No. 818,595. PATENTED APR. 24, 1906.

E. W. WILCOX.

STORE SERVICE APPARATUS.

APPLICATION FILED MAR. 24, 1905.

4 SHEETS—SHEET 1.

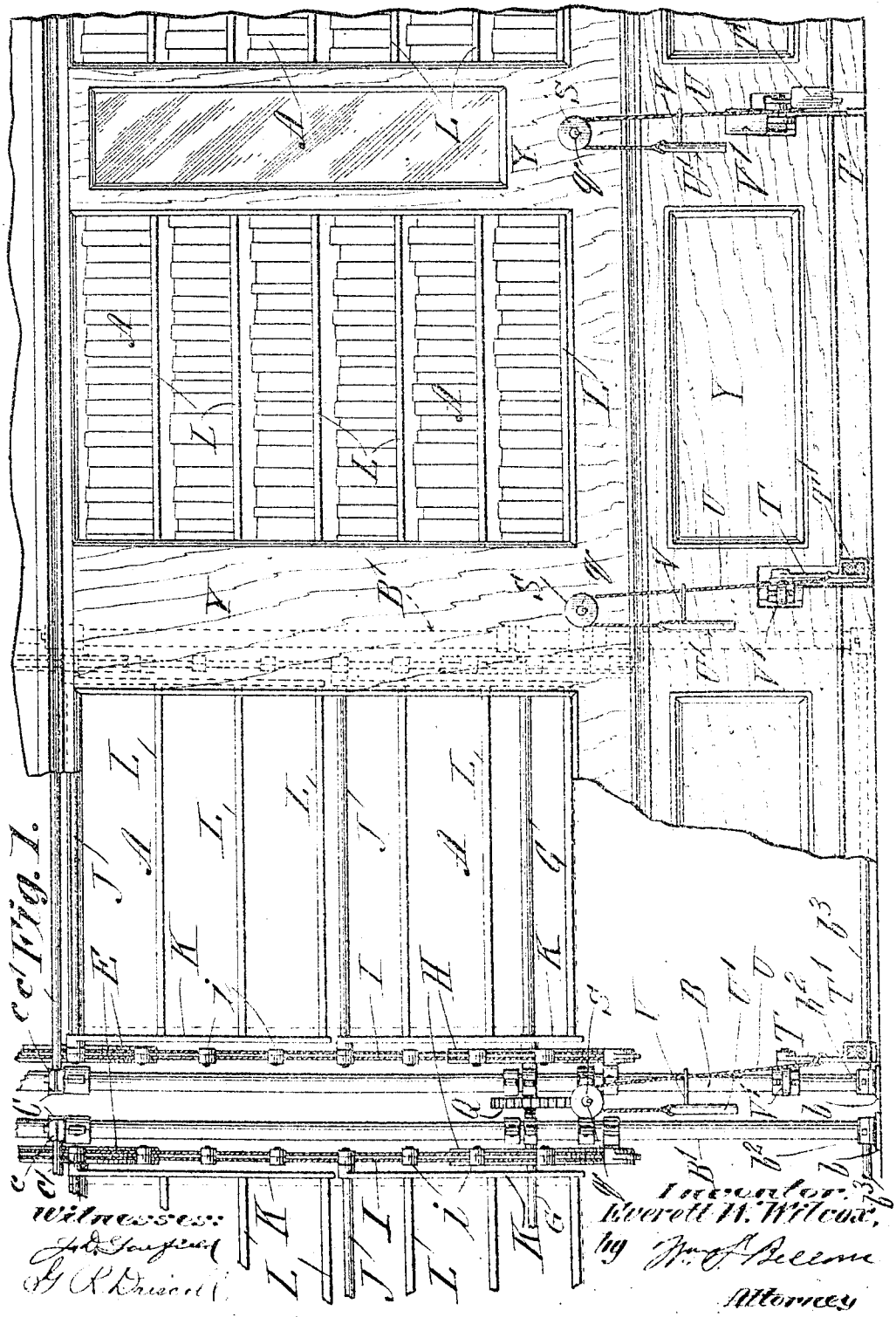


Fig. 1.

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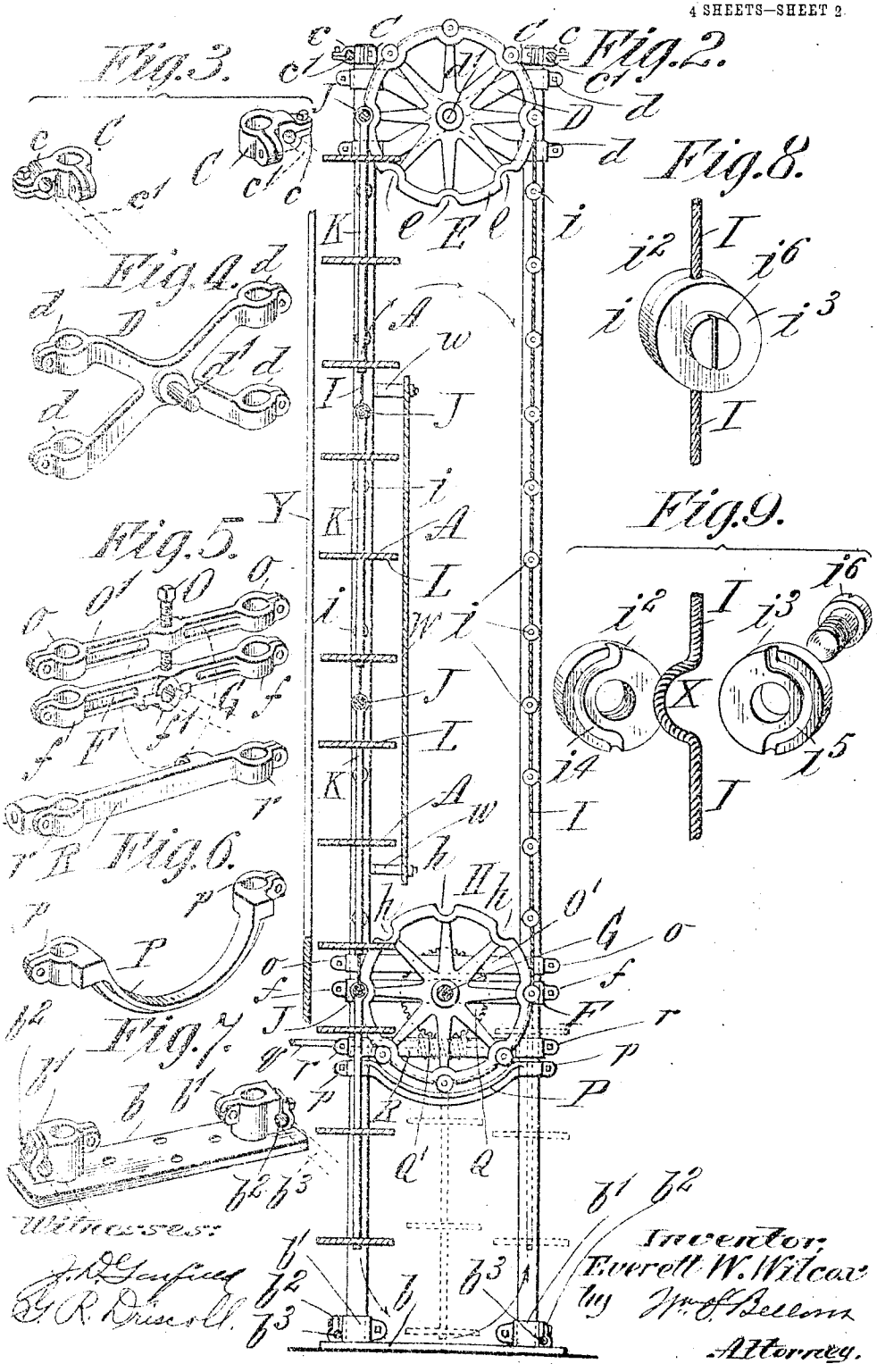
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4 SHEETS—SHEET 2.



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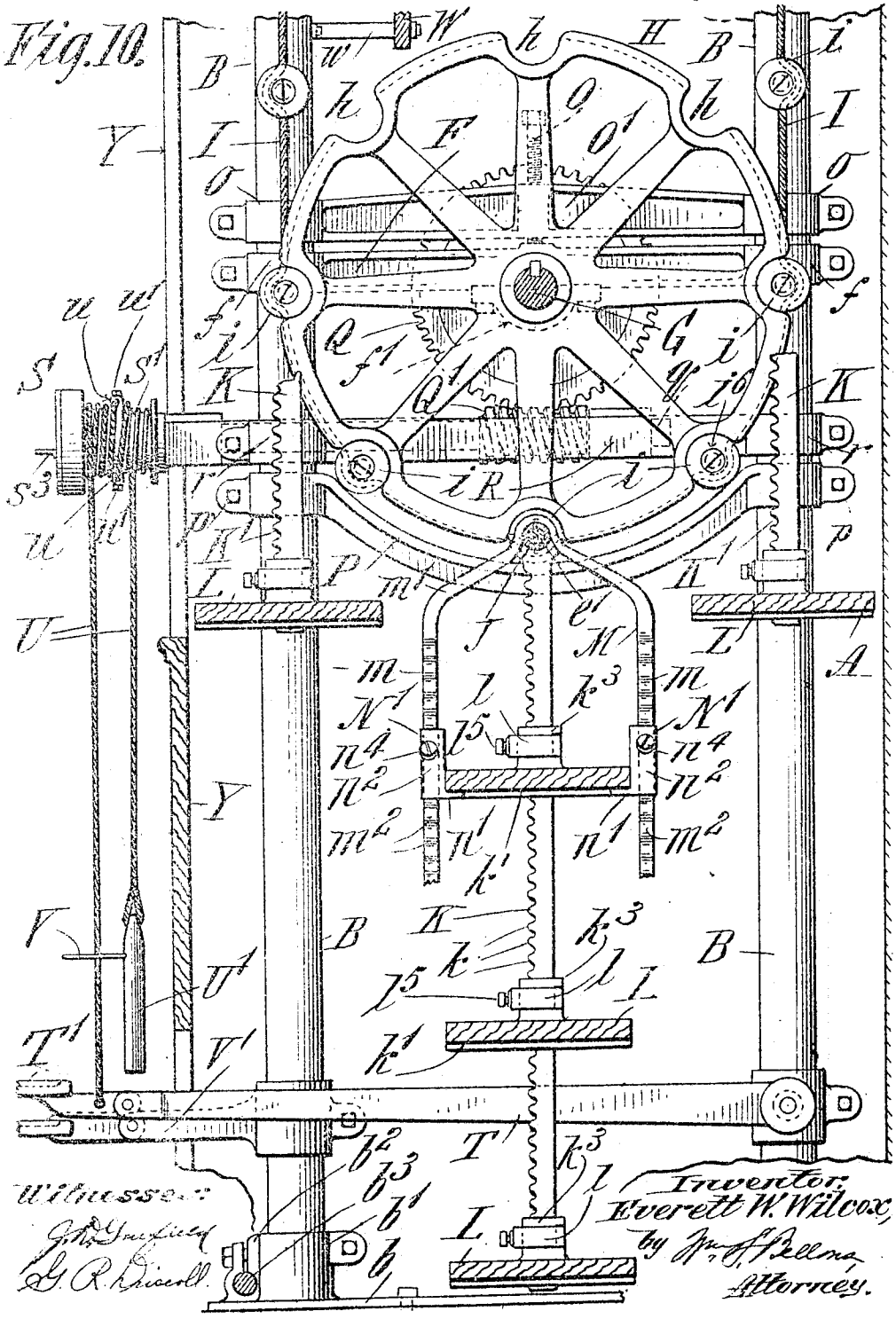
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4 SHEETS—SHEET 3

Fig. 10.



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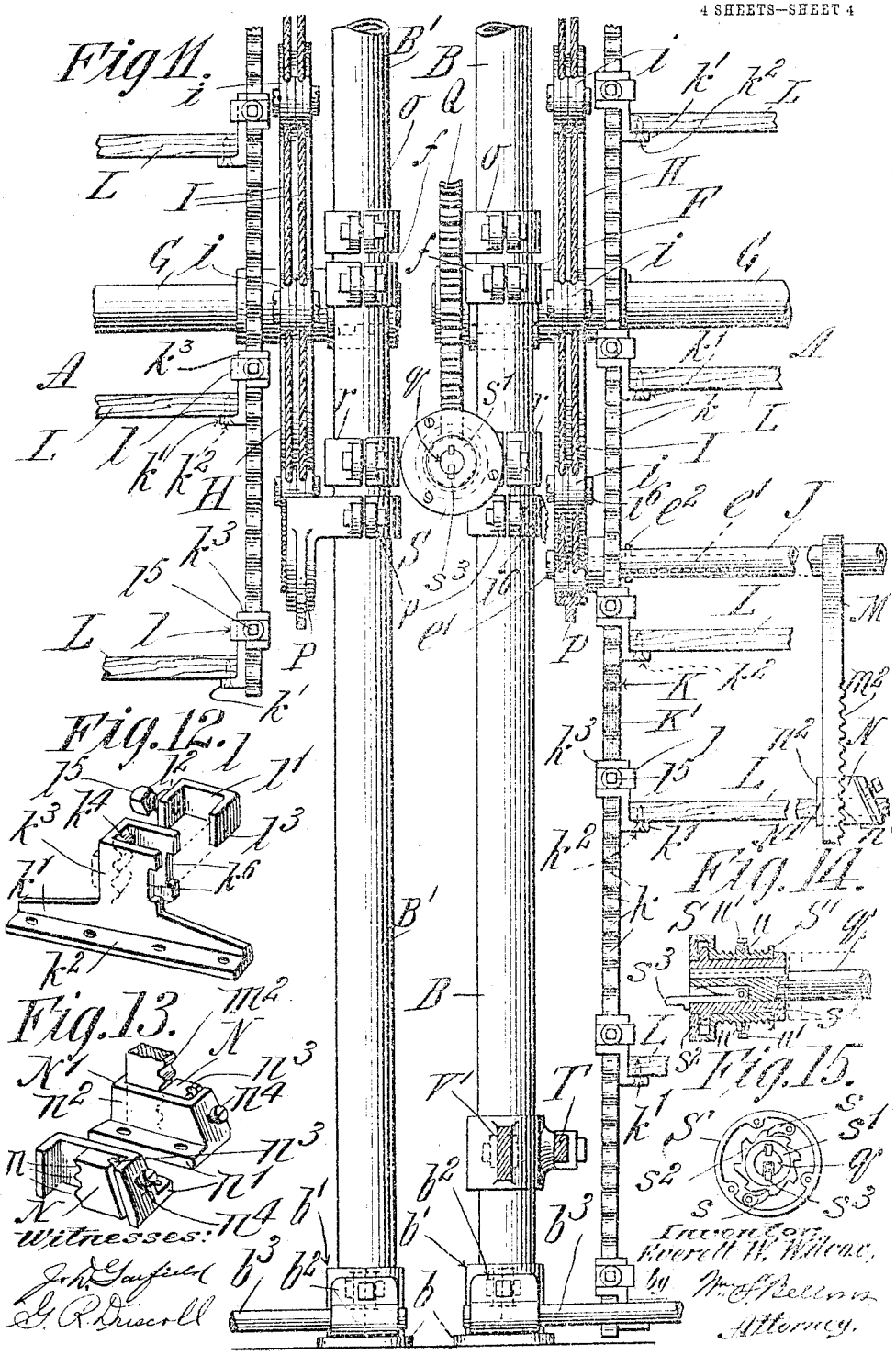
No. 818,595. PATENTED APR. 24, 1906

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4 SHEETS—SHEET 4



UNITED STATES PATENT OFFICE.

EVERETT W. WILCOX, OF SPRINGFIELD, MASSACHUSETTS.

STORE-SERVICE APPARATUS.

No. 818,595. Specification of Letters Patent. Patented April 24, 1906.

Application filed March 24, 1905. Serial No. 251,766.

To all whom it may concern:

Be it known that I, EVERETT W. WILCOX, a citizen of the United States of America, and a resident of Springfield, in the county of Hampden and State of Massachusetts, have invented certain new and useful Improvements in Store-Service Apparatuses, of which the following is a full, clear, and exact description.

This invention relates to shelves and shelving-supports, and more especially to that class thereof in which the shelves are suspended at their opposite ends by endless cables that pass around upper and lower pairs of grooved pulleys and by means of which the upper shelves may be quickly moved within reach of the operator.

A leading object of this invention is to provide a strongly-braced and self-supporting structure to sustain the shelving and constructed so as to permit of quick assemblage by reason of the interchangeable and simple organization of the parts, permitting of its erection in places varying greatly in height of ceiling and extent of wall-space.

Other objects are attained by the improved cable construction, the shelf supporting and adjusting means, novel operating mechanism for raising and lowering the shelves, and by other devices and equipments hereinafter set forth.

In the accompanying drawings, Figure 1 is a front elevation of several tiers of shelves embodying my improvements as adapted, for instance, for library purposes. Fig. 2 is a vertical section through a set or tier of shelving as adapted for store or factory uses, the structural supports, one of the cables, and wheels therefor being seen in elevation. Fig. 3 is a perspective view of a pair of upper stay-rod clamps. Fig. 4 is a perspective view of the upper wheel-supporting bracket. Fig. 5 is a perspective view of the lower wheel supporting and adjusting bars. Fig. 6 is a perspective view of the hanger-supporting guard. Fig. 7 is a perspective view of the base-plate and its clamp-sockets. Fig. 8 is a perspective view of a cable-button, showing the parts thereof assembled. Fig. 9 is a perspective view of the parts of a cable-button in separated relations to each other and to a bend in the cable. Fig. 10 is a vertical section similar to Fig. 2, but of the lower portion of the appliances and on a larger scale. Fig. 11 is a front elevation of the adjacent lower end portions of two sets of shelving. Fig. 12 is a perspective view of a locking-clamp for uniting the shelf ends to their hangers. Fig. 13 is a perspective view of a clamp for uniting the central portion of a shelf to centrally-supported hangers therefor. Fig. 14 is a longitudinal sectional view of the worm-shaft operating ratchet and drum; and Fig. 15 is an end view of the same, the end plate of the drum being removed.

Similar characters of reference indicate corresponding parts in all of the views.

Referring to the drawings, A represents a tier or set of shelves at each end of which are a pair of vertical shelf-supporting columns B and B′. These pairs of columns rest on base-plates *b*, fastened to the floor, and the lower ends of the columns are securely clamped in upwardly-open sockets *b*′, which are formed at opposite portions of the base-plates. The length of these base-plates and the distance apart thereon of the clamping-sockets *b*′ are sufficient to afford a stable support for the columns of each pair.

That each pair of columns comprised in and located at each end of the shelving of a tier may be maintained at their proper distance from each other the base-plate sockets *b*′ have formed thereon clamp-supports b^2, which receive and rigidly hold the extremities of the column-uniting stay-rods b^3, which extend between two pairs of the columns for one tier of shelving.

At the upper end portion of each of the pairs of columns B and B′ are clamp-collars C, which have formed thereon clamp-supports *c*, (similar to those indicated by b^2 on the base-plates,) which receive and hold the ends of the upper stay-rods *c*′.

Truss-like frames or brackets D, having clamp-collars *d* formed on the extremities thereof, unite the upper portions of each pair of columns B and B′ and contribute to the rigidity of and help to maintain the said columns in their upright positions. In the center of these brackets D are rigidly provided short studs *d*′, which carry thereon the grooved wheels or pulleys E. Near the lower portion of the columns and adjustably attached thereto by clamp-collars *f* are bracket-bars F, having shaft-bearings *f*′ formed therein and at the middle portions thereof. Supported in these bearings *f*′ and extending from those of one pair of columns to those on the other is a shaft G. Groove-wheels H, which may be identical in size and

construction to the wheels E, are mounted on shaft G at points thereon directly below and in coinciding planes with the wheels E.

I I represent endless cables (their ends being spliced or otherwise suitably joined) which are provided and carried in pairs by and around the wheels E and H. These cables are provided with buttons *i*, which are accurately located thereon equidistant from each other and engage in the half-round notches *e* and *h* on the wheels E and H, respectively, these notches being of a distance from each other equal to the distance between the cable-buttons *i*. At equal distances apart thereon and connecting the opposite runs or portions of the cables for a tier of shelving are tubular shafts or bars J, the ends of which are connected to certain of the cable-buttons *i* by long bolts *e'*, (see Fig. 11,) which are passed through the cable-buttons and thence into the open ends of the tubular bars J a distance sufficient to insure a firm engagement therewith, and to prevent any spreading apart of the cables I the bolts *e'* are pinned at e^2 to the said bars J. Pivotally attached to each of the bars J and at either end thereof and adjacent the cables I are two depending bars or shelf-hangers K. These hangers K are of such length as to permit the lower or depending end of each to clear the next shaft J. One edge portion K' of each of the hangers K is provided with rounded serrations or notches *k*, and each end of the shelves L is provided with locking attachments for connecting and maintaining said shelves at any desired height on the hangers K by engagement with said notches *k*. Referring to Figs. 10, 11 and 12, this shelf-locking attachment comprises a flanged cleat portion *k'*, on which the ends of the shelves L rest and are secured thereto by screws k^2. A recessed block k^3, formed centrally on cleat *k'*, is provided at its closed side with a notched surface k^4, which engages the notches *k* of hanger K. A removable retaining-clamp *l*, having one side portion *l'* and the angular end extensions l^2 l^3, is adapted to be slipped about the block k^3 after the desired point of engagement with hanger K has been determined, and by then tightening the set-screw l^5 in the end extension l^2 the notched portions of bar K and the block k^3 are immovably engaged and held together.

That the cables and the buttons secured thereon may always have a close engagement with the notched pulleys E and H a cable-tightening screw O is provided on and has a screw-threaded engagement with a bar O', that is secured to the columns B by clamp-collars *o*, and this bar O' is secured in place slightly above the lower wheel-supporting bar F. To effect a tightening of the cable by this means, the clamp-collars *f* of bar F are first loosened, and the clamp-collars *o* of bar O' being locked to the columns a powerful downward setting of the bar F is effected by the screw O. This means for adjusting or tightening the cables is provided on both columns B and B' of a set of shelving; but as the stretch of wire cables is slight the amount of adjustment necessary is correspondingly slight.

In case the shelves are installed in places where great weight is to be carried thereon a curved supporting-guideway P for the cable-buttons to ride on is provided under the wheels H, the ends of this curved support being provided with clamp-collars *p*, which lock the same to the columns, and thereby carry the weight of the shelves suspended from their cable-buttons, as before described, and prevent any disengagement of any of the cable-buttons from the wheel-notches *h*.

The construction of the cables for a set of shelving is as follows: The number of shelf-hangers to be employed having been determined, the two pairs of cables for the set of shelving are cut to the required length and their ends carefully spliced or united, care being taken to insure accuracy. The cable-buttons that are next secured to the cables are, as seen in Fig. 9, made in two halves or sections i^2 and i^3, and the adjoining faces of these button-sections are each provided with half-round semicircular grooves i^4 and i^5. The manner of attaching these sections together and to the cable consists in pressing a curved bend, as X, of the cable into the grooves of one section and then securing the other section thereto by a screw i^6, as shown in Fig. 8. If desired, the central portion of the shelves L may also be supported and prevented from sagging by a substantially similar hanger and shelf-locking device to those above described for the shelf ends.

Referring to Figs. 10, 11, and 13, M is a double-arm hanger, the two depending members *m* united at the top by a yoke portion *m'*, which is supported on the hanger bar or shaft J. Notches m^2 on the depending members *m m* are engaged by the notches *n* of removable blocks N of shelf-attachment devices N'. Each shelf-attachment device consists of a flanged portion *n'*, on which the shelf rests, and of a hanger guide or casing n^2, one end of which is angularly inclined and receives between said end and the inclosed notched hanger the notched block N, Fig. 13. The angular or beveled side of this block N has a groove n^3 formed thereon, which receives the point of the set-screw n^4, which has screw engagement through the angularly-inclined side of hanger-guide n^2, whereby the hanger-guide n^2, hanger-arm *m*, and notched block N are all rigidly locked together.

The means for operating the cable-wheels, and thereby elevating or lowering a tier of the shelving, as desired and as illustrated in Figs. 1, 2, 10, and 11 of the drawings, is through a worm-and-gear connection. A

worm-wheel Q is provided on one end of the wheel-shaft G, and a worm Q', adapted to engage said worm-wheel, is secured on a shaft q, mounted in suitable boxes on supporting-bar R, having clamp-collars r for securing the bar to the columns. (See Figs. 6 and 10.)

By the substitution of worm-wheels of different sizes and the vertical adjusting of the bar R on the columns to bring the worm Q' into mesh therewith varying degrees of speed or power for raising and lowering the shelving is quickly acquired.

Various means may be employed for imparting rotational movement to the worm-shaft q, such as electric or water motors or manually-operated hand wheels or cranks.

A powerful foot-power device is illustrated in Figs. 1, 10, 11, 14, and 15 of the drawings and comprises a cable-drum or windlass S on one end of shaft q. The outer shell S' of this windlass, having the cable-grooves thereon, has in an enlarged recessed head thereof a pair of pawls s s. This cable-carrying shell is rotatably mounted on a sleeve s', which has secured thereon a ratchet-wheel s^2, which rotates in the enlarged and recessed end of the outer shell S' and is engaged by the click-pawls s s therein, pivotally mounted on and bodily carried by the part S'. This sleeve s' is keyed to shaft q, and the sleeve and shell are both held against endwise movement on shaft q by a latch s^3, pivotally secured in a recess in the end of worm-shaft q. Pivotally attached to one of the supporting-columns at a point near the base is a pedal or foot-lever T, its foot-plate T' being preferably hinged and foldable relatively to its free end. A cable U is secured to this foot-plate and extends upwardly to and with a winding engagement around the drum S and thence downwardly to a counterweight U'. Centrally of the spiral cable-grooves of the drum S are two lugs u u, formed thereon, through which the cable U is passed and secured thereto by set-screws u'. (See Figs. 10 and 14.) A staple-like wire guide V on counterweight U' embraces the part of the cable leading to the foot-lever and serves to steady travel of the counterweight U'. A folding foot-rest or bracket V' is adjustably attached to one of the columns and extends alongside of the foot-lever T', preferably to the left thereof, whereby the operator may raise himself thereon a slight distance above the floor and level with the foot-plate T, with the advantage of imparting the entire weight of the body to the foot-plate in an easier and more advantageous manner than would be the case if he stood on the floor. The operation of this foot-lever T, as described, rotates the drum S through the cable U and by the ratchet-and-pawl devices described rotates the work-shaft q to move the shelves in one direction. To move them in an opposite direction, the drum S (comprising the sleeve with its ratchet and the outer sleeve with its pawl) is slipped off from the end of shaft q and replaced thereon in a position endwise reversed from that shown in the drawings and is retained by the latch s^3, as before described.

By reason of the substantial lengths of the shaft-hanger bars that I employ and of the low center of gravity of the shelves supported thereon there is no occasion for guiding the shelves in their movements except at the point where they are accessible to the operator, and that at such location the shelves may not be inadvertently swung inwardly I have provided a shelf-backing which consists of a panel W, preferably of ordinary sheathing-boards, which is supported, as seen in Fig. 2 and upper part of Fig. 10, by brackets w, bolted to the front columns of a pair in each set of shelving.

The front panels of woodwork Y are so designed as to prevent any outwardly swinging of the shelves.

Any design of woodwork or paneling of any material, ornamented as shown in Fig. 1, with mirrors or with any suitable decoration may be erected in front of sets of shelving to conceal the columns and mechanism from view; but such screening, while imparting a good appearance to the shelving equipments, forms no important aid to the support or maintenance thereof, as has been commonly heretofore the case.

From the accompanying illustrations and the foregoing descriptions it is to be seen that the parts and appliances comprising and located between each of the end supports is a unitary movable or revolubble shelf apparatus, and by reason of the sectional, adjustable, and interchangeable character and capabilities of the parts one or a series of the shelving apparatuses may be provided to correspond with any given space for its occupancy, with shelf capacity proportionately available, and in any of the unitary apparatuses the shelves may be provided in as few and widely-separated or in as many and closely-disposed relations as occasion may demand. It is also apparent that in the organization described the shelving of the apparatus of large size and great capacity may be most easily and steadily moved and with satisfactory rapidity by the exertion of comparatively slight force by the operator, and the apparatus is entirely susceptible of being moved by power where such manner of operation is advantageous, and important objects attained by the invention are the acquirement of provision of parts which in their production and assemblage are practicable, mechanical, comparatively inexpensive, durable, capable of protracted use without derangement, and which contribute to constitute an apparatus especially useful in stores and other places which is sightly and attractive.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a movable shelving apparatus, opposite side supporting structures, upper and lower pairs of wheels rotatably mounted on each structure, endless cables provided to run around the side pairs of wheels, a plurality of shelves and shelf-supports having swinging connections with the courses or runs of the cables, and means for vertically adjusting the shelves relatively to the cables.

2. In a movable shelving apparatus, opposite side supporting structures, upper and lower pairs of wheels rotatably mounted on said structures, endless cables provided to run around side pairs of the wheels, bars horizontally carried between courses of the oppositely-located cables, hangers journaled on said cross-bars and depending therebelow, shelf-supports vertically adjustable on the depending hangers, and means for locking the shelf-supports in their adjusted positions.

3. In a movable shelving apparatus, opposite side supporting structures, upper and lower pairs of wheels rotatably mounted on said structures, endless cables provided to run around side pairs of the wheels, bars horizontally carried between courses of the oppositely-located cables, hangers journaled on said cross-bars and depending therebelow, and having their depending members provided with teeth, shelf-supports vertically adjustable on the depending hangers, and having teeth engaging those of the hangers, and means for confining the shelf-supports in their interlocked positions, relatively to the hangers.

4. In an apparatus of the character described, opposite side supporting structures, upper and lower pairs of wheels rotatably mounted on said structures, endless cables provided to run around side pairs of the wheels, bars horizontally carried between courses of the oppositely-located cables, hangers journaled on said cross-bars and having separated depending members provided with teeth, shelf-supports comprising horizontal shelf-supporting portions and upright portions each comprising a part k^3 having teeth k^4 and separated cheek members angularly arranged relatively to said part k^3, and adapted to embrace and engage the depending members of the hangers, and a three-sided part l having a set-screw l^5, substantially as described.

5. In an apparatus of the character described, opposite side supporting structures, upper and lower pairs of wheels rotatably mounted on said structures, endless cables provided to run around side pairs of the wheels, bars horizontally carried between courses of the oppositely-located cables, hangers journaled on said cross-bars and having separated depending members provided with teeth, shelf-supports comprising horizontal shelf-supporting portions and upright portions comprising a part k^3 having teeth, k^4 and separated cheek members angularly arranged relatively to said part k^3 and adapted to embrace and engage the depending members of the hangers, and constructed with edge recesses k^6, and a three-sided part l having a set-screw l^5, and adapted for an interlocking engagement by said cheek members in said recesses k^6, substantially as described.

6. In an apparatus of the character described, opposite side supporting structures, each comprising base-plates having front-to-rear arrangements and columns or posts having lower end connections with, and supports on, said base-plates, and a transverse member D comprising the divergent arms terminating in contractible collars d for embracing and adjustably engaging the upper portions of the columns of a pair, an upper carrier-wheel journaled on each appliance D, and a lower carrier-wheel and lower support therefor sustained by said columns, endless cables provided to run around the side pairs of wheels, and a plurality of shelves and shelf-supports having swinging connection with the opposite courses or runs of the cables.

7. In an apparatus of the character described, opposite side supporting structures, each comprising base-plates having front-to-rear arrangements and provided with upwardly-opening socketed bosses, constructed with the transverse sockets b^2 and means for constricting the walls thereof, the stay-rods b^3 having their extremities confined in said sockets b^2 and extending from the one side structure to the other, columns or posts having the lower ends thereof received in said socketed bosses, and transverse members uniting the upper portions of the columns of each side pair, upper and lower pairs of wheels rotatably mounted on each of said side structures, endless cables provided to run around the side pairs of wheels, and a plurality of shelves and shelf-supports having swinging connections with the opposite courses or runs of the cables.

8. In an apparatus of the character described, opposite side supporting structures, each comprising base-plates having front-to-rear arrangements and provided with upwardly-opening socketed bosses, constructed with the transverse sockets b^2 and means for constricting the walls thereof, stay-rods b^3 having their extremities confined in said sockets b^2 and extending from the one side structure to the other, columns or posts having the lower ends thereof received in said socketed bosses, and transverse members uniting the upper portions of the columns, of each side pair, clamp-collars C and means for confining them on the upper portions of the columns having horizontal sockets, and stay-rods c' adjustably confined in said horizontal

sockets and extending from those of one side structure to the other, upper and lower pairs of wheels rotatably mounted on each of said side structures, endless cables provided to run around the side pairs of wheels, and a plurality of shelves and shelf-supports having swinging connections with the opposite courses or runs of the cables.

9. In a store-service apparatus of the character described, opposite side supporting structures, upper and lower pairs of wheels rotatably mounted on each structure, endless cables provided to run around the side pairs of wheels, hangers having swinging connections with the courses or runs of the cables, and depending members, a plurality of shelf-supports connected with said depending members, and shelves on said supports.

10. In a store-service apparatus of the character described, opposite supporting structures, upper and lower pairs of wheels rotatably mounted on each structure, endless cables provided to run around the side pairs of wheels, bars J supported horizontally by, and between, the runs of the oppositely-located cables, hangers K having swinging connections with said bars near the cables, and intermediately-arranged hangers M, each comprising depending front and rearwardly located members *m*, *m*, and a uniting upper portion engaged with an intermediate portion of a bar J, a series of shelf-supports on, and adjustably connected to respective sets of said hangers, and shelves on said supports.

11. In an apparatus of the character described, oppositely-located end structures each comprising a front and rearwardly located column, wheel-carrying members transversely connecting the pairs of columns, one thereof being vertically adjustable relatively to said columns, and means for confining such member in its adjused position, a member connected to, and extending between, the columns of a pair, and a device mounted thereon and operable relatively to the adjustable wheel-carrying member to impart its adjusting movement thereto, cables for runs around the wheels, bars J extending between the runs of the different cables, hangers and shelf-supports, and shelves thereon.

12. In an apparatus of the character described, oppositely-located end structures each comprising a front and rearwardly located column, wheel-carrying members D F, transversely connecting the pairs of columns, the one F thereof being vertically adjustable relatively to said columns, and means for confining such member in its adjusted position, a bar O′ having collar-provided ends, and confinement devices, and connected to the columns of a pair, and a screw O engaging through said bar O′ and coacting with the adjustable wheel-carrying bar F, cables for runs around the wheels, bars J extending between the runs of the different cables, hangers and shelf-supports, and shelves thereon.

13. In an apparatus of the character described, opposite end structures, cable-supporting wheels thereon, one adjustable vertically relatively to the other, endless cables running around the upper and lower wheels comprised in each end pair, hangers supported for swinging movements by, and relatively to, the cables, and a plurality of shelf-supports, individually vertically adjustable on each hanger, and shelves carried by pairs of said shelf-supports.

14. In an apparatus of the character described, opposite end supporting structures, adjustable toward each other, and upper and lower stay-rods extending between and adjustably connected to said end supporting structure, cable-supporting wheels on said end structures, endless cables running around the upper and lower wheels in each end pair, hangers supported for swinging movements by, and relatively to, the cables, a plurality of shelf-supports individually vertically adjustable on each hanger and shelves carried by oppositely-located pairs of said shelf-supports.

15. In an apparatus of the character described, opposite end structures, one adjustable toward and from the other and upper and lower stay-rods extending between and adjustably connected to the end structures, cable-supporting wheels on said end structures, one adjustable vertically relatively to the other, endless cables running around the upper and lower wheels comprised in each end pair, bars J supported horizontally between the runs of the endwise opposite cables, hangers supported for swinging movements on said bars, a plurality of shelf-supports individually adjustably connected on said hangers, and shelves on pairs of the said shelf-supports.

16. In an apparatus of the character described, opposite end structures and cable-supporting wheels thereon, one of said cable-supporting wheels having a worm-wheel connected to rotate as one therewith, endless cables running around the upper and lower wheels comprised in each end pair, hangers supported for swinging movements by, and relatively to, the cables, shelves carried by and extending between the opposite hangers of each pair thereof, a support vertically adjustable on one of the end structures and having journals for a shaft which is carried thereby and which has a worm in mesh with the said worm-wheel.

17. In an apparatus of the character described, opposite end structures, each comprising a front and a rearwardly located column and means of transverse connection therefor, and cable-supporting wheels mounted for rotation on said end structures, and

one of said cable-supporting wheels having a worm-wheel connected to rotate as one therewith, endless cables running around the upper and lower wheels comprised in each end pair, hangers supported for swinging movements by, and relatively to, the cables, shelves carried by and extending between the opposite hangers of each pair thereof, transverse supporting-bar R having the clamp-collars r at the ends thereof to embrace the columns of one of the end structures, and means for effecting the confinement of said clamp-collars on said columns, and said bar having horizontal journal-bearings, a worm-shaft supported by and extended through said bearings and having a worm in mesh with the worm-wheel, and means for rotating the worm-shaft.

18. In an apparatus of the character described, opposite end structures, and cable-supporting wheels, one of said cable-supporting wheels having a worm-wheel connected to rotate as one therewith, endless cables and a plurality of shelves carried thereby, a shaft horizontally mounted at one end of the apparatus, and having a worm in mesh with the said worm-wheel, and a drum mounted on the worm-shaft, pawl-and-ratchet devices having intervening connections between the drum and the worm-shaft, a lever, and a cable connected with the lever and having a winding engagement about said drum.

19. In an apparatus of the character described, opposite end structures, and cable-supporting wheels, one of said cable-supporting wheels having a worm-wheel connected to rotate as one therewith, endless cables and a plurality of shelves carried thereby, a shaft horizontally mounted at one end of the apparatus, and having a worm in mesh with the said worm-wheel, and a drum mounted on the worm-shaft, pawl-and-ratchet devices having intervening connections between the drum and the worm-shaft, a lever, a cable, one portion of which is connected to said lever, and another portion thereof having a winding engagement about said drum, and a cable section having a winding engagement with said drum, and having a portion depending therebelow and carrying a weight.

20. In an apparatus of the character described, opposite end structures, and cable-supporting wheels, one of said cable-supporting wheels having a worm-wheel connected to rotate as one therewith, endless cables and a plurality of shelves carried thereby, a shaft horizontally mounted at one end of the apparatus, and having a worm in mesh with the said worm-wheel, a foot-lever and means actuated thereby for intermittently rotating the worm-shaft in a given direction, and a bracket or foot-support projecting from the one end structure at a place somewhat above the floor and adjacent the said foot-lev

21. In an apparatus of the character described, opposite end structures, and cable-supporting wheels, one of said cable-supporting wheels having a worm-wheel connected to rotate as one therewith, endless cables and a plurality of shelves carried thereby, a shaft horizontally mounted at one end of the apparatus, and having a worm in mesh with the said worm-wheel, and a device mounted on the worm-shaft and comprising a ratchet-wheel in non-rotatable engagement with the shaft and a rotatable drum-shell having a pawl pivoted thereon, and engaging said ratchet-wheel, a lever and a cable connected with said lever and having a winding engagement about said drum and means for exerting a retracting or reversing force on said drum.

22. In an apparatus of the character described, opposite end structures, and cable-supporting wheels, one of said cable-supporting wheels having a worm-wheel connected to rotate as one therewith, endless cables and a plurality of shelves carried thereby, a shaft horizontally mounted at one end of the apparatus, and having a worm in mesh with the said worm-wheel, and a device mounted on the worm-shaft and comprising a sleeve having a ratchet-wheel, in non-rotatable engagement with the shaft, and a drum-shell surrounding and rotative relatively to the said sleeve, and having a pawl pivoted thereon and engaging said ratchet-wheel of the sleeve, a foot-lever and a cable therewith connected and having a winding engagement about said drum.

23. In an apparatus of the character described, opposite end structures, and cable-supporting wheels, one of said cable-supporting wheels having a worm-wheel connected to rotate as one therewith, the endless cables and a plurality of shelves carried thereby, a shaft horizontally mounted at one end of the apparatus, and having a worm in mesh with the said worm-wheel, and a device mounted on the worm-shaft and comprising a sleeve having a rib-and-groove engagement with the worm-shaft, and removable therefrom, and endwise reversible relatively thereto, a ratchet-wheel provided on said sleeve, and a drum-shell rotative about the sleeve and having a pawl, pivoted thereon, and engaging said ratchet-wheel, a latch for retaining the sleeve and shell in place on the worm-shaft, a lever, and a cable connected with said lever and having a winding engagement about said drum, and means for exerting a retracting or reversing force on said drum.

24. In an apparatus of the character described, opposite supporting structures, upper and lower pairs of peripherally-recessed wheels rotatably mounted on each structure, endless cables provided to run around the wheels, and having buttons connected at intervals thereon, hangers arranged in opposite pairs and horizontal cross-bars having at their extremities, supporting connections

with buttons of the cable, and on which the hangers are supported, and an arc-shaped bar P having a supporting connection on each of said opposite structures, adjacent the lower wheels thereon, and in positions to serve as supporting-guards for the cable-buttons and equipments supported thereby at the time such parts have movements around the lower cable-wheels, and shelves carried on the hangers.

25. In an apparatus of the character described, opposite side columns comprising each a front and rearwardly located column, transverse column-uniting members having cable-wheels journaled on said uniting members, and said wheels being peripherally recessed, cables having buttons at intervals thereon, shelf-supporting hangers having supporting connection with buttons of the cable, arc-shaped transverse members P endwise provided with constrictive collars engaging about said columns, and means of confinement therefor, substantially as shown and for the purpose set forth.

26. In an apparatus of the character described, opposite end supporting structures, and peripherally-recessed cable-wheels thereon, endless cables, and a plurality of buttons each comprising a pair of facewise adjoined and separable sections, constructed in the proximate faces thereof with arc-shaped and endwise-alined grooves f^4, f^5, for receiving engagement of cable-bends therein, and means for connecting the button-sections in their embracing engagements about the cable.

27. In an apparatus of the character described, opposite end structures and cable-wheels rotatably mounted thereon and constructed with recesses or notches e in their peripheries, cables having buttons connected at intervals thereon, headed rods e' extending horizontally through and inwardly beyond the buttons, tubular bars J within the end portions of which said rods enter, means for confining the buttons, rods and tubular bars in their engaged relations, hangers supported by said tubular bars and shelves carried by said hangers.

Signed by me at Springfield, Massachusetts, in presence of two subscribing witnesses.

EVERETT W. WILCOX.

Witnesses:

WM. S. BELLOWS,

G. R. DRISCOLL.