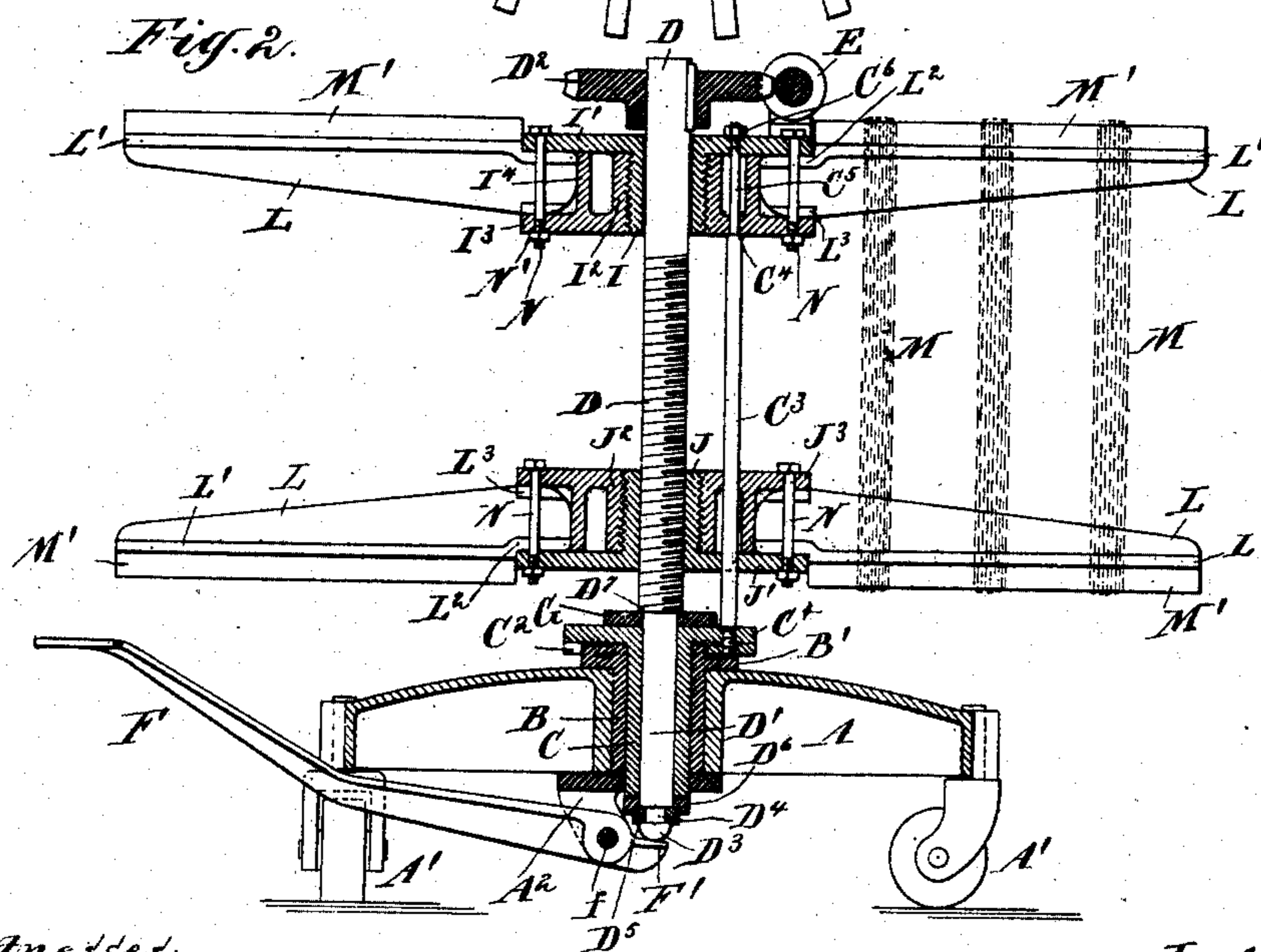


C. H. KNAPP.
STRETCHING MACHINE.
APPLICATION FILED SEPT. 4, 1907.

2 SHEETS—SHEET 1.



L. M. Lewis.
B. Petersen.

Charles H. Knapp.
by his attorney,
Charles R. Steele.

UNITED STATES PATENT OFFICE.

CHARLES H. KNAPP, OF PATERSON, NEW JERSEY.

STRETCHING-MACHINE.

No. 907,247.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, CHARLES H. KNAPP, a citizen of the United States, residing in the city of Paterson, county of Passaic, and State of New Jersey, have invented certain new and useful Improvements in Stretching-Machines, of which the following is a specification.

The invention relates to apparatus for holding freshly dyed or otherwise dampened skeins of silk strongly stretched for the purpose of imparting to the filaments a peculiar gloss or "luster" produced by the intense strains due to the shrinkage of the silk, while thus held, during the drying operation.

The object of the invention is to provide a machine in which the skeins may be conveniently applied and removed, constructed to resist successfully the strains to which it is subjected and to permit the easy removal and replacement of parts most likely to be broken, and which shall occupy but little space in the drying-room and be easily shifted in position therein.

The invention consists in certain novel features, arrangement of parts and details of construction by which the above objects are attained, to be hereinafter described.

The accompanying drawings form a part of this specification and show the invention as it has been carried out in practice.

Figure 1 is a plan or top view of the machine. Fig. 2 is a corresponding vertical section partly in elevation. Fig. 3 is a partial plan view and horizontal section, on a larger scale, of the upper spider-frame, with the arms of which the upper ends of the skeins are engaged. Fig. 4 is a corresponding vertical section. Fig. 5 is a similar section through the lower spider-frame. Fig. 6 is a side elevation showing the inner end of one of the radial arms. Fig. 7 is a corresponding plan view. Fig. 8 is a vertical transverse section of the same, on the line 8—8 in Fig. 6. Fig. 9 is a vertical section on a reduced scale showing the locking means for holding the spider-frames against revolving. Figs. 10 and 11 are views showing the adjacent faces of the flanges composing such locking means. Fig. 12 is a face view of a split-washer employed to receive the weight of the spider-frames.

Similar letters of reference indicate the same parts in all the figures.

A is a truck, shown as rectangular in plan view, mounted on casters A^1 A^1 and having

a central boss in which is fixed a vertical bushing B receiving a revoluble sleeve C serving as a socket for a reduced plain cylindrical portion D^1 at the lower end of a vertical screw-shaft D. On the upper end of the bushing B is a flange B^1 having recess b in its upper face receiving corresponding lugs or swells C^2 on the under face of a flange C^1 on the socket-sleeve C and serving to lock the latter to the bushing, except when separated therefrom by a vertical movement, as will be described.

On the screw-shaft are two spider-frames one above the other, each comprising a hub with horizontally extending radial arms. The lowermost hub is screw-threaded to match to the threads on the screw-shaft and be raised or lowered by rotating the latter, while the upper hub is simply bored to receive and be supported laterally by the upper end of the screw-shaft which extends therethrough. The spider-frames are held against rotation relatively to each other by stiff rods or standards C^3 firmly set in the thick portions formed by the lugs C^2 of the flange C^1 and extending vertically through guide-openings in the lower hub, to the under face of the upper where they are reduced to form supporting shoulders C^4 , sustaining the stationary upper frame which is secured by nuts C^6 to the screw-threaded ends of the reduced extensions C^5 thus produced.

Keyed to the protruding upper end of the screw-shaft D is a worm-wheel D^2 engaged by a worm E mounted in bearings on the upper hub and revolved by a crank E^1 . Motion thus communicated to the screw revolves the latter in the spider-frames and correspondingly moves the lower frame toward or from the upper or relatively stationary frame. Skeins of silk, as indicated at M M in Figs. 1 and 2, applied on corresponding arms on the upper and lower frames respectively are thus stretched, and held strongly extended during the drying operation.

F is a foot-lever fulcrumed at f to a bracket A^2 on the under face of the truck A. It has a toe F^1 in contact with a semi-spherical bearing surface D^3 joined to the lower end D^1 of the screw-shaft D by a neck D^4 and through a divided washer D^5 and recessed ring D^6 transmits the lifting force of the toe F^1 to the screw and to the socket-sleeve C; by depressing the foot-lever the screw and sleeve with the frames are elevated suffi-

ciently to disengage the lugs C^2 from the recesses in the bushing B. Thus conditioned the frames, screw, and socket-sleeve may be rotated as a whole, and the attendant may
 5 supply the skeins to the arms as the latter are successively presented in vertical pairs, the removal of the dried and stretched skeins being similarly conducted.

The weight of the revolving portions of the machine is preferably received on a washer G interposed between the shoulder D^7 on the screw-shaft and the upper face of the sleeve C to relieve the latter from wear; and to permit the washer when worn to be easily re-
 10 moved and a new one substituted, it is made in two semi-annular halves held together by screws G^1 . The divided washer D^5 , above mentioned and performing a similar function at the lower end of the screw-shaft may be
 15 understood to be similarly constructed.

So far as described the radial arms and hub composing each spider-frame may be portions of a single casting and this construction may be employed if preferred, but as experiment has demonstrated that fracture of the arms or other parts is likely to occur by reason of the excessive strains developed by the stretched silk in shrinking during the drying operation I prefer to make the hub a built-up
 25 structure and mount the arms removably therein so that a broken arm may be easily replaced by a new one. The upper hub comprises a central sleeve I smoothly-bored on the interior, screw-threaded exteriorly and
 30 having a wide horizontal annular flange I^1 on the upper end, and a sleeve I^2 screw-threaded interiorly to match to and inclose the sleeve I, and having on its lower end an annular flange I^3 corresponding in diameter to the
 35 flange I^1 . The flange I^3 is strengthened by a concentric rib I^4 surrounding the sleeve I^2 and connected thereto by radial ribs I^5 , and by curved ribs I^6 extending from the exterior of the concentric, or annular, rib to the flange,
 40 as shown. The lower hub is essentially a counter-part of the upper but reversed to resist upward strains to which it is subjected by its arms. It has an exterior sleeve J^2 screw-threaded, flanged and braced similarly
 45 to the sleeve I^2 and an interior sleeve J screw-threaded exteriorly to match to the sleeve J^2 and carrying an annular flange J^1 , but is screw-threaded interiorly to serve as a traveling nut on the screw D. Both flanges in
 50 both hubs are drilled as at i j to receive the struts or standards C^3 , the openings in the upper hub being smaller to receive the screw-threaded extensions C^5 as before described. The arms L are the same for both hubs but
 55 are applied in reverse positions vertically, as shown, with their inner ends received between the flanges of their respective hubs. Each comprises a deep fin having a flanged head L^1 extending longitudinally thereof
 60 throughout the main portion of its length

and preferably slightly grooved to receive round bars M^1 of wood on which the skeins M are placed to prevent damage to the latter through contact with the metal of the arms.

L^2 L^3 are flanges on the inner ends of the arms, presenting their flat faces to the inner
 70 faces of the flanges I^1 I^3 and J^1 J^3 between which they are received, and tapered on the side edges to match each to its neighbor, and the inner ends of the fins are rounded to
 75 match to the ribs I^6 J^6 against which they rest. The arms are held against movement in the direction of their lengths by bolts N extending through the flanges I^1 I^3 and J^1 J^3
 80 near their peripheries, between each adjacent pair of arms, the flanges L^2 L^3 of which are provided with semi-circular notches l to receive and engage them. The bolts N, secured by nuts N^1 also serve to resist strains
 85 tending to separate the hub-flanges. Thus constructed any arm may be withdrawn radially by removing the bolts N by which it is locked, and a new one substituted and held.

By mounting the spider-frames on the wheeled truck A the machine may be readily
 90 changed in position as desired to conform to conditions in the drying room, and the revolvability of the frames permits the machine to be easily loaded or unloaded, as may be done
 95 by an attendant standing in a comparatively cool position at the open door of the room, thus avoiding the necessity of removing the machine therefrom in performing these operations.

The built-up hubs are strong and if parts thereof fail they may be easily replaced; and the removability of the arms permits the easy substitution of a new one in case of fracture.

I claim:—

1. In a machine of the character set forth, two spider frames each comprising a hub and radial arms, a support therefor, means on the one frame engaging means on the shaft of the other for moving such frames toward and
 110 from each other, and means for preventing relative rotation of said frames.

2. In a machine of the character set forth, two spider frames each comprising a hub and radial arms, a support therefor, means on the
 115 one frame engaging means on the shaft of the other for moving such frames toward and from each other, and means for preventing relative rotation of said frames and for sustaining the upper frame.

3. In a machine of the character set forth, two spider frames each comprising a hub and radial arms, a support therefor, means on the one frame engaging means on the shaft of the
 120 other for moving such frames toward and from each other, means for preventing relative rotation of said frames and for sustaining the upper frame, and means for bodily raising said frames and their connecting
 125 means.

4. In a machine of the character set forth, two spider frames each comprising a hub and radial arms, a support therefor, means on the one frame engaging means on the shaft of the other for moving such frames toward and from each other, means connected with one of the hubs and loosely received through the other and constructed to sustain the latter, and means for bodily raising the said frames and their connecting means.

5. In a machine of the character set forth, two spider frames each comprising a hub and radial arms, a support therefor, means on the one frame engaging means on the shaft of the other for moving such frames toward and from each other, means connected with one of the hubs and loosely received through the other and constructed to sustain the latter, means for bodily raising the said frames and their connecting means, and vertically separable means for permitting said frames and their rotating means to rotate as a whole.

6. In a machine of the character set forth, two spider-frames, each comprising a hub and radial arms, a screw-shaft extending loosely through one of said hubs and engaged in screw threads in the other, means for supporting one of said frames and holding both against revolving relatively to each other, a bodily movable lower support for said shaft and means for turning said screw-shaft.

7. In a machine of the character set forth, two spider-frames located one above the other, each comprising a hub and radial arms, a screw-shaft extending loosely through the upper hub and engaged in screw threads in the lower hub, a bodily movable lower support for said shaft means for holding said upper frame stationary relatively to said lower, and means carried by said upper hub and engaging said screw-shaft for turning the latter.

8. In a machine of the character set forth, two spider-frames located one above the other, each comprising a hub and radial arms, means for holding said upper frame stationary relatively to the lower, a screw-shaft extending loosely through the upper hub and engaged in screw threads in the lower hub, a bodily movable lower support for said shaft a worm-wheel on the upper end of said shaft and a worm carried by said upper hub and engaged with said worm-wheel.

9. In a machine of the character set forth, two spider-frames located one above the other, each comprising a hub and radial arms, a screw-shaft extending loosely through the upper hub and engaged in screw threads in the lower hub, a bodily movable lower support for said shaft standards secured in said upper hub and extending loosely through said lower hub, and means carried by said upper hub and engaging said screw-shaft for turning the latter.

10. In a machine of the character set forth, two spider-frames and means for mov-

ing them toward and from each other, embodying a screw shaft and a bodily-movable lower support therefor each of said frames comprising a hub having annular flanges thereon, and a series of arms detachably received between said flanges means for preventing relative rotation of said frames and sustaining the upper frame.

11. In a machine of the character set forth, two spider-frames and means for moving them toward and from each other, embodying a screw shaft and a bodily-movable lower support therefor each of said frames comprising a hub having annular flanges thereon, a series of radial arms having their ends received between said flanges, and bolts extending through said flanges and engaged with said arms to hold the latter detachably to said hub means for preventing relative rotation of said frames and for sustaining the upper frame.

12. In a machine of the character set forth, two spider-frames and means for moving them toward and from each other, each of said frames comprising a hub having annular flanges thereon, a series of radial arms having their ends received between said flanges, notches on the adjacent faces of each pair of arms and bolts extending through said flanges and notches to hold said arms detachably engaged with said flanges.

13. In a machine of the character set forth, a spider-frame comprising an inner sleeve screw-threaded exteriorly and having an annular flange, an outer sleeve screw-threaded interiorly to engage said inner sleeve, and having an annular flange, a series of radial arms received between said flanges and abutted against said outer sleeve, and means extending through said flanges and engaged with said arms to hold the latter detachably to said flanges.

14. In a machine of the character set forth, two spider-frames located one above the other, each comprising a hub and radial arms, a screw-shaft extending loosely through the upper hub and engaged in screw threads in the lower, a revoluble socket-sleeve receiving the lower end of said shaft, standards on said socket-sleeve extending loosely through said lower hub and fastened to said upper hub, and means for engaging said upper hub with said screw-shaft to revolve therewith, whereby said screw-shaft, socket-sleeve and frames rotate together.

15. In a machine of the character set forth, two spider-frames located one above the other, each comprising a hub and radial arms, a screw-shaft extending loosely through the upper hub and engaged in screw threads in the lower, a socket-sleeve receiving the lower end of said shaft, a fixed bushing inclosing said socket-sleeve, locking means between said bushing and socket-sleeve, standards on the latter extending

loosely through said lower hub and fastened to said upper hub, means for engaging said upper hub with said screw-shaft to revolve therewith, and means for unlocking said socket-sleeve and bushing, whereby said screw-shaft and socket-sleeve are conditioned for rotation in said bushing.

16. In a machine of the character set forth, two spider-frames located one above the other, each comprising a hub and radial arms, a screw-shaft extending loosely through the upper hub and engaged in screw threads in the lower, a socket-sleeve receiving the lower end of said shaft, a fixed bushing inclosing said socket-sleeve, locking-lugs on said socket-sleeve engaged with recesses in said bushing, standards on said socket-sleeve extending loosely through said lower hub and fastened to said upper hub, means for engaging said upper hub with said screw-shaft to revolve therewith, and a lever constructed to raise said screw-shaft and socket-sleeve and free said locking-lugs from said recesses, whereby said screw-shaft and socket-sleeve are conditioned for rotation in said bushing.

17. In a machine of the character set

forth, two spider-frames located one above the other, each comprising a hub and radial arms, a screw-shaft extending loosely through the upper hub and engaged in screw threads in the lower, a wheeled truck, a boss therein, a bushing fixed in said boss, a socket-sleeve inclosed by said bushing and receiving the lower end of said shaft, locking-lugs on said socket-sleeve engaged with recesses in said bushing, standards on said socket-sleeve extending loosely through said lower hub and fastened to said upper hub, means engaging said upper hub with said screw-shaft to revolve therewith, and a lever pivoted on said truck and constructed to raise said screw-shaft and socket-sleeve to free said lugs from said recesses, whereby said screw-shaft and socket-sleeve are conditioned for rotation in said bushing.

In testimony that I claim the invention above set forth I affix my signature, in presence of two witnesses.

CHARLES H. KNAPP.

Witnesses:

HENRY POELSTRA,

CORNELIUS A. KERSHUEK.