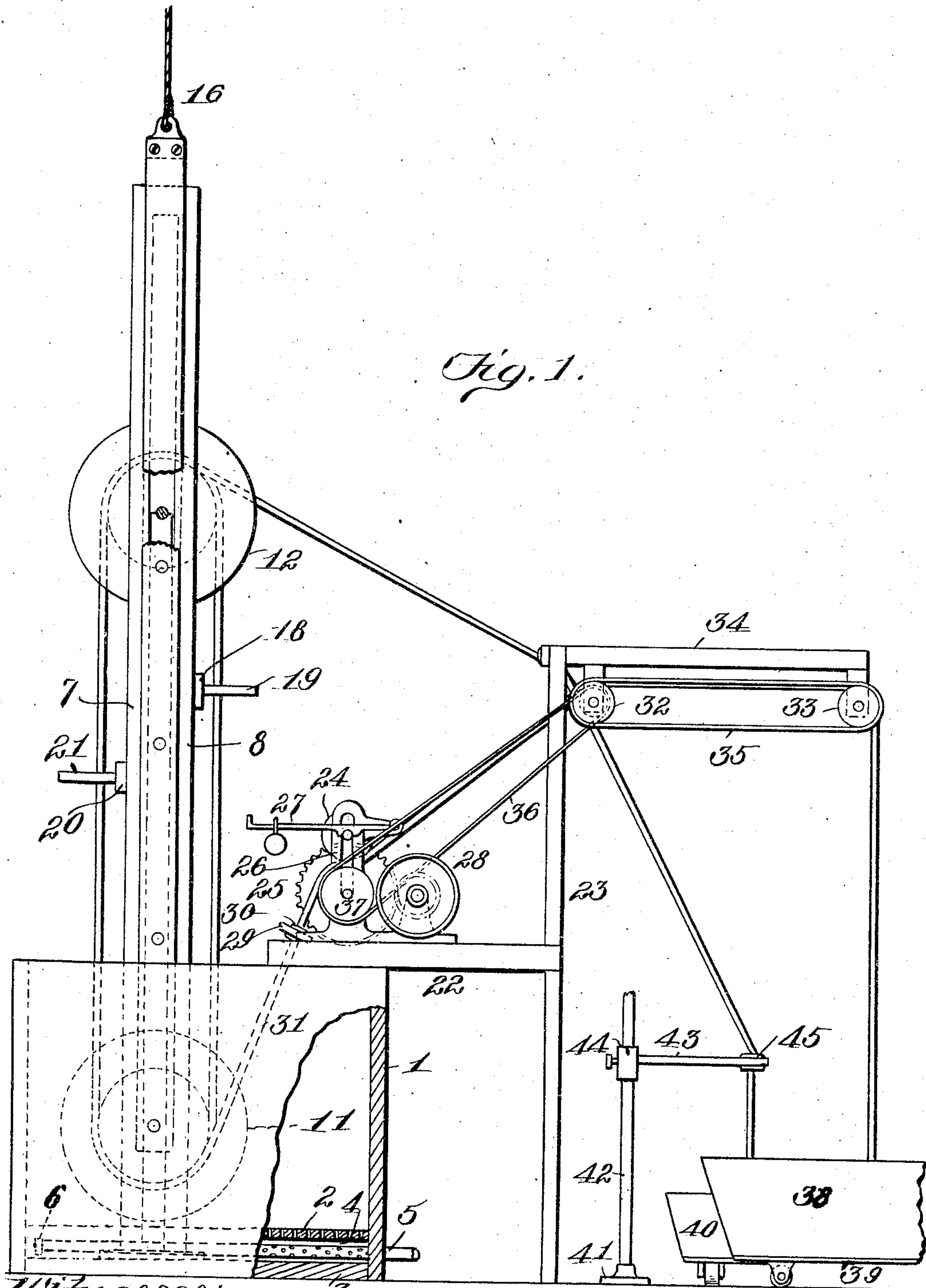


No. 785,597.

PATENTED MAR. 21, 1905.

T. E. DAVIS.
WARP DYEING MACHINE.
APPLICATION FILED MAY 17, 1904.

3 SHEETS—SHEET 1.



Witnesses:
C. S. Hester
James L. Norris, Jr.

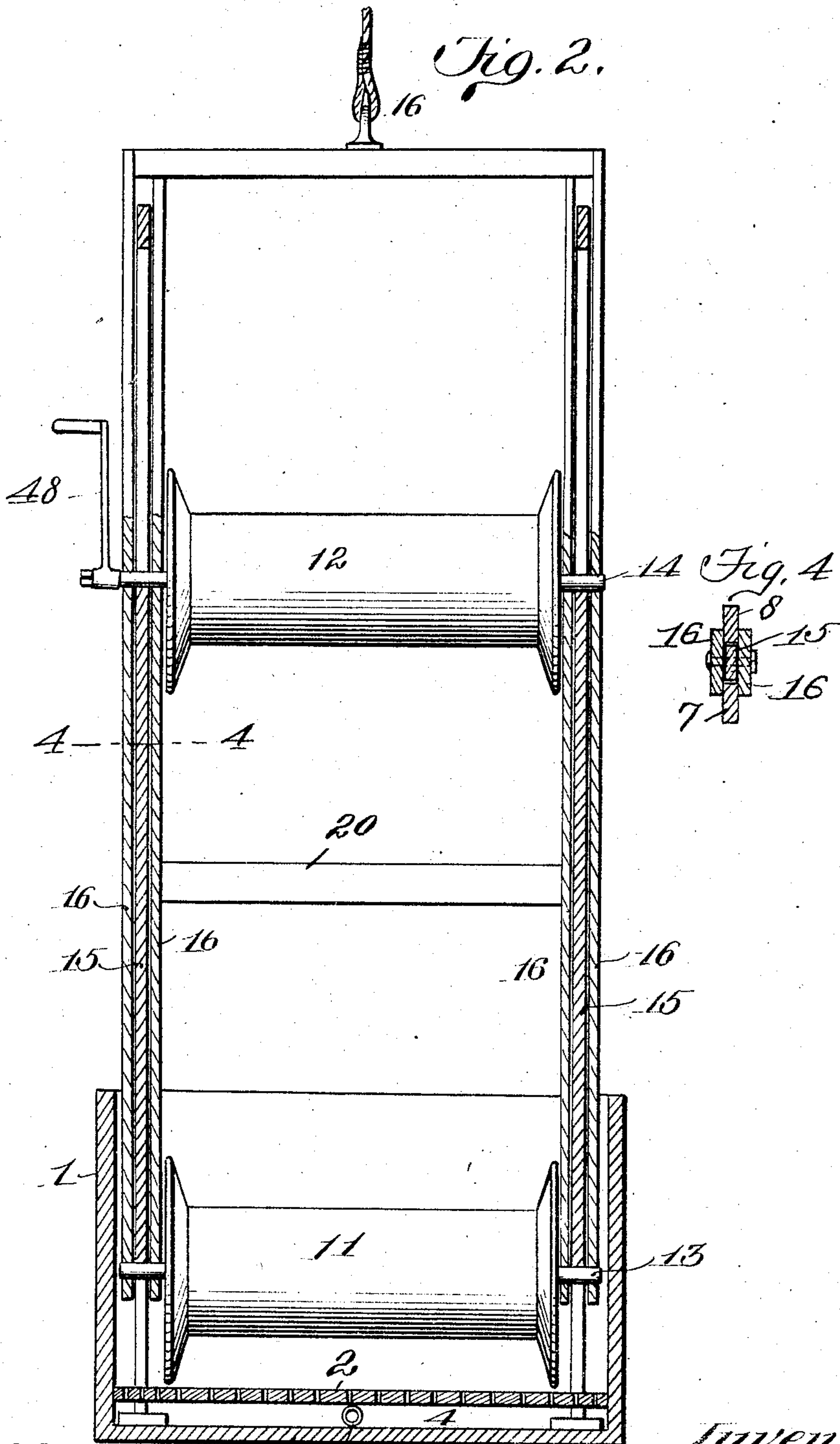
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3 SHEETS—SHEET 2.



Witnesses
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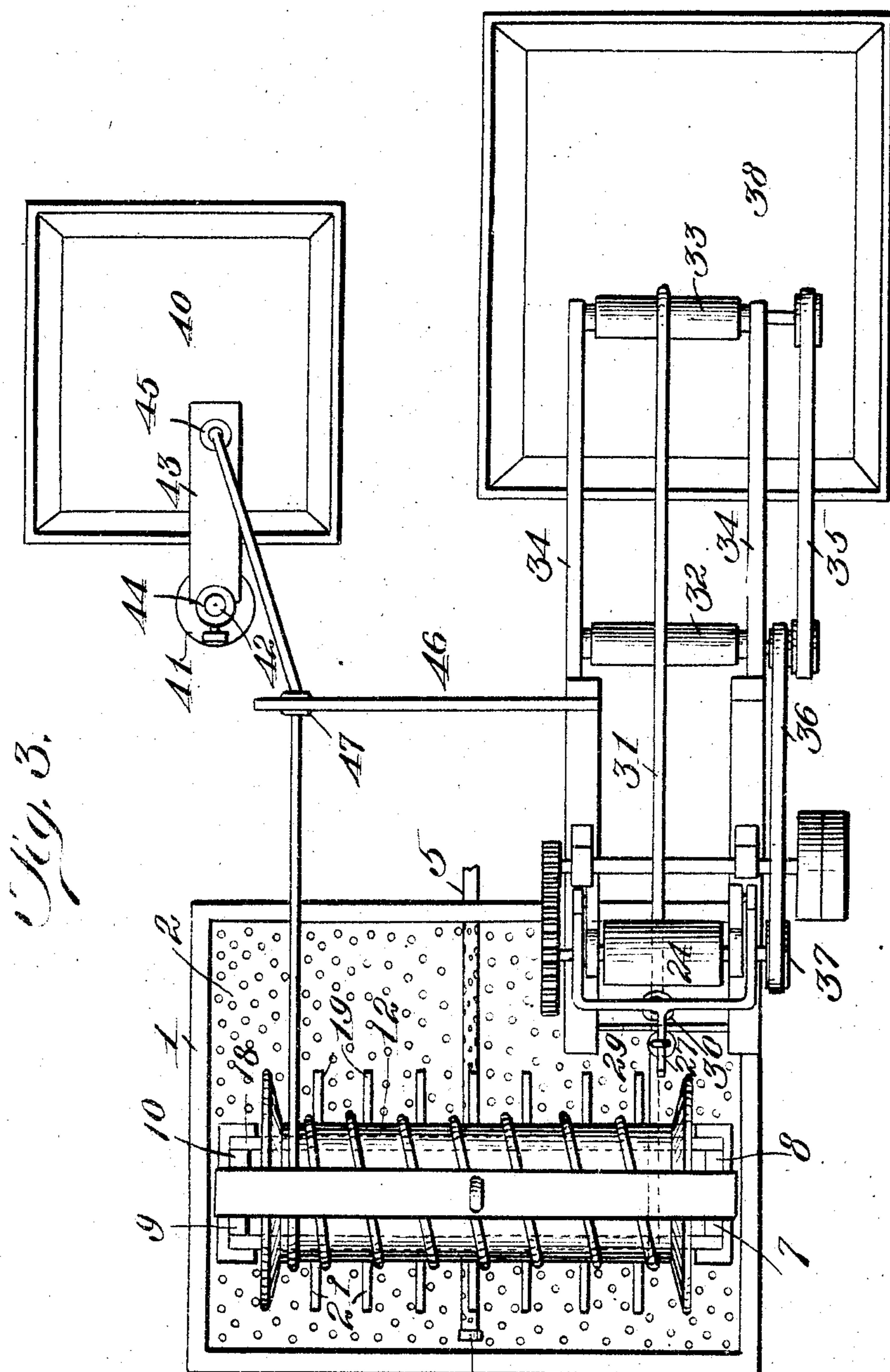
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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

THEODORE E. DAVIS, OF WINSTON SALEM, NORTH CAROLINA.

WARP-DYEING MACHINE.

SPECIFICATION forming part of Letters Patent No. 785,597, dated March 21, 1905.

Application filed May 17, 1904. Serial No. 208,411.

To all whom it may concern:

Be it known that I, THEODORE E. DAVIS, a citizen of the United States, residing at Winston Salem, in the county of Forsyth and State of North Carolina, have invented new and useful Improvements in Dyeing-Machines of the Class for Dyeing Warp, of which the following is a specification.

This invention relates to dyeing-machines of the class for dyeing warp.

The object of the invention is to provide a machine for dyeing warp which is so constructed as to permit of dyeing a large amount of warp at one time, to reduce the tension on the warp to a minimum, to prevent tension on the warp during the dyeing operation, to obtain the necessary oxidation of the warp during the dyeing operation, to keep the dye-bath at a regular temperature throughout the run, and to produce even shades in the finished product, thereby overcoming the great difficulty in matching one warp with another.

The invention further aims to construct a machine for dyeing warp various colors, as sulfur-blacks, cutch-brown, anilin-blues, &c., and which shall be simple in construction, strong, durable, efficient in its use, and comparatively inexpensive to set up.

With the foregoing and other objects in view the invention consists of the novel combination and arrangement of parts hereinafter more specifically described, illustrated in the accompanying drawings, and particularly pointed out in the claims hereunto appended.

In describing the invention in detail reference is had to the accompanying drawings, forming a part of this specification, wherein—

Figure 1 is a side elevation of the machine. Fig. 2 is a front elevation. Fig. 3 is a top plan view, and Fig. 4 is a section on the line 4 4 of Fig. 2.

Referring to the drawings by reference characters, 1 denotes a dye-liquor receptacle or kettle which is open at its top and provided with a perforated false bottom 2, arranged above the imperforate bottom 3 of the receptacle, so as to form an auxiliary dye-liquor-receiving chamber 4, and into the said chamber 4 extends the perforated steam-heat-

ing pipe 5, having its inner end closed, as at 6. The dye liquor is run into the receptacle 1 in any suitable manner.

Suitably secured to the inner face of the sides of the receptacle 1 is a frame consisting of two pairs of standards, one pair being designated by the reference characters 7 8 and the other pair by the reference characters 9 10. Each pair of the standards is suitably spaced apart, so as to form an opening to permit of adjusting the warp-reels, to be hereinafter referred to. The standards 7, 8, 9, and 10 are suitably connected together at their tops.

The reference character 11 denotes the lower warp-reel, and the reference character 12 denotes the upper warp-reel. The reel 11 is mounted upon a shaft 13, and the reel 12 is mounted upon the shaft 14. The shafts 13 and 14 project from each end of the reels 11 and 12, and the said reels are separated and spaced apart through the medium of spacing-bars 15, arranged within the openings formed between the standards 7, 8, 9, and 10. The reels 11 and 12 are not vertically adjustable with respect to each other, but are retained a suitable distance apart through the medium of the spacing-bars 15; but the reels 11 and 12 are vertically movable together simultaneously. The manner in which this operation is obtained will be hereinafter referred to. The spacing-bars 15 at their tops support the shaft 14 of the reel 12 and at their bottoms rest upon the shaft 13 of the reel 11. The spacing-bars 15 are not as wide as the openings between the standards 7, 8, 9, and 10, thereby permitting of said bars being vertically adjusted in a manner as hereinafter set forth. Secured to each side of each of the bars 15 is a vertically-extending as well as vertically-movable lifting-bar 16, and the said bars are wider than the openings between the standards 7, 8, 9, and 10 and are provided with openings to receive the projecting ends of the shafts 13 and 14. The bars 16 act as bearings for the shafts 13 and 14. The lifting-bars 16 at their tops are connected to a suitable hoisting device, as at 17, and when the said hoisting device is operated it will either elevate or lower the bars 16, carrying thereby the reels 11 and 12 and the bars 15. In Fig. 4 is shown

a pair of standards, a spacing-bar, and a pair of lifting-bars arranged with respect to each other. The reel 11 is adapted when the machine is operated to be arranged within the receptacle 1 and is elevated out of said receptacle 1 when occasion requires through the medium of the vertical movement of the lifting-bars 16, said vertical movement of the lifting-bars 16 being obtained when the hoisting device is operated. When the reel 11 is vertically moved, the reel 12 will be simultaneously moved therewith, or, in other words, the two reels are moved in a vertical direction simultaneously.

Secured to one side of the standards 8 10 is a supporting-bar 18, carrying the guide-pins 19, and secured to one side of the standards 7 9 is a supporting-bar 20, carrying the guide-pins 21. Preferably the guide-pins 21 are arranged above the guide-pins 19, and the said pins 19 and 21 are used for guiding the warp during the dyeing operation, or rather the reeling off of the warp when the machine is operated. The pins 19 and 21 not only guide the warp, but act as a spacing means therefor during the dyeing operation, so that the warp will be retained a suitable distance apart when the reeling operation is taking place.

The reels 11 and 12 are preferably constructed of wood and are spaced apart in such a manner that the tension upon the warp as it is being reeled off is reduced to a minimum.

The machine is provided with a combined warp-drawing and compressing device, and said device is arranged at one side of the receptacle 1, at the front thereof, and is mounted upon the platform 22, which projects part way over the top of the receptacle 1. The said platform 22 is supported upon the top of the receptacle 1 and by the supporting-frame 23. The combined warp drawing and compressing device consists of upper and lower compressor-rolls 24 and 25, respectively, which are mounted in the bearing-standards 26, the roll 24 being provided with means for retaining it in close proximity to the roll 25, and said means consists of a counterweighted lever 27, which bears upon the shaft of the upper roll 24. The shaft of the roll 25 is geared with a driving device of any suitable construction, as indicated by the reference character 28. Upon the platform 22 at the front of the lower roll 25 is arranged a suspension device 29, carrying a guiding-eye 30 for the warp 31 as it leaves the lower reel 11. The guiding-eye 30 is preferably constructed of porcelain. The rolls 24 25 perform two functions. They not only draw off or cause the reeling off of the warp 31 from the reels 11 and 12, but also squeeze the warp, so as to remove the dye liquor, and said surplus dye liquor is discharged back into the receptacle 1. Although element 22 is referred to as a platform, it is formed of two separate sections suitably

spaced apart, so that the surplus dye liquor when expressed from the warp will fall into the receptacle 1. Arranged in suitable relation with the combined warp drawing and compressing device is a pair of conveyer-rolls 32 and 33, carried by a pair of suspension-arms 34, supported by the frame 23. The rolls 32 and 33 are arranged a suitable distance above the combined warp drawing and compressing device and are connected together by the endless band 35, so as to cause the said rolls to simultaneously rotate, and the roll 32 is operated through a driving-belt 36, connected with said roll 32 and with a disk 37, carried by the shaft of the lower compressor-roll 25. Arranged below the rolls 32 and 33 is a receiving-tank 38 for the warp, and said tank is mounted upon a transferring-truck 39.

The reference character 40 denotes the warp-truck adapted to contain the warp to be dyed, and when the machine is in operation the truck is arranged at the front thereof, and at the position where the truck 40 is arranged an adjustable guide for the warp as it leaves the truck 40 is provided, and said guide consists of a base 41, carrying an upwardly-extending rod 42, upon which is mounted an arm 43, provided with an adjustable collar 44 to permit of vertically adjusting said arm 43 upon said rod 42. The arm 43 is provided with an eye 45, preferably constructed of porcelain. As the warp leaves the truck 40 the arm 43 is lowered. Another warp-guide is provided, which consists of a bar 46, having an eye 47, preferably of porcelain. The bar 46 is arranged at the front of the machine below the reel 12 when the latter is in its operative position. The eye 47 tends to guide the warp upon the reel 12, at one side thereof, as the warp enters the machine to be dyed.

The operation of the machine is as follows: A leader is passed through the eye 47, and the reels 11 and 12 are suitably filled with the leader. The proper spacing of the leader is obtained through the medium of the guide-pins 19 and 21. This operation is done when the reels 11 and 12 are elevated, so as to be out of the receptacle 1. The rolls 11 and 12 are then simultaneously lowered, so that the reel 11 will be within the receptacle 1. The warp to be dyed is connected to one end of the leader and the other end of the leader is passed between the compressor-rolls 24 25. The filling of the reels 11 and 12 with the leader is done through the medium of a crank 48, carried by the shaft 14. The dye liquor is then run into the receptacle 1 and retained at its proper temperature through the medium of the steam-pipe 5. The combined warp drawing and compressing device is then operated which, as it draws the leader, will cause the reels to turn and the rolls 24 and 25 will express the liquid out of the warp into the receptacle 1. As the warp leaves the rolls 24 and 25 it will be carried up and over the rolls

32 and 33 and be discharged into the receptacle 28.

One of the advantages of a dyeing-machine constructed in accordance with the foregoing description is that when dyeing with sulfur colors from one to two hundred feet of the warp is in the dye-vat at one time. By the employment of the reels as set forth, one of which is immersed in the dye liquor, the warp is compelled to travel around said reels eight or more times and passes in and out of the dye liquor, and as the warp is raised high in the air it will oxidize before the dye liquor is pressed out, thereby giving the coloring-matter time to properly fix before being exposed to the air, prevent too sudden surplus precipitation, and produce deep jet-blacks in two or three runs. Another advantage of the machine is that by the employment of the steam-pipe in the manner as set forth a regular temperature of the dye-bath is maintained without injury to the warp, thereby producing colors at less cost. Another advantage is that the tension upon the warp is reduced to a minimum. Consequently when the warp leaves the dyeing-machine it is soft and elastic. A further advantage is that the compressor-rolls are not arranged within the dye-liquor receptacle, and consequently the reels 11 and 12 can be removed when occasion requires, and, furthermore, as the reels 11 and 12 are constructed of wood and have the guide-pins cooperating therewith wraps, breaks, and tangles are prevented.

By the employment of the machine in the manner as set forth the exact quantity of water and dyestuff is not so essential, as none of the coloring-matter is precipitated and thrown down. Thus when operating upon the warp glossy blacks are obtained with great saving both in dyestuffs and labor. By the employment of the machine the dye-bath is easily kept in solution, thereby producing even shades and overcoming the great difficulty in matching one warp with another. In this particular it is only necessary to observe the per cent. of dyestuff for each hundred pounds of warp, the quality of water not being considered at all.

It is thought the many advantages of my improved warp-dyeing machine can be readily understood from the foregoing description, taken in connection with the accompanying drawings, and it will furthermore be evident that changes, variations, and modifications can be resorted to without departing from the spirit of my invention or sacrificing any of its advantages, and I therefore do not wish to restrict myself to the details of construction hereinbefore described, and set forth in the annexed drawings, but reserve the right to make such changes, variations, and modifications as come properly within the scope of the protection prayed.

Having thus fully described my invention,

what I claim as new, and desire to secure by Letters Patent, is—

1. A warp-dyeing machine having a stationary frame, a pair of warp-reels, means arranged in said frame for spacing said reels apart, means connected to said spacing means for vertically adjusting said reels simultaneously, said spacing means movable in unison with said vertically-movable means, and guide-pins secured to each side of the frame and cooperating with said reels.

2. A warp-dyeing machine including a dye-liquor receptacle, a stationary frame extending upwardly therefrom, a pair of bodily and vertically movable warp-reels slidably supported within said frame, means disconnected from the frame and adapted when operated to vertically and bodily move said reels, a combined warp drawing and compressing device, and guide and spacing pins carried by the frame.

3. A warp-dyeing machine including a dye-liquor receptacle, a stationary frame extending upwardly therefrom, a pair of bodily and vertically movable warp-reels slidably supported within said frame, means disconnected from the frame and adapted when operated to vertically and bodily move said reels, a combined warp drawing and compressing device, guide and spacing pins carried by the frame, and a guide for said device.

4. A warp-dyeing machine including a dye-liquor receptacle, a stationary frame extending upwardly therefrom, a pair of bodily and vertically movable warp-reels slidably supported within said frame, means disconnected from the frame and adapted when operated to vertically and bodily move said reels, a combined warp drawing and compressing device, guide and spacing pins carried by the frame, a guide for said device, and a warp-feeding guide arranged in suitable relation to one of said reels.

5. A warp-dyeing machine including a dye-liquor receptacle, a stationary frame extending upwardly therefrom, a pair of bodily and vertically movable warp-reels slidably supported within said frame, means disconnected from the frame and adapted when operated to vertically and bodily move said reels, a combined warp drawing and compressing device, guide and spacing pins carried by the frame, a guide for said device, a warp-feeding guide arranged in suitable relation to one of said reels, and a conveying means cooperating with said device.

6. A warp-dyeing machine including a dye-liquor receptacle, a stationary frame extending upwardly therefrom, a pair of bodily and vertically movable warp-reels slidably supported within said frame, means disconnected from the frame and adapted when operated to vertically and bodily move said reels, a combined warp drawing and compressing device, guide and spacing pins carried by the frame,

a guide for said device, a warp-feeding guide arranged in suitable relation to one of said reels, a conveying means cooperating with said device, and an adjustable warp-feeding guide cooperating with said first-mentioned warp-feeding guide.

7. A warp-dyeing machine including a dye-liquor receptacle having a perforated false bottom, a heating-medium feed-pipe extending in said receptacle below said false bottom, an upwardly-extending frame secured to said receptacle, a pair of reels mounted in said frame, a pair of spacing-bars for said reels, means connected with the spacing-bars and when operated adapted to bodily and vertically move said reels, said spacing-bars and vertically-adjustable means moving in unison, said means acting as a bearing for said reels, and a warp-drawing means cooperating with the reels.

8. A warp-dyeing machine including a dye-liquor receptacle having a perforated false bottom, a heating-medium feed-pipe extending in said receptacle below said false bottom, an upwardly-extending frame secured to said receptacle, a pair of reels mounted in said frame, a pair of spacing-bars for said reels, means connected with the spacing-bars and adapted when operated to bodily and vertically move said reels, said spacing-bars and vertically-adjustable means moving in unison, said means acting as a bearing for said reels, and a combined warp drawing and compressing means cooperating with said reels.

9. A warp-dyeing machine including a dye-liquor receptacle having a perforated false bottom, a heating-medium feed-pipe extending in said receptacle below said false bottom, an upwardly-extending frame secured to said receptacle, a pair of reels mounted in said frame, a pair of spacing-bars for said reels, means connected with the spacing-bars and adapted when operated to bodily and vertically move said reels, said spacing-bars and vertically-adjustable means moving in unison, said means acting as a bearing for said reels, a combined warp drawing and compressing means cooperating with said reels, and a plurality of combined warp guiding and spacing pins secured to each side of said frame.

10. A warp-dyeing machine including a dye-liquor receptacle having a perforated false bottom, a heating-medium feed-pipe extending in said receptacle below said false bottom, an upwardly-extending frame secured to said receptacle, a pair of reels mounted in said frame, a pair of spacing-bars for said reels, means connected with the spacing-bars and adapted when operated to bodily and vertically move said reels, said spacing-bars and vertically-adjustable means moving in unison, said means acting as a bearing for said reels, a combined warp drawing and compressing means cooperating with said reels, a plurality of combined warp guiding and spacing pins secured

to each side of said frame, and a warp-feeding guide carried by said frame cooperating with one of said reels.

11. A warp-dyeing machine including a dye-liquor receptacle having a perforated false bottom, a heating-medium feed-pipe extending in said receptacle below said false bottom, an upwardly-extending frame secured to said receptacle, a pair of reels mounted in said frame, a pair of spacing-bars for said reels, means connected with the spacing-bars and adapted when operated to bodily and vertically move said reels, said spacing-bars and vertically-adjustable means moving in unison, said means acting as a bearing for said reels, a combined warp drawing and compressing means cooperating with said reels, a plurality of combined warp guiding and spacing pins secured to each side of said frame, a warp-feeding guide carried by said frame cooperating with one of said reels, and a warp-guiding means cooperating with said device.

12. A warp-dyeing machine including a dye-liquor receptacle having a perforated false bottom, a heating-medium feed-pipe extending in said receptacle below said false bottom, an upwardly-extending frame secured to said receptacle, a pair of reels mounted in said frame, a pair of spacing-bars for said reels, means for bodily and vertically moving said reels, said spacing-bars and vertically-adjustable means moving in unison, said means acting as a bearing for said reels, a combined warp drawing and compressing means cooperating with said reels, a plurality of combined warp guiding and spacing pins secured to each side of said frame, a warp-feeding guide carried by said frame cooperating with one of said reels, a warp-guiding means cooperating with said device, and an adjustable warp-feeding guide cooperating with the feed-guide carried by the frame.

13. A warp-dyeing machine including a dye-liquor receptacle, an upwardly-extending stationary frame secured to said receptacle and provided with a pair of elongated openings, a pair of reels having their shafts extending through said frame, spacing-bars mounted in the openings and interposed between the shafts of the reels for retaining the reels a fixed distance apart, means for vertically moving said reels in unison, said means acting as a bearing for the shafts of the reels and secured to the spacing-bars, guide-pins secured to each side of the frame, and a warp-feeding guide arranged in suitable relation to one of said reels.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

THEODORE E. DAVIS.

Witnesses:

J. H. MCGEE,
THOS. E. LANDQUIST.