Jan. 23, 1951 H. BRADLEY 2,538,755

APPARATUS FOR TRAVERSING DRAPERIES AND THE LIKE

Filed April 10, 1946 2 Sheets-Sheet 1

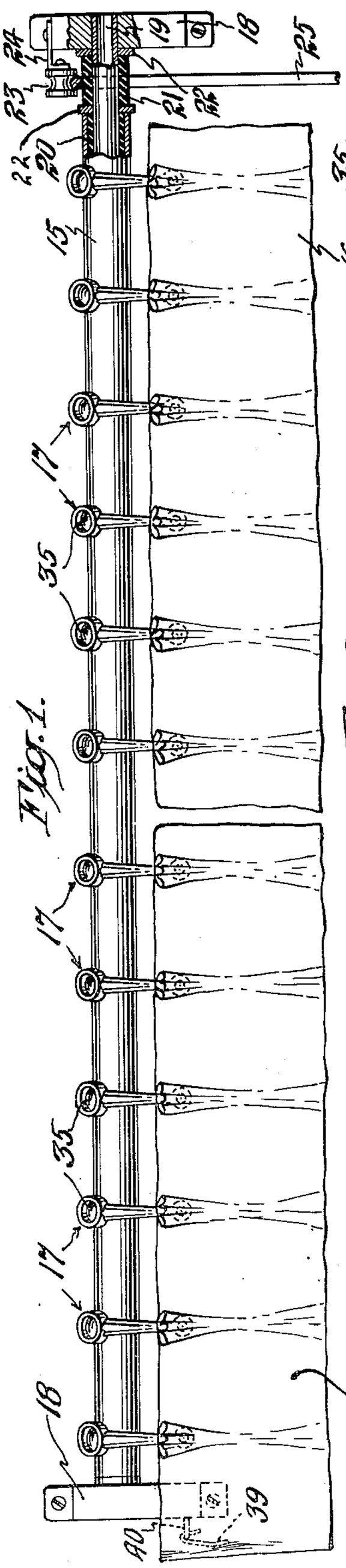


Fig. 1.

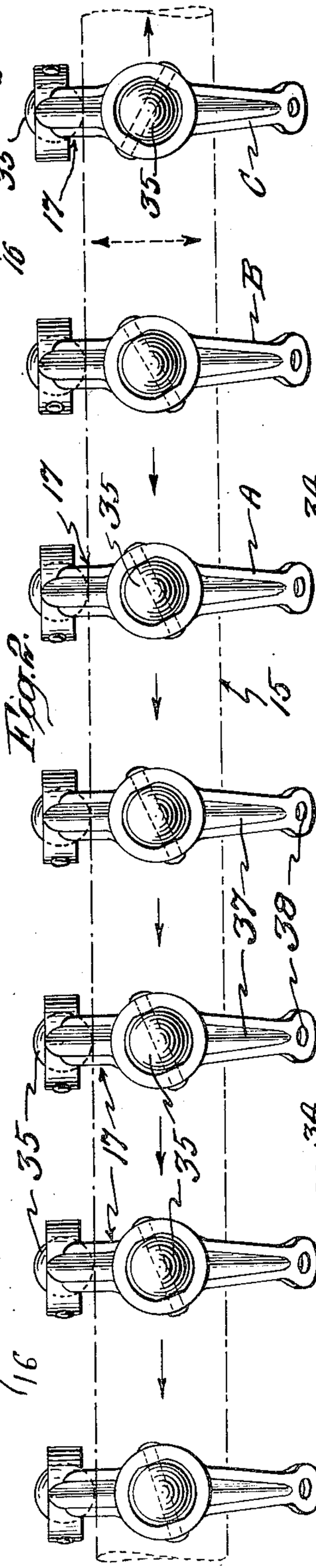


Fig. 2.

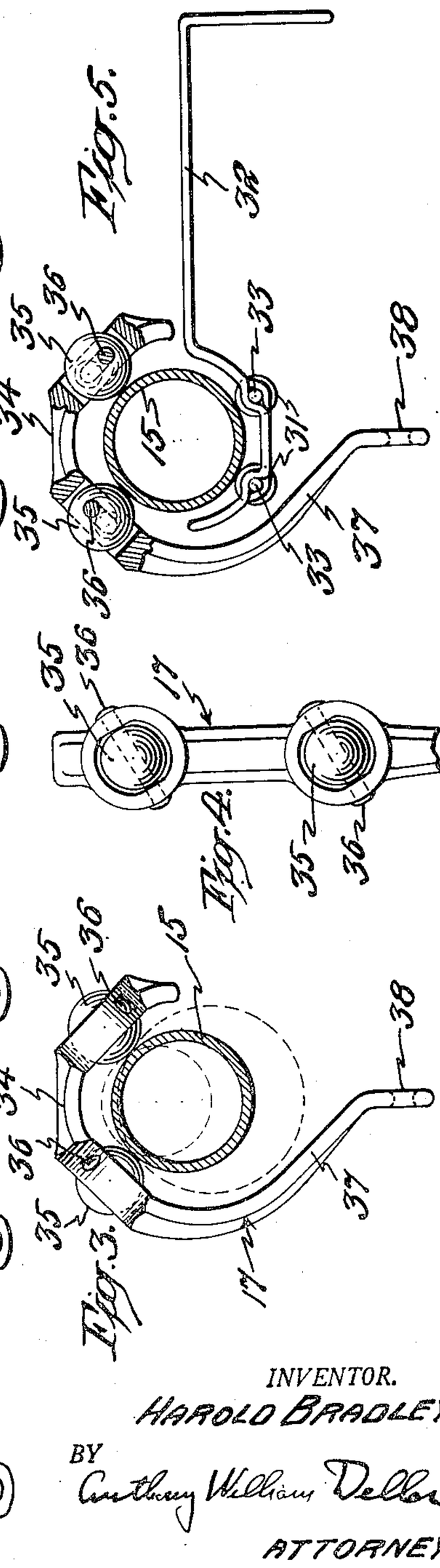


Fig. 5. Fig. 4. Fig. 3.

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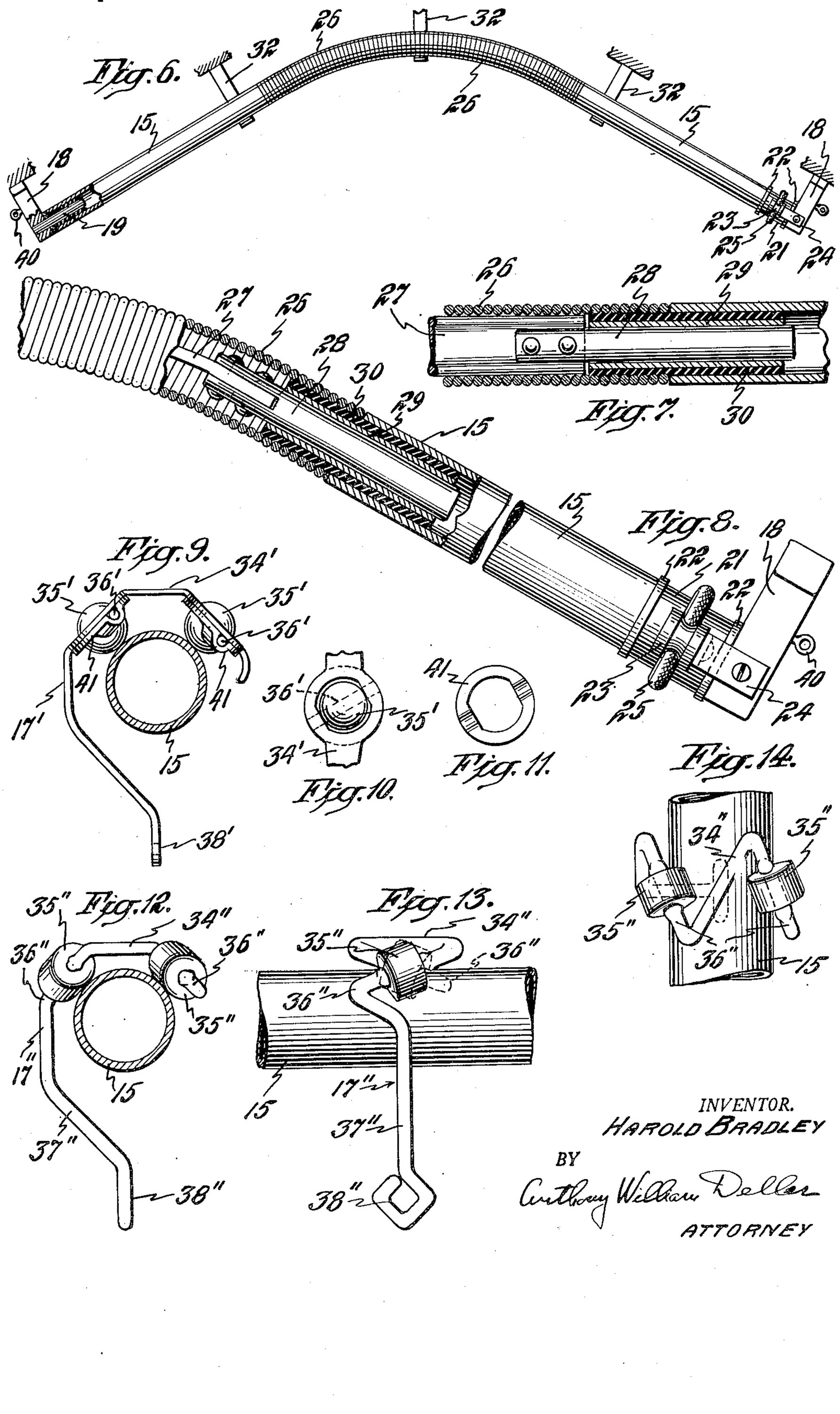


Fig. 6.




Fig. 7.

Fig. 8.




Fig. 9.




Fig. 10.




Fig. 11.

Fig. 14.







Fig. 12.




Fig. 13.

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## APPARATUS FOR TRAVERSING DRAPERIES AND THE LIKE

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15 Claims. (Cl. 160—343)

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This invention relates to the art of flexible and portable closures, partitions and panels, and has particular reference to the movement of draperies, such as curtains and the like, from a point of remote control.

Prior practice in this regard has usually depended upon curtain rings, other slidably mounted hangers, or roller equipped carriers, mounted on a fixed pole or track spanning the area to be draped or the path to be traversed by the hangers; the lead carrier for each panel or drape being fastened to a cable which is operated over a series of pulleys, said lead carrier moving at the same speed as the cable, pushing or pulling the drapery, and the other carriers attached to the drapery, to a desired position. Such devices make no provision for preserving an equal distribution of the fullness of the curtain, nor for automatically creating and maintaining predetermined fold effects during all stages of operation. Neither do such devices anticipate usage in connection with a curved path of travel as required for the treatment of curved panels and especially for travel around a path having a curved section of short radius, as required in the treatment of modern corner windows; the treatment of both of these widely accepted and increasingly popular creations of modern architectural design being in growing demand and popularity due to their pleasing lines and to their ability to provide wider vision with a minimum of undesirable reflection effects. Furthermore, devices known to the prior art are inadequate for use in association with windows inclined from the vertical or other installations requiring curtains secured at the top and bottom as in airplanes, railroad cars, busses, and the like.

An object of this invention is to provide a method and apparatus for traversing draperies, from a point of remote control in a manner to preserve automatically, during all stages of operation, the equal distribution of the fullness of the drapery in even folds according to a predetermined pleating or other hanging effect proportioned to the extent of the drapery movement across or relative to an area to be covered or exposed.

Another object is to provide a traversing mechanism operative to move draperies and the like in a curved path of travel, including a curved path of travel of sufficiently small radius to permit traversing around squared or other angled corners, without alteration of a prearranged hanging effect.

A further object is to provide a drapery traversing mechanism that is self-adjusting with regard to a plurality of hangers movable under the influence of an operating means common to all.

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A still further object is to provide a drapery traversing mechanism having opposed sets of hangers movable concurrently in relative opposite directions through the agency of a single operating means common to the sets.

A still further object is to provide a drapery traversing mechanism having a plurality of sets of hangers movable concurrently in like and opposite relative directions over unequal distances, through the agency of a single operating means common to all sets. This permits the treatment of a group of windows having unequal panels and separate drapery hangings, by means of a single operating unit.

A still further object is to provide a traverse mechanism which, when employed to close pairs of curtains, delivers to the point of closure any extra fullness of the curtain over and beyond the fullness required to enable the closure to be made; thus eliminating the tendency of hangings to gape at the point of closure, said tendency to gape being due to the inability of prior devices to move this extra fullness to the point of closure.

Other objects will be apparent to those skilled in the art. In the ensuing specification and claims, the term "draperies" is employed in a generic sense to include all free-hanging curtains or the like, as well as those secured at both top and bottom edges for movement relative to the supporting means.

Another object of the invention is to provide a means for traversing material carrying hangers, said hangers being slidable relative to the hanger traversing mechanism when they are stopped at the end thereof or positively at any other point.

The present disclosure comprises an embodiment by which the invention is reduced to practice. It is to be understood, however, that the structural details and arrangements of parts are illustrative and not restrictive, and that variations in the same may be made in any manner not inconsistent with the scope of the invention as claimed.

In the drawings:

Figure 1 is an elevation, partly in section, of a traversing mechanism and associated draperies constructed in accordance with the invention;

Figure 2 is an auxiliary view of a portion of a shaft having a plurality of hanger carriers mounted thereon for movement in different directions and for different distances of travel;

Figure 3 is an elevation of a hanger carrier

mounted in service position showing its adaptability for use on shafts of varying diameters;

Figure 4 is a development of a top view of Figure 3 into a single plane showing the parallelism of the angularly disposed shafts;

Figure 5 is an elevation, partly in section, of a hanger carrier mounted in service position, showing the relative angular disposition of the roller shafts in a radial plane and disclosing a method and device for intermediate support of the rotatable shaft without interference with the rectilinear travel of the hanger carriers on said rotatable shaft;

Figure 6 is a top elevation, partly in section, of a traversing mechanism embodying both rigid and flexible shaft sections;

Figure 7 is a section showing the method of joining rigid and flexible sections one to another, including a detail of the non-rotatable internal support comprising a flexible member with a dowel-like end member which is journaled by an internal sleeve;

Figure 8 is a top elevation showing in detail the method of joining rigid and flexible sections one to another and the method of support of the non-rotatable, flexible, internal support member, as well as a detail of the means of maintaining positive contact of the cable with the rotatable shaft;

Figure 9 is an elevation similar to Figure 3 illustrating an alternative embodiment of a hanger carrier;

Figure 10 is a fragmentary auxiliary view of a hanger carrier, as shown in Figure 9, showing that portion of the hanger carrier which houses the spherical roller and its shaft;

Figure 11 is an elevation of the channeled washer which supports the roller shaft as shown in Figure 9;

Figure 12 is an elevation similar to Figure 3, but illustrating an alternative embodiment of a hanger carrier;

Figure 13 is a side elevation of the hanger carrier as illustrated in Figure 12; and

Figure 14 is a top elevation of the hanger carrier as shown in Figure 12.

In detail, the apparatus comprises a drive shaft 15 of a length requisite to span an area that is to be covered or exposed by drapery means 16, here shown as a flexible fabric curtain, suspended from the shaft by means of hanger carriers 17. The drive shaft, as one of its functions, serves in the manner of a conventional curtain rod or pole, and is journalled at each end for rotation in a fixed support 18 adapted to be rigidly attached to a wall or window frame, not shown.

As illustrated, the shaft 15 is hollow, with rigid tubular end sections 19 which are force fitted into a previously installed rubber-like sleeve 20 which is duly compressed between the outside diameter of the tubular end section 19 and the inside diameter of the shaft 15 insuring a maximum of frictional contact and resistance against torque stresses to be applied. One end section has a heavier gauge rubber like sleeve 21 located between the end of the shaft 15 and the end bracket 18 and separated from both by metal washers 22. This extra heavy rubber sleeve 21 and metal washers 22 are press fitted over the tubular end section 19 and serve jointly as a pulley for cable 25. Said cable 25 is positioned and kept in positive contact with rubber-like sleeve section 21 through the medium of a small grooved roller 23 which is supported in turn by a small bracket 24 mounted on end bracket 18. This operating cable



25 which is trained over rubber-like sleeve 21 provides the means by which the shaft 15 may be rotated from a point of remote control.

The drive shaft may be disposed as a straight shaft or, as shown in Figure 6, it may be curved by substituting a flexible drive shaft 26 in whole or in part, for rigid drive shaft 15, thereby conforming to the arc of curvature of an area to be covered or exposed, such as a curved window or the like, not shown. The degree of curvature is determined and maintained by the use of a curved guide member 27, either rigid or perfectly resilient in one plane and rigid in the other, disposed within the hollow flexible section 26 to provide a form on which the section is carried and held against sagging. The greatest width of the curved guide 27 is preferably only slightly less than the internal diameter of the flexible section 26, and is vertically disposed as shown in Figure 7. At each end, the curved guide is provided with a reduced rounded extension 28, such as a dowel pin, which projects axially into and through the adjacent tubular shaft coupling element 29 in loose rotatable engagement therewith so that rotation of the shaft sections is not imparted to the curved guide. Said shaft coupling element 29 is used in conjunction with rubber-like sleeve 30 to connect the ends of the rigid shaft sections 15 with the flexible section 26 for rotation as a unit, whereby rotation imparted through the manipulation of the operating cable 25 is transmitted throughout the entire length of the shaft with all sections rotating in unison. Where desired, the shaft sections may have one or more points of intermediate support as shown in Figure 6 on anti-friction roller bearings 31 rotating on their respective axial shafts 33 mounted in the U-shaped end of a wall or window attached bracket 32, as shown in Figure 5.

The drive shaft 15 supports a plurality of hanger carriers 17. Each hanger comprises a hook-shaped body having a top portion 34 extending over and across the drive shaft and mounting a pair of anti-friction or slidable rollers 35 which contact the shaft rotatably and yet slidably at points spaced apart but within an arc of 135 degrees of its total periphery. The rollers, which may be hard surfaced and may take any desired form, are here shown as spherical bearings journalled on axes 36 angled with respect to the axis of the drive shaft. The angles of the axes of both bearing rollers are equal and in the same direction, as best shown in Figure 4. Due to this arrangement, when the shaft 15 is rotated, the bearings 35 will be correspondingly rotated by frictional contact with the shaft and will cause the hanger in which they are mounted to move axially along the shaft in a direction depending upon the direction of rotation of the drive shaft. Within limits, the greater the angle between the shaft and roller bearing axes, the greater will be the length of travel of the hangers per revolution of the drive shaft.

Each hanger 17 is further provided at one side with a downwardly directed shank having an inclined portion 37 which terminates in a depending eye 38 disposed in vertical registry with the drive shaft axis. The drape 16 is provided at its upper edge portion with attached hooks 39 for engagement to the hanger eyes to suspend the drape vertically beneath the shaft 15 with the load distributed equally to the rollers 35.

Individual hangers are mounted on the drive shaft simply by hooking them in the positions desired and they may readily be moved manually

on the shaft or may be disengaged with equal facility.

Figure 9 illustrates an alternative embodiment of hanger carrier 17' formed in sheet metal stampings 34' which when assembled resemble in configuration and perform in the same manner as the hanger carrier body shown in Figure 3, having rollers 35' on axes 36' and including a depending eye 38' for attachment of drapery 16 by means of drapery hooks 39 or like means. Figure 11 portrays the washer-like part 41 with its channel-like recess to hold roller axes 36' and having flat sections perpendicular to the axis shaft channel for the proper centering of the spherical roller 35'. Figure 10 shows the assembly of roller 35' and axis shaft 36' by the assembly of washer 41 to the sheet metal hanger body as shown in Figure 9.

Figures 12, 13 and 14 illustrate a further alternative embodiment of hanger 17'', formed of a single length of wire 34'' bent at the desired angles at its upper portion to form axles 36'' on which substantially cylindrical rollers 35'' with rounded end edges are mounted between retainers swaged from the wire stock. These hangers are similar in configuration to the hangers 17 with a downwardly inclined shank 37'' terminating in a vertically depending eye 38''.

As shown in Figure 2, individual hangers may be set to move different distances and in different directions on the same drive shaft and by the same operation. For example, the hangers B and C having their roller axes at equal and opposite angles will move in opposite directions either toward or away from each other depending upon the direction of rotation of the drive shaft. The hanger A having its roller axes at a lesser angle with respect to the drive shaft axis than the hanger B, but in the same direction, will move with the hanger B in the same direction and for a lesser distance per revolution of the drive shaft. This method of operation is particularly advantageous in the case of center meeting curtains and in creating and maintaining a predetermined fold effect proportioned to the extent of travel of a curtain.

In operation, a requisite number of hangers is mounted on the drive shaft and a drapery hung by engagement of its attached hooks with the hanger eyes. The non-traveling edge of the drape is anchored by hooking a pin in a retainer 40 carried by the adjacent support 18. Upon rotation of the drive shaft by appropriate manipulation of the actuating cable 25, the hangers will be caused to travel along the shaft to open or close the drape depending upon the direction of rotation of the drive shaft. With the hangers arranged in proper sequence, as indicated in Figure 1, they will be moved individually and in unison. For any given number of revolutions of the drive shaft, each hanger will move in proportion to the total distance it is required to travel when the drape is fully opened. By this arrangement, drapes may be partially opened or closed yet will automatically retain, in proportion, a prearranged proportionate fold pattern.

A feature of the invention resides in the point contact of the bearing rollers on the drive shaft. This enables the rollers to slip on the drive shaft when the hanger on which they are mounted has reached the limit of its travel and is restrained by the holding section of the drape.

Another feature of the invention resides in a hanger carrier which does not completely encompass the periphery of the rotating shaft, but



rather provides sufficient opening to allow intermediate support of said shaft at any point, without interference with the traversing function.

Although the present invention has been described in conjunction with preferred embodiments, it is to be understood that modifications and variations may be resorted to without departing from the spirit of the invention, as those skilled in the art will readily understand. Thus, for example, my hangers or carriers can be used in tandem within a single frame or as units coupled by rigid connecting means.

I claim:

1. Traverse mechanism for draperies comprising, in combination, a rotatable shaft, drapery hanger carriers freely suspended therefrom, rotatable bearings in said carriers on axes angled relative to the shaft axis said angle being selected to give the desired movement of the carrier longitudinally on said shaft and being less than 90° relative to the shaft axis, and supporting said carriers on the shaft, and means for rotating said shaft whereby to cause rectilinear movement of the carriers along the shaft.

2. Traverse mechanism for draperies comprising, in combination, a rotatable shaft including rigid sections and a hollow flexible section connected for rotation as a unit, a form in said flexible section for imparting a desired bend thereto, hanger carriers on said shaft, anti-friction rollers in said carriers and bearing on said shaft with their axes angled relative to the shaft axis said angle being selected to give the desired movement of the carrier longitudinally on said shaft, and being less than 90° and more than 0° and means for rotating said shaft and rollers whereby to move said carriers therealong.

3. In a drapery traverse mechanism having a rotatable shaft and hangers suspended therefrom, hard-surfaced roller bearings in said hangers and in point contact with said shaft to support the hangers thereon, and the axes of said rollers being angled less than 90° relative to the axis of the shaft so that said hangers will move along said shaft upon rotation of the shaft.

4. In a drapery traverse mechanism having a rotatable shaft and a plurality of traveling hangers thereon, a pair of rollers in each hanger in contact with the shaft and supporting the hanger thereon, said rollers being angled less than 90° and more than 0° relative to the shaft upon which it is supported and being spaced apart and making contact with the shaft within an arc of substantially 135 degrees of the total periphery of the shaft.

5. In a drapery traverse mechanism having a rotatable shaft and a plurality of traveling hangers thereon, a pair of rollers in each hanger in contact with the shaft and supporting the hanger thereon, and the axes of the rollers in any individual hanger being equally angled relative to the shaft axis and disposed in the same direction said angles being less than 90° relative to the axis of the shaft and selected to give the desired travel to each of the hangers as the shaft is rotated.

6. In a drapery traverse mechanism having a rotatable shaft and a plurality of traveling hangers thereon, a pair of rollers in each hanger in contact with the shaft and supporting the hanger thereon, the axes of the rollers in any individual hanger being disposed in the same direction less than 90° relative to the axis of said shaft and at equal angles to the axis of said shaft, and the angle of the roller axes in at least

one hanger being different from the angle of the roller axes in the other hangers so that said hangers will travel at different speeds as the shaft is turned.

7. In a drapery traverse mechanism having a plurality of traveling hangers with hanger driving means, a rotatable shaft supporting said hangers on said driving means and in driving engagement said hanger driving means being in frictional engagement with said shaft, said shaft comprising rigid straight sections and at least one curved section maintained in a predetermined contour and connected for rotation as a unit, with said straight portions, the exterior face of said curved section being flexible and means for rotating said shaft to move said hangers therealong.

8. In a drapery traverse mechanism having a plurality of traveling hangers with hanger moving means, a rotatable shaft having an exterior surface supporting said hangers and in driving engagement with said moving means, said shaft comprising rigid straight sections and at least one hollow curved section with a flexible exterior surface connected end to end for rotation as a unit, a shaped guide extending through and supporting said hollow flexible section against deformation as the shafts are rotated, support means in the rigid straight sections, and the ends of said shaped guide having rotatable bearing engagement in said support means and means connected to at least one of said shafts for rotating the shafts as a unit for traversing said hangers supported thereby.

9. Traverse mechanism for draperies including a hollow, rotatable shaft having a flexible exterior surface, a support for each end thereof, a curved guide extending through said shaft and supporting the same against deformation, the ends of said guide having freely rotatable engagement in said supports, driven hangers having hanger moving means supported on and in frictional operative connection with the surface of said shaft, and means for rotating said shaft to effect longitudinal movement of the hangers.

10. In a drapery traverse mechanism, a rotatable shaft, a hanger having a shank disposed at one side of the shaft, a portion of said shank being extended transversely over the shaft, roller bearings in said extended portion and contacting the shaft on axes equally angled with respect to the shaft axis and at angles less than 90° relative to said shaft axis, said shank further having a depending portion inclined beneath the shaft, and the terminal of said inclined portion having a depending drapery engageable portion in registry with the shaft axis.

11. In a material traversing apparatus for drapery or the like, a rotatable shaft, a plurality of material supporting hangers having rotatable hanger driving means on axes less than 90° and greater than 0° relative to the shaft axis, and means for rotating the shaft carrying said hangers, said driving means being in frictional engagement with said shaft and rotatable thereby as the shaft rotates to traverse said hangers along the shaft, said hangers slipping relative to said shaft when positively stopped.

12. In a material traversing apparatus for drapery or the like, a rotatable shaft, a plurality of material supporting hangers having rotatable hanger driving means on axes less than 90° and



greater than 0° relative to the shaft axis, each of the hangers having the axis of the driving means therefore at different angles relative to said rotatable shaft so that said hangers will move different distances on said shaft as said shaft is rotated, and means for rotating the shaft carrying said hangers, said driving means being in frictional engagement with said shaft and rotatable thereby as the shaft rotates to traverse said hangers along the shaft, said hangers slipping relative to said shaft when positively stopped.

13. In a material traversing apparatus, a rotatable shaft, material suspending hangers carried by said shaft, and hanger driving means on said hangers moving said hangers along said shaft in unison as said shaft is rotated, the axis of each of said hanger driving means being preset at angles less than 90° and more than 0° relative to the axis of said shaft maintaining said hangers the same proportional distance apart at all times between a fully extended relationship and a contracted relationship, said hangers being adapted to slip relative to said shaft when positively stopped.

14. In a material traversing apparatus, a rotatable shaft, a plurality of material supporting hangers having hanger driving means frictionally contactable with said shaft, said driving means being rotatably mounted on axes on said hangers, said axes being less than 90° and greater than 0° relative to the shaft axis, and shaft rotating means, said driving means being in frictional engagement with said shaft and rotatable thereby as the shaft rotates to traverse said hangers and materials carried thereby along the shaft, said hangers slipping relative to said shaft when positively stopped.

15. In a material traversing apparatus, a rotatable shaft means, a plurality of material supporting hangers suspended from said shaft means, said hangers having frame means passable by supporting arrangements for said rotatable shaft means, hanger driving means on said material supporting hangers frictionally contactable with the rotatable shaft means, said driving means being rotatably mounted on axes on said hangers, said axes being less than 90° and greater than 0° relative to the axis of the rotatable shaft means, and shaft rotating means, said driving means being in frictional engagement with said shaft and rotatable thereby as the shaft rotates to traverse said hangers and materials carried thereby along the shaft, said hangers slipping relative to said shaft when positively stopped.

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