of stretch can be varied at will within limits merely by varying this pressure.

I attain a further object of my invention by directing the air at an angle to the fabric structure and generally in the direction of the movement of the fabric structure, and in this way assist in the feeding movement of the fabric during its process of treatment.

The employment of air in the manner and for the purposes set forth also attains a further object in that the cushion of air will tend to form an annular column of air which will maintain the fabric in its stretched tubular form even after it has passed by the points of pressure application of air thereto, and will thus, from one aspect, keep the fabric out of contact with adjacent physical structure, and also create a column of air about the point of application under pressure of air to the fabric structure, so as to virtually continue the drying process.

The treatment above set forth has been of a character to stretch the fabric and incidentally thereto will also dry and finish the fabric and therefore can be viewed from any number of aspects such as a process for drying, a process of stretching, or a process for finishing, or a process serving to attain any two of these results or all three of them.

From another aspect, my invention relates to a process of subjecting the fabric in tubular form to a treatment wherein the fabric is caused to move downwardly for purposes of being subjected to treatment and gathered at the bottom of the apparatus at the end of the treatment process, and then is moved upwardly to be wound on a winding apparatus or the like for purposes of removal and storage or shipping. In this way, I attain the objective of speeding up the treatment in a manner that I will now point out.

When moist fabric is fed downward into and through the machine, as is customary in the machines and processes of this type heretofore used, it is difficult to handle, and the speed at which this can be done is comparatively slow. When the moistened fabric gathers on the platform at the base of the treating unit, it forms into wrinkles and folds which are practically impossible to eliminate from the finished fabric by any treating process, and which are worse if it is attempted to increase the speed of operation, thereby imposing a limitation on the speed. On the upward feed, the fabric is treated and after treatment wound or taken up. The speed of the taking up operation is therefore dependent on that of the treating operation, which is a slow process. In my process, on the contrary, the fabric is moist only for a small fraction of its downward travel, namely during its travel to the treat-

ing unit, and thereafter it is gathered in dried form. When dry, it does not wrinkle, and after it is dry it is wound up rapidly without any further treatment. The total time for the treating operation is therefore substantially less than it is in the old process, in which the moistened fabric is fed into gathered form at a slow speed and then dried and taken up again at a slow speed.

A method of fabric treatment which involves loading the fabric on a platform while wet, and then feeding the fabric upwardly for the treating operation presents this disadvantage. Wet fabrics are loaded only with difficulty and cannot be symmetrically loaded and take up a great deal of space. I have found that by my method wherein I treat the fabric while being fed downwardly, I am able to gather almost three times as much fabric yardage on the platform as can be loaded thereon by the previous method.

I have illustrated this aspect of my invention as employed in connection with a process wherein the treatment of the cloth is effected by a cushion of air in the manner and serving the purpose above pointed out, although it is to be understood that this second aspect of my invention may be performed without the employment of a cushion of air as set forth above, but instead thereof may be employed with any other drying medium, such as a dome or drum heated by air under conditions where no stretching operation is effected.

My invention contemplates, particularly from the standpoint of the second aspect, that the fabric to be subjected to the treatment be suspended freely from a point directly above where the treatment is applied, and that this be true throughout the entire operation and of each section of the fabric as it is fed down continuously.

From another aspect my invention relates to an arrangement whereby a number of tubular fabric sections can be simultaneously subjected to treatment and this is attained by employing a bank or battery of treating units associated together as in the manner to be pointed out.

From still another aspect my invention relates to an attachment to be associated with a type of apparatus such as heretofore employed, wherein the cloth is subjected to a drying or stretching operation, or both, during the upward movement thereof, whereby such apparatus can be readily changed over to employ my process and to function as hereinbefore set forth.

For the attainment of these objects and such other objects as may hereinafter appear or be pointed out, I have shown in the drawings several types of apparatus, embodying my invention and adapted for the practice thereof, and wherein:

Figure 1 is a side view of one form of my improved apparatus for the treatment of fabrics while in tubular form, portions thereof being shown in section, and portions thereof being broken away;

Figure 2 is a detail view of the take up mechanism used in connection with the apparatus of Figure 1;

Figure 3 is a side view showing a bank of machines adapted for unitary control, portions thereof being broken away and other portions being shown in section;

Figure 4 is a plan view thereof;

Figure 5 is a view similar to Figure 1 showing another form of my machine;

Figure 6 is a detail view in plan, of a portion of the roller mechanism of the apparatus of Figure 5;

Figure 7 is a side view, similar to Figure 1,

showing a machine of the type heretofore used, with an attachment for the same, whereby it may be used for carrying out my improved process.

My process can be best explained in connection with the description of a specific machine for carrying it out. Such a machine in general will consist of means for causing the fabric, while in tubular form, to move in relation to a body of air under pressure, said air being directed through a suitable conduit, located within the tube of moving fabric, and provided at its end with means for discharging the air outwardly against the fabric and uniformly in all radial directions. For greater effectiveness in drying the air may be heated. The body of discharged air will impinge upon the inner walls of the fabric, and being under pressure when fabric stretching is desired, will distend the fabric to an extent which may be readily controlled by the simple expedient of regulating the pressure of air. Thereby the fabric is caused to move past the air discharging means and during such movement the column of air acts as a cushion which serves to support it and to guide it. While I have described the use of air as the treating means, it is to be understood that it is also within my contemplation to use other treating media where other forms of treatment are desired, and fluid media other than air may be employed.

Thus far, the general idea underlying my invention has been described. As adjunctive thereto there will be provided means for feeding the fabric to move it in relation to the body of treating air. Such means may consist, for example, of a feed roller which will serve to feed the moistened fabric from some station where it is placed preparatory to the stretching and drying treatment, vertically downward over the discharging air. The purpose of the vertical down feed is to freely suspend the fabric and to expose it to the action of gravity and thereby secure uniformity of tensioning and symmetry of form when the air is directed against the inner walls thereof. There will further be provided a suitable station such as a table or platform for receiving the dried fabric, after exposure to the air treatment, in gathered or collapsed condition. I have found it of advantage, although it is not necessary for the successful practice of my invention in its other aspects, to direct the air currents downwardly in addition to their outward movement. In this way, a propelling effect against the fabric is attained which will assist the feeding means in their operation. It is also within my contemplation, where such construction seems desirable, to depend exclusively on this downwardly directed air current for feeding the fabric, in which event the driven feed roller may be dispensed with and a freely rotatable guide roller substituted therefor.

As a further adjunct of my machine, some form of take up means may be provided, which may consist of a take up roller over which the fabric will be fed at a speed far greater than is possible on the down feed, because there is no treating process connected with the take up operation, and we are dealing only with the transportation of dried fabric.

Comparative tests have shown that a fabric moved downwardly and treated during such movement and then fed upwardly for rewinding can be treated in one-third the time as can a fabric moved downwardly while wet for loading and then treated while moving upwardly. In addition to this advantage a wet fabric tends to

stick to the adjacent apparatus and the downward feed must be assisted by manual cooperation.

Referring to Figure 1 in detail, it will be observed that the fabric 10, to be treated, is there shown as pendently overhanging and surrounding an air conducting system which comprises a conduit 12, open at its top, as shown at 14, and a distributing head 18 supported in any preferred or suitable manner over the open mouth of said conduit, as shown at 16. The function of head 18 is to redirect the air as it emerges from the conduit 12, so as to cause it to pass radially outward and downwardly, as indicated by the arrows 20 in the figure, and for this purpose the head 18 has its inner surface curved appropriately and in addition to directing the air as indicated by the arrows also serves to spread the air. The air impinges against the fabric and a portion of it will pass through the pores of the fabric, thereby drying it. Due to the fact that the fabric offers resistance to the passage of air, however, a portion of the air will pass downward and thereby interpose a cushion of air between the conduit 12 and the lower stretches 24 of the fabric. As the air strikes the fabric adjacent the mouth 14 of the conduit 12, it will cause it to belly as indicated at 22, but since the air causes a drying of the fabric, and simultaneously a contraction thereof, the diameter of the fabric as it dries, will decrease from its bellied diameter and the resulting conformation of the downwardly moving fabric is indicated in Figure 1. It will be understood that above the bellied portion 22, the fabric is moist, and that below said bellied portion the fabric is dry and has assumed its final form. By controlling the air pressure by suitable or preferred means, not indicated, such as valve means, the fabric may be stretched at its bellied portion to an extent so that when dry it will remain stretched to the desired degree within limits. As the finished fabric passes farther downward, it is gathered up as indicated at 26 on a platform or table 28 provided for this purpose. It is then ready to be taken up, and to carry out the latter process, the flow of air is shut off, and the motion of the fabric is reversed by suitable means that will be hereinafter described.

The head 18 is made of such a diameter that it will not contact with the fabric 10 in its finished form, as it passes therearound, so that the take up operation may be a rapid one. It will be observed that both during the feeding operation and the take up operation the fabric does not come into contact with any rigid guiding members, but that the entire drying operation takes place over a cushion of air uniformly supporting and cushioning the fabric, whereby the fabric will be uniformly tensioned. Uniformity of air pressure is obtained by suitable provision therefor in the construction of the head 18, and secondly by the automatic action of the suspended fabric in positioning itself so as to be balanced in relation to the outward air flow. After the fabric is dried it is in a very suitable form for handling, being then highly resistant to wrinkling and creasing and it may be safely and rapidly handled on the take up operation without danger of damage. Nowhere in its course through the treating apparatus on the take-up operation is the fabric subjected to rigid tensioning or forming members that would tend to distort it and result in defects such as crow-feet, wrinkles and creases or the like or that would tear the same.

The feeding mechanism is shown as consist-

ing of a roller 30, which may have its surface coated with felt or the like, to protect the fabric, and which is driven by suitable means, as indicated at 32, and the function of which is to guide the raw fabric, gathered on a platform 34 from said platform downward and so as to surround the head 18, and for that purpose the feeding side of the roller is positioned in substantially vertical alignment over said head. A guide member 36 is also shown as located directly above the head 18, and this will function to initiate the spreading of the fabric which has come from the roller in flattened form, into its ultimate tubular form. Once the end of the fabric has passed the head 18, however, the guiding member 36 will ordinarily cease to function, as there will usually be sufficient air pressure to cause distension of the fabric before it reaches the guide means 36.

Due to its downward direction, the air current 20 exerts a downward pushing action on the fabric, and thereby assists the motivating means 32 for the feed roller 30. As has already been mentioned, this action may be made use of to dispense with the motivating means 32 altogether and to substitute for the driven roller 30 an idler roller which will allow the fabric to pass thereover as the air current 30 pulls it down.

The take up feed roller, driven by suitable means indicated at 40 is shown at 38, and it is spaced from roller 30, so as to afford space for the fabric to pass therebetween. Like the roller 30, it may be coated with felt or the like to protect the fabric. Its direction of rotation is reverse to that of the feed roller 30 and it guides the fabric 10 upward and over a take-up roller 42 on which the fabric 10 is rolled and by which it may be removed from the apparatus when the operation is finished. The take-up roller 42 is actuated by the contact of the fabric 10, rolled up thereon, with the roller 38, and for this purpose the roller is mounted on slidable bearings.

The details of the mounting of roller 38 are shown in Figure 2. An upright 46 is provided on the roller carrying frame 44, and this is provided with a fixed extension 48 and an arm 50 pivoted at 52 and suspended at its free end from the extension 48 by means of a spring 52. A carriage 54 is free to slide along arm 50 and is pulled toward the pivoted end of the arm by weight 56 suspended therefrom by any suitable or preferred means, such as the cable 56, which may pass over a roller 57 associated with the pivot 52. The trunnions 62 of the roller 42 are journaled in the carriage 60.

It will be observed therefore that the roller 42 is free to move toward or away from roller 38, but is always urged thereagainst by the weight 56. This construction is necessitated by the increasing diameter of the roller as the fabric is wound up on it, and the necessity for always maintaining the contact between roller 42, or rather the fabric rolled up on it, for maintaining it in motion for rolling up the fabric. At the same time, the spring 53 provides for resilient contact between rollers 38 and 42 and thereby assures a smooth, even operation.

It will not be necessary to refer to the various details of the construction as the same may be varied widely, and for the purposes of this disclosure are adequately illustrated in the drawings. Attention, will, however, be called to the pipe 43 by which steam or other treating fluid may be mixed with the air or by which the air may be heated.

Passing next to the consideration of the dis-

closure of Figures 3 and 4, it will be observed that I show therein a battery or set of treating devices, designated by the letters A, B, C, D, E and each provided with an air distributing head 18' above a conduit 12' and constructed and functioning like the apparatus described in connection with Figure 1. The source of air supply is indicated at 84 and suitable valves 86 are interposed between this air source 84 and each conduit 12, so that air may be admitted or cut off from any one or all of the heads 18' at pleasure. A common feed roller 30' serves all the heads, and a common take up feed roller 38' may be used to draw the fabric from any one of the heads and to actuate the take up rollers 42' of which there is one corresponding to each head 18'.

The number of heads in the battery is controlled entirely by expediency and various practical considerations, and the showing of five heads in the battery of Figures 3 and 4 is intended to be illustrative merely.

Figure 3 indicates fabric 10' as positioned in relation to the various heads in various stages of treatment. In the head A, the fabric is just about to descend over the head. In the head B, it is being treated and gathered on the platform 28'. In the head C, it is shown as being taken up, while in head D the fabric is at the beginning of the downward feeding operation and in head E it is gathered at the bottom of the conduit 12' and ready to be taken up.

In the operation of this battery of heads, the operator may start one head and feed fabric into it for treatment. During this feeding process he may devote his attention to another head and in this way feed fabric into successive heads and while the treating operation is going on in one or more of the heads, he may be taking up fabric from other heads. The operation of each of the heads is entirely independent of that of the others in spite of the fact that common feed and take up rollers are used.

It will, of course, be understood that a single take-up roller 42' may be used instead of the individual rollers 42' illustrated, but in that case the finished product of all the heads would have to be removed simultaneously. If necessity or desirability for such construction arises, it is also within my contemplation to use individual rollers 30' and 38' for each apparatus A—1, A—2, etc. Such conditions might arise where a variety of fabrics is to be treated in which case each of the rollers may be given different speeds.

The modified form of my invention illustrated in Figures 5 and 6 comprises essentially the same elements, as the form heretofore described. A simplification, however, has been effected in the roller system, which comprises a roller 130 driven by suitable or preferred means 132, and a second roller 142, the detailed construction of which is indicated in Figure 6, and in which it is shown as provided with flanges 140 at its end portions, which flanges are in contact with roller 130, whereby the roller 130 will serve to drive the roller 142. Further details of the roller construction are shown in Figure 5 wherein the mounting of roller 142 is shown as similar to that of the roller 42 of Figures 1 and 2, that is, it is journaled in a carriage adapted to slide along a bar 150 pivoted in the roller supporting frame and resiliently suspended by spring 153 from an extension 148 of the frame. A counterweight 158 is flexibly connected to the carriage in which the roller 142 is journaled so as to maintain the driving connection between rollers 130 and 142, and whereby

roller 142 will be free to adjust itself to irregularities of motion of the rollers and the fabric.

In the operation of this form of my invention the untreated fabric 110, positioned on platform 134, will be fed into the apparatus for purposes of treatment, by the roller 142 actuated from roller 130. The take-up is accomplished, as indicated in dotted lines, by leading the fabric over roller 130, which may be felted or otherwise protectively covered, to prevent injury to the fabric, and on to a roller similar to roller 42, which replaces the roller 142.

Figure 7 indicates the application of my improved process to treating apparatus of the type heretofore used. By way of illustration, I have selected apparatus of the particular type disclosed in my Patent No. 1,711,094 of April 30, 1929.

The air duct or conduit 212 in such apparatus surrounds a steam pipe 214 and a drain pipe 216 and these in turn support a steam bowl 220 and a steam drum 222 shown in Figure 7 in two positions, one at the left side in full lines, to indicate their removal from the apparatus, and one in the middle in dotted lines to indicate the position they normally occupy in the apparatus. When removed, their place is taken by the guiding member 236, and an air distributing head 218 is positioned above the open mouth of air duct 212.

The normal roller equipment for this apparatus comprises a pair of rollers 230 and 231, between which the fabric is led upward out of the machine after its treatment therein. To adapt such apparatus for my new process, I propose to add roller 242, provided with flanges 240, whereby it may be driven from roller 231, and having a construction and mounting similar to that of the roller 142 heretofore described.

Fabric 210, gathered on platform 234, will be fed into the machine over roller 242, as indicated by the arrow, and will be taken up by passage between the rollers 230 and 231, as indicated by the dotted lines and the arrow relating thereto, to be rolled up on a roller similar to roller 42, which takes the place of roller 242, just as has been described in connection with the form of Figures 5 and 6.

Attention is invited to the fact that by the arrangement of the battery of fabric treating apparatuses shown in Figure 5, the units are so related and assembled that one unit can be employed for feeding the fabric downwardly and subjecting it to treatment during such movement and while another unit is feeding a fabric section upwardly for rewinding purposes. In this manner all the units may be employed simultaneously without requiring the parallel treatment on each unit.

In this connection attention is invited to the fact that this is also true of the embodiment of Figure 7 where only one unit is shown, to the extent at least that no change is required in the direction of movement of any of the parts for employing the apparatus either for a downward feed for fabric treatment or for upward feed for fabric rewinding.

While I have confined my detailed disclosure to illustrative embodiments of my invention, it will be understood that the same may be embodied in many other forms and may be practised in many other ways, without departing from the spirit thereof, as defined in the appended claims.

Having thus described my invention and illustrated its use, what I claim as new and desire to secure by Letters Patent is—

1. In apparatus for treating fabrics, a vertically positioned upwardly opening conduit for conducting heated air under pressure, deflecting means positioned above the mouth thereof for deflecting said air so as to cause it to move symmetrically radially outwardly and downwardly, means for progressively lowering tubularly formed fabric thereover so that it is freely suspended and so as to surround said conduit and said deflecting means and to receive and to be distended by said downwardly directed air discharge, the dimensions of said conduit, said deflecting means, and said fabric being so related to the air pressure, that said fabric throughout its motion will be spaced from said conduit and said deflecting means by a cushion of air, whereby said moving fabric during its treatment by the air will be subjected to no forces except those of gravity and the pressure of the air against the fabric.

2. The process of treating fabrics which comprises the steps of exposing successive annular zonal portions of the fabric to a treating fluid and directing said fluid so that it will exert a propulsive pressure against the fabric tending to cause it to advance, and causing said fabric, as the result of said propulsive pressure of said fluid, to advance and thereby expose fresh portions of the fabric to the action of the fluid.

3. The process of treating fabrics while in tubular form, which comprises the steps of exposing successive portions of the fabric to a treating fluid applied internally thereof and directing said fluid outwardly against the fabric and so that it will exert a propulsive pressure against the fabric tending to expand it and to cause it to advance, and causing said fabric, as the result of said propulsive pressure of said fluid, to advance and thereby expose fresh portions of the fabric to the action of the fluid.

4. In apparatus for the treatment of fabrics, when in tubular form, by fluids, means for suspending and lowering said fabric, said means being adapted to control the speed of lowering thereof, and means positioned vertically beneath said lowering means and within said tubular fabric when it is lowered thereover for directing and radially and symmetrically discharging a treating fluid under pressure outwardly in all directions and downwardly against the inner walls of said fabric, the pressure of said fluid being sufficient to cause a propelling effect on the fabric, all of said means being so positioned in relation to said fabric that the same, below its point of suspension from the suspending and lowering means, and during the action of said fluid, is free from the action of all forces, except the action of gravity and the moving fluid.

5. In apparatus for the treatment of fabrics, when in tubular form, by fluids, means for suspending and lowering said fabrics, said means being adapted to retard the speed of lowering thereof, means positioned vertically beneath said lowering means and within said tubular fabric when it is lowered thereover, for directing and symmetrically distributing a treating fluid under pressure outwardly and downwardly in all directions against the inner walls of said fabric, the pressure of said fluid being sufficient to cause it to exert a propelling effect on said fabric, said fabric below its point of suspension from the suspending and lowering means being free from the

action of all forces except the action of gravity and the moving fluid, whereby said treating fluid will have a treating and stretching action, and whereby said fluid will propel said fabric downward against the retarding effect of said suspending means.

6. In apparatus for the treatment of fabrics when in tubular form, by fluids, means for frictionally engaging said fabric for suspending and lowering said fabric, said means being adapted to cause downward movement of said fabric and to determine the speed of lowering thereof, means positioned vertically beneath said lowering means and within said tubular fabric, when it is lowered thereover, for directing and symmetrically projecting a treating fluid outwardly and downwardly in all directions against the inner walls of said fabric at such velocity that it exerts a propelling force on the fabric, said fabric below its point of suspension from the suspending and lowering means being free from the action of all forces except the action of gravity and the moving fluid, whereby said treating fluid will have a treating and stretching action, and will act conjunctively with the said suspending and lowering means, to propel said fabric downward.

7. In apparatus for treating fabrics while in tubular form, means for suspending said fabric so that it is free to move downwardly, means for supplying air under pressure positioned within said fabric and guide means for deflecting said air current so as to direct it radially outwardly and also downwardly, the pressure of said air being such that it will strike the fabric with sufficient force to cause said fabric to move with the air current.

8. The process of treating tubular fabrics which comprises the steps of supporting said fabric so that it is adapted to move downwardly while freely suspended and applying against the inner surface of said fabric, so as to distribute the same uniformly, a downwardly moving current of treating fluid, and thereby causing said fabric to move downwardly and effecting treatment of the same.

9. The method of treating fabrics while in tubular form which comprises the steps of suspending a portion of said fabric from a rotatable feed roller so as to hang down freely, directing a treating fluid under pressure against the inner walls of an annular section thereof at such an angle and under such a pressure as to cause stretching thereof and a downward propelling effect, and causing said fabric to move downwardly, while freely suspended, by the action of said propelling effect and movement of said feed roller, whereby consecutive portions of said fabric will be treated.

10. In apparatus for the treatment of tubular fabrics, means for uniformly distributing a treating fluid under pressure radially outward and at the same time downward, and a feed-roller above said fluid distributing means adapted to lower a freely suspended tubular fabric over said means so as to surround the same, the pressure of said fluid being sufficient to space the fabric from said fluid distributing means, and serving in conjunction with said feed-roller to cause motion of said fabric downward, and said fabric below said fluid distributing means being subject to no forces except those of gravity and the pressure of the fluid.

MAURICE M. KASANOF.