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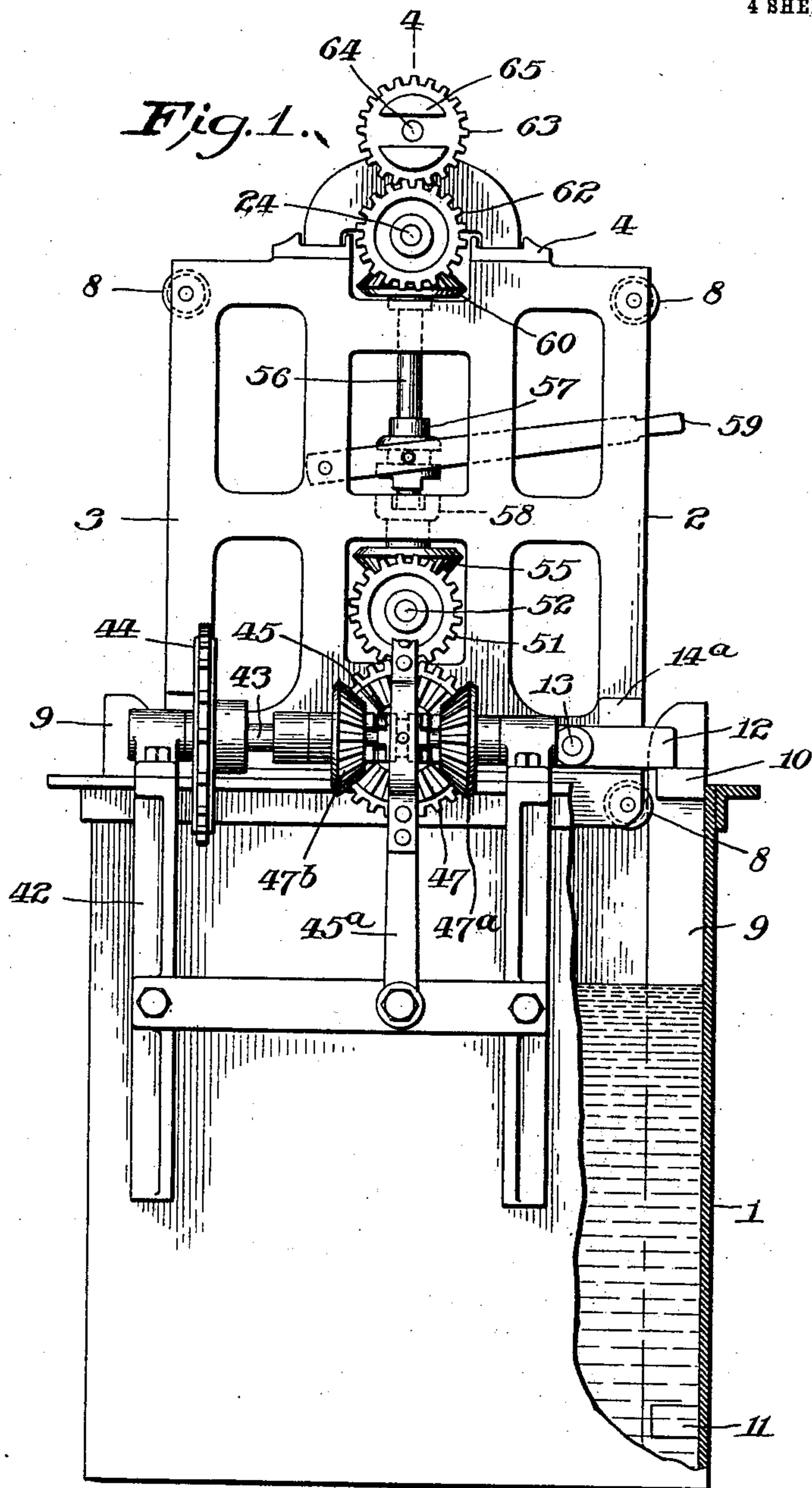
PATENTED MAR. 29, 1904.

R. P. SMITH & G. E. DRUM.
MERCERIZING APPARATUS.

APPLICATION FILED MAY 31, 1902.

NO MODEL.

4 SHEETS—SHEET 1.



WITNESSES:

W. W. Leachby
J. H. Gamble

INVENTORS:

Robert P. Smith
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BY John P. Nolan
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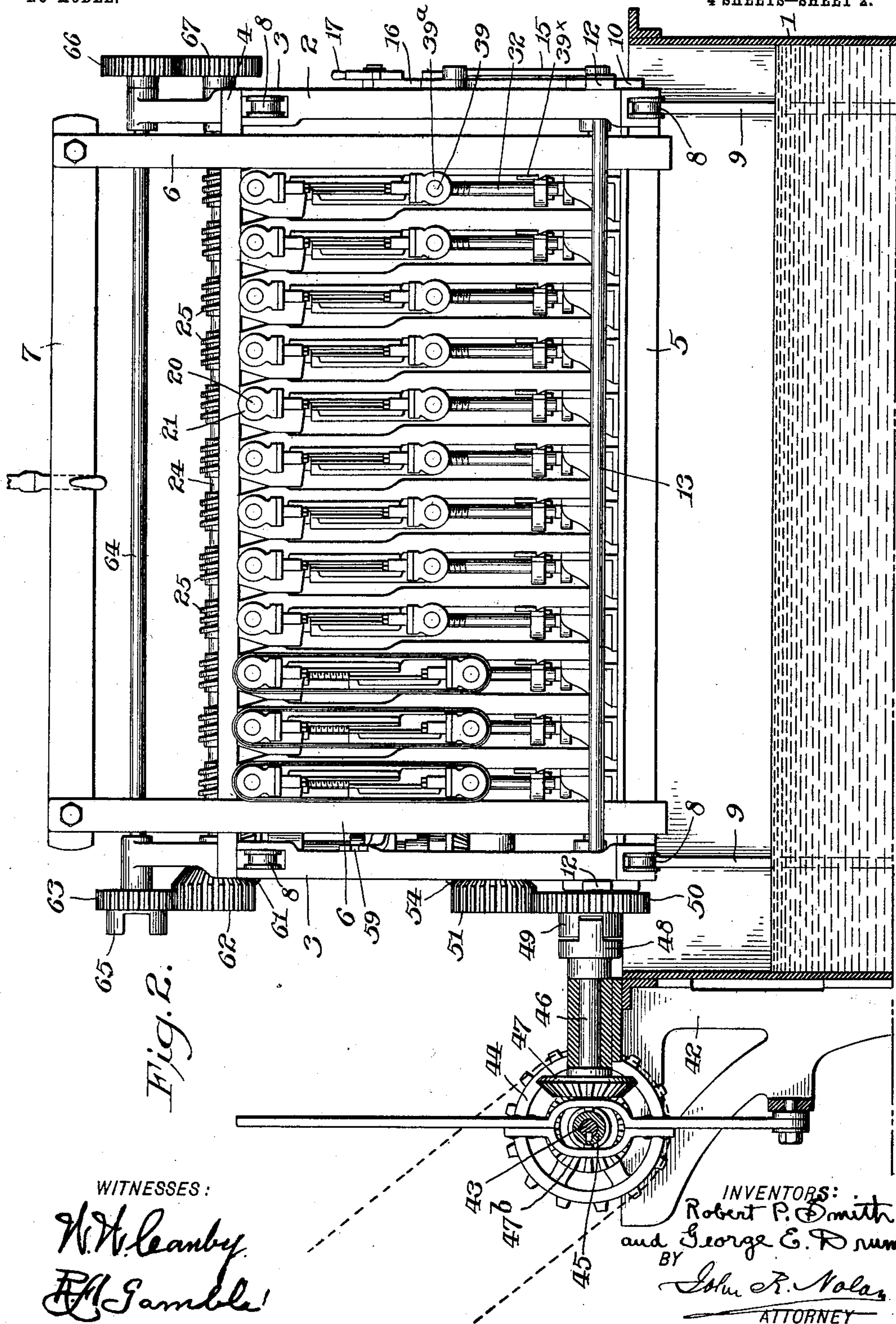
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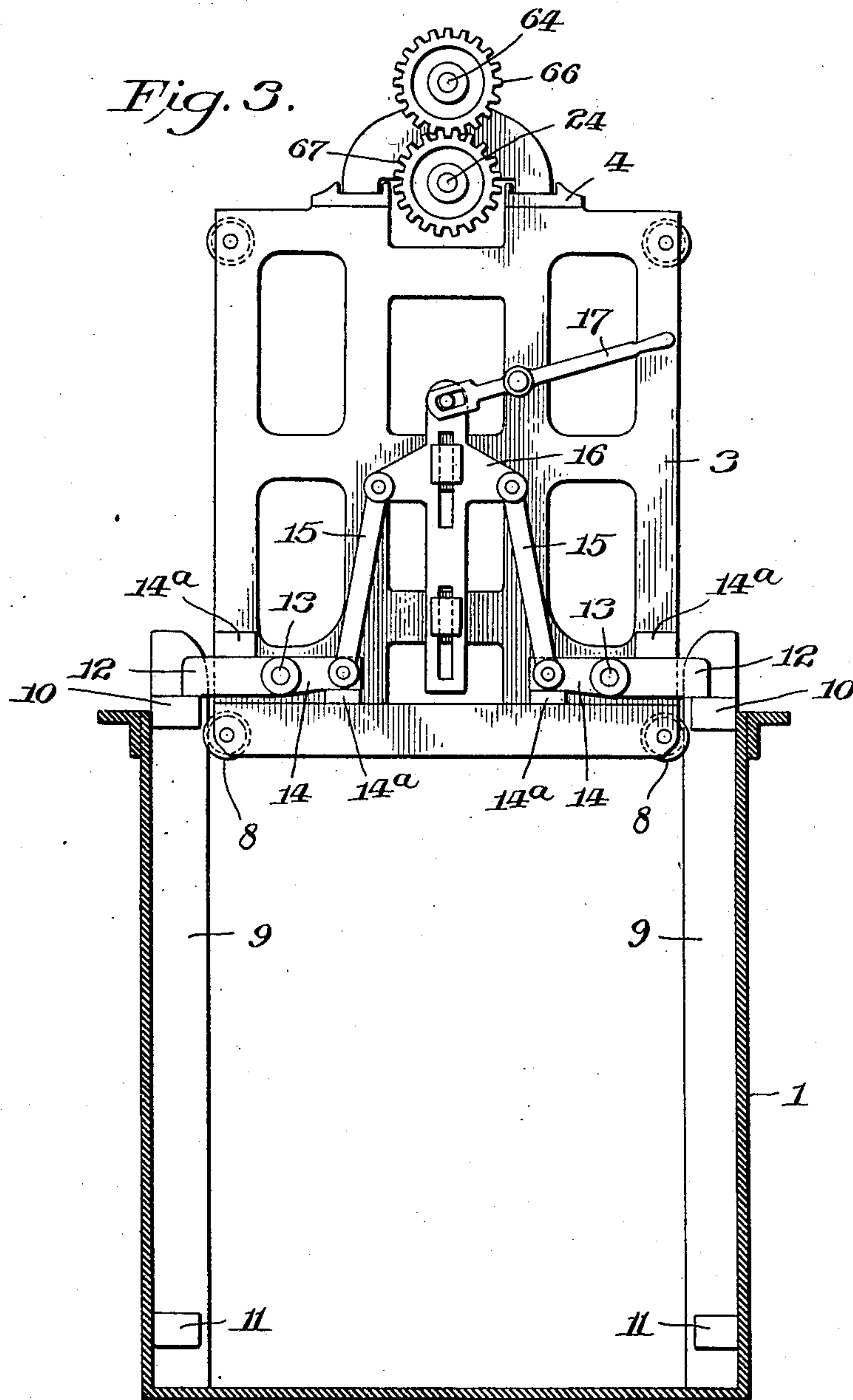
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4 SHEETS—SHEET 3.



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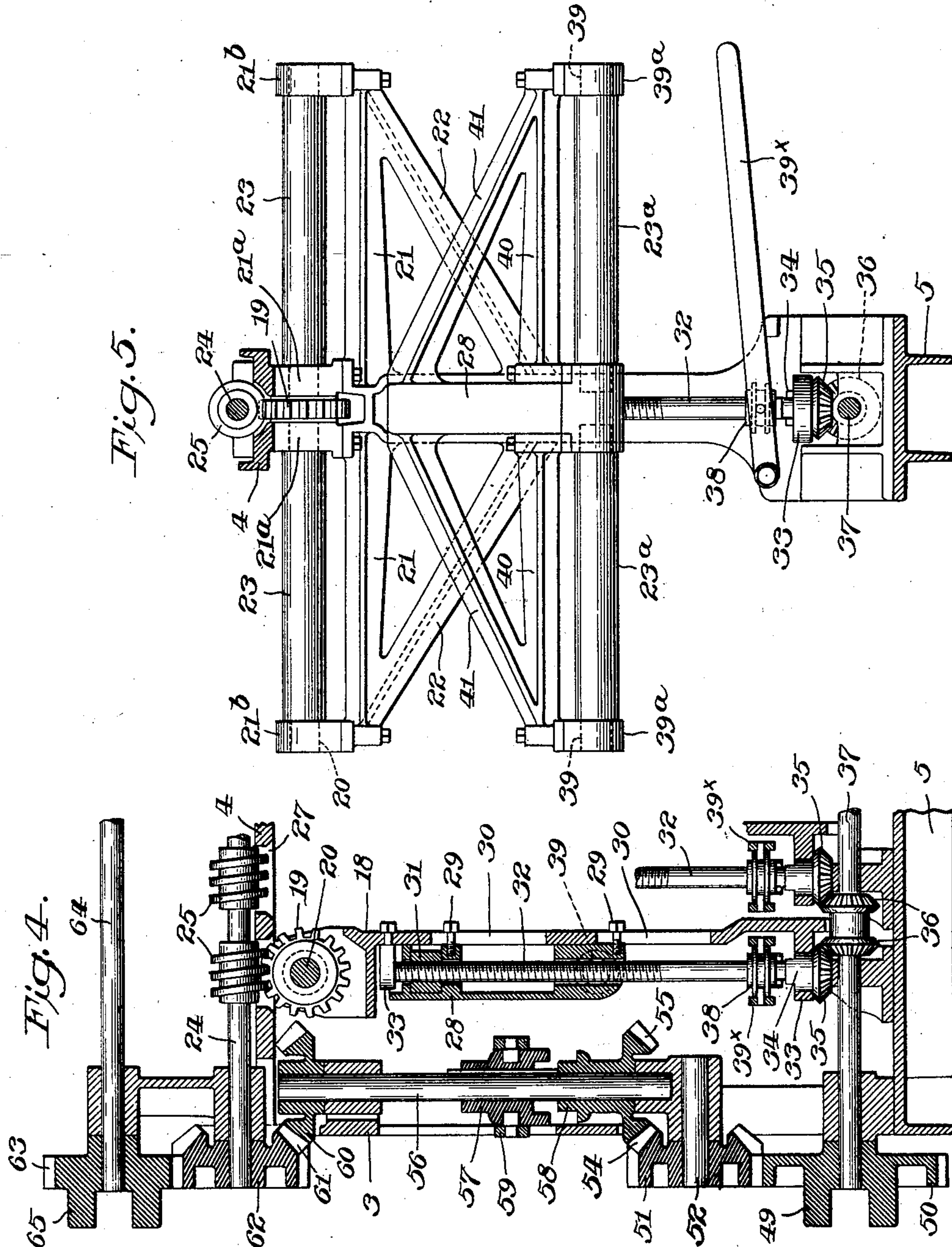
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UNITED STATES PATENT OFFICE.

ROBERT P. SMITH AND GEORGE E. DRUM, OF PHILADELPHIA, PENNSYLVANIA.

MERCERIZING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 755,716, dated March 29, 1904.

Application filed May 31 1902. Serial No. 109,636. (No model.)

To all whom it may concern:

Be it known that we, ROBERT P. SMITH and GEORGE E. DRUM, citizens of the United States, residing in the city and county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Mercerizing Apparatus, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

The object of this invention is to provide a simple and efficient construction and organization of mechanism whereby the so-called "mercerization" of cotton may be expeditiously accomplished, as will be hereinafter fully set forth.

In the drawings, Figure 1 is an end elevation of the apparatus, part of the tank being broken away. Fig. 2 is a side elevation thereof, the tank being in section and several hanks of yarn being shown as applied to the apparatus. Fig. 3 is an end elevation opposite to Fig. 1, the tank being also in section. Fig. 4 is a vertical section, enlarged, through the left-hand end of the apparatus, as on the line 4 4 of Fig. 1. Fig. 5 is an elevation of one of the adjustable yarn-carrying frames and adjuncts.

1 designates the tank in which the mercerizing liquid or dye is contained, and 2 a framework which is movable into and from the interior of the tank and is equipped with provisions for the support and operation of the material under treatment. This framework includes in its preferred construction vertical end heads 3, rigidly connected by top and bottom bars 4 5, respectively, together with vertical side bars 6, extending above the body of the frame and united at the top by means of a longitudinal bar 7, to which any usual or approved raising and lowering mechanism may be connected. The end heads are provided at or near their upper and lower corners with antifriction-rollers 8, adapted to run upon vertical guide-rails 9 on the inner side walls of the tank, and thus insure vertical alinement of the framework in respect to the tank. On the walls of the tank adjacent the

upper and lower ends of the rails are ledges 10 11, respectively, with which suitably-disposed stops on the end heads of the framework are adapted to bear when the framework is at the bottom or the top of the tank. These stops in the present instance comprise four arms 12, fulcrumed at the respective lower corners of the end heads in such manner as to be movable outwardly beyond or downwardly of the framework, as desired. If the arms be set in the outward position, they may rest upon either the upper or the lower ledges, as the position of the framework may determine, and if, on the other hand, the arms be set in the downward position the frame may be freely movable up and down within the tank. The arms are provided with inward extensions 14, and the adjacent end heads are provided with suitably-disposed stops 14^a, against which the arms and their respective extensions abut, so as to limit the movement of the arms.

As a simple and efficient means to operate the stop-arms simultaneously the following construction is provided: Extending longitudinally of the framework are two rock-shafts 13, having their bearings in the end heads. Upon the extremities of these shafts the respective stop-arms are affixed. The inward extensions of the two arms at one end of the machine are connected by means of links 15 with a vertically-movable slide 16 on the adjacent end head of the frame. This slide in turn is connected to one arm of a hand-lever 17 on the end head, so that by proper manipulation of the lever the slide may be conveniently raised or lowered, as desired. When the slide is raised, the stop-arms connected therewith are thrown downward, and at the same time the two rock-shafts are turned to move similarly the stop-arms at the opposite end of the machine. When the slide is depressed, a reverse operation of the parts is accomplished.

Interposed between the upper and lower bars of the frame and constituting, in effect, a part of the frame are standards 18, which are arranged at intervals apart. Out-

wardly-extending arms 21 are provided at the upper end of each of the standards, and diagonal brace-bars 22 converge downwardly from the outer ends of the respective arms to the standard, and thereby rigidly support said arms. Upon the top of the standard and the outer ends of the arms are boxes 21^a 21^b; respectively, in which is journaled a shaft 20, that affords, in effect, two integral rollers 23.

On the body of the shaft, intermediate the boxes 21^a, is a worm-wheel 19. Extending longitudinally of the main frame, directly above the top bar thereof, is a shaft 24, equipped with a series of worms 25, which correspond in number with the worm-wheels 19 and gear therewith, suitable openings 27 for the passage of the worms being formed in the top bar 4 of the frame. Hence by rotating the worm-shaft the worm-wheels and their roller-shafts will be simultaneously revolved, as will be presently described. On the front of each of the standards is a vertically-adjustable carriage 28, comprising in the present instance a hollow body provided with cap or guide screws 29, which extend through vertical guide-slots 30 in the proximate standard. In the upper end of this body is seated a nut 31, through which extends a correspondingly screw-threaded shaft 32, having its bearings in lugs 33 near the respective ends of the standard, whereby when the shaft 32 is properly turned the nut and, perforce, the carriage-body is adjusted up or down, as desired.

Loose on the lower end of the shaft 32 is a clutch member 34, provided with a bevel-wheel 35, which gears with a similar wheel 36 on a longitudinally-disposed shaft 37. The companion member 38 of the clutch is splined on the screw-shaft and is connected to a hand-lever 39^x, conveniently fulcrumed on the standard, so that by actuation of the lever the clutch member 38 may be engaged with or disengaged from the member 34, as desired. It will thus be seen that if the shaft 37 be rotated any or all of the vertical screw-shafts may be actuated, as the position of the movable clutch members on said shafts in respect to the positively-driven members may determine. Thus the carriages may be independently or simultaneously adjusted, as desired. A mechanism which we prefer to use for operating the shaft 37 will be hereinafter explained.

Extending transversely in opposite directions from bearings at the lower end of the carriage-body, directly below and parallel with the roller-shaft 20, are two shafts 39, the outer ends of which are journaled in boxes 39^a, carried by outwardly-extending arms 40 on said body. The outer ends of these arms are rigidly supported by diagonal braces 41, which converge from the respective arms to the upper portion of the carriage-body. The two shafts 39 afford integral rollers 23^a. The arms and braces are arranged in a plane laterally of

the corresponding upper members in order that overlapping of the parts may be obtained to permit the minimum vertical adjustment of the carriage and its appurtenances, and thereby obtain the shortest distance between the upper and lower rollers. The hanks of yarn or other material to be treated are applied to the companion upper and lower rollers, as seen in Fig. 1, and the requisite tension upon the material is effected by adjusting the carriage vertically by means of the screw-shaft 32, said shaft being operated through the medium of the shaft 37. The mechanism previously alluded to for actuating this shaft 37 is as follows: Adjacent one end of the tank is a frame 42, in which are bearings for a main shaft 43, which is driven from a suitable source of power. In the present instance the shaft 43 is adapted to be driven by appropriate sprocket-gearing, the driven wheel 44 thereof being fast on said shaft. The frame 42 also supports a bearing for a stud-shaft 46, which is in line axially with the shaft 37 when the framework is in its elevated position. The stud-shaft is provided with a fixed bevel-wheel 47, which coacts with two oppositely-disposed wheels 47^a, loose on the main shaft. Splined on the latter shaft, intermediate the wheels 47^a, is a clutch member 45, which may be interlocked with complementary members on the opposing faces of the wheels 47^a, so as to lock either of said wheels 47^a to the shaft, as desired, and thereby effect the rotation of the stud-shaft to the right or left, as occasion may require. A suitable hand-lever 45^a to manipulate the clutch is provided. On the end of the stud-shaft is a clutch member 48, which is constructed and arranged to interlock with a corresponding member 49 on the shaft 37 when the framework is elevated, in which case the latter shaft constitutes, in effect, a continuation of the stud-shaft and partakes of its motion. The clutch member 49 is preferably an integral part of a spur-wheel 50, fast on the shaft 37, which wheel coacts with a similar wheel 51 on a stud-shaft 52, having its bearings in the adjacent end head of the main frame. The wheel 51 is provided with bevel-gear teeth 54, which mesh with those of a bevel-wheel 55, loose on the lower end of a vertical shaft 56, having its bearings also in said end head. The shaft 56 has splined thereon a clutch member 57, which may be engaged with or disengaged from a corresponding member 58 on the wheel 55, so as to render the latter fast or loose on the vertical shaft, as desired. The clutch member is manipulated by means of a suitably-disposed hand-lever 59 on the end head. On the upper end of the shaft 56 is a bevel-wheel 60, which coacts with bevel-gear teeth 61 on the side of a spur-wheel 62 on the worm-shaft 24, previously described, which spur-wheel is in mesh with a spur-wheel 63 on a shaft 64, extending longitudinally of the framework and above the said worm-shaft.

From the foregoing it will be seen that when the gear 55 is fast on its shaft 56 and the stud-shaft 46 is coupled with the gear 50 the motion will be transmitted from the latter shaft through the intermediate gearing to the worm-shaft 24, and that, therefore, the several roller-shafts 20 will be simultaneously rotated to impel the hanks of yarn about their supports. If desired, the clutch member 49 may be formed on the wheel 51 and the stud-shaft coupled with the latter instead of with the wheel 50.

The wheel 63 is provided with a clutch member 65, corresponding with that (49) on the wheel 50, which member 65 is so disposed as to interlock with the clutch member 48 on the stud-shaft 46 when the frame is in its lowermost position within the tank. In that event the shaft 64 and, perforce, the worm-shaft 24 will be positively rotated to effect the rotation about their supports of the hanks of yarn immersed in the mercerizing liquid. The end of the shaft 64 opposite to that provided with the clutch member is preferably equipped with a gear 66, which coacts with a similar gear 67 on the adjacent end of the worm-shaft, and thereby insures a uniform rotative action upon the respective ends of the latter.

The operation, briefly described, is as follows: Assuming the clutch member 45 to be in intermediate position, as shown in Fig. 1, the main frame is hoisted to the top of the tank, the stop-arms 12 are projected laterally and engaged with the upper ledges 10 of the tank, and the shaft 37 is coupled with the stud-shaft. The clutch 57 by actuation of the lever 59 is freed from the wheel 55 on the vertical shaft 56. As occasion may require, any or all of the hand-levers 39^x are manipulated to couple their respective screw-shafts 32 with the lower clutch member 34. The skeins to be treated are then applied to the appropriate upper and lower rollers, whereupon the clutch member 45 is shifted to lock the gear 47^a on the main shaft, and in consequence the shaft 37 is thereby actuated to effect the proper turning of the screw-shafts in gear therewith, thus lowering the carriage 28 and their rollers to impart the requisite tension to the supported skeins. The screw-shafts are then uncoupled from the clutch member 34. Next the framework is slightly elevated and the lever 17 is operated to disengage the stop-arms from the upper ledges, whereupon the framework, with its appurtenances, is lowered into the tank, the lever 17 being again at the proper time operated to throw the stop-arms into position to rest upon the lower ledges 11. When the framework reaches its lowermost position, the clutch-shaft 64 is coupled with the stud-shaft 46, and the power is therefore communicated to the worm-shaft 24. Hence the immersed skeins are caused to turn slowly about their supports to insure uniform treatment of the fibers by the liquid. After the skeins have been suffi-

ciently treated the clutch member 45 is moved to the intermediate or idle position, the framework is hoisted to the top of the tank, the wheel 55 is rendered fast on the vertical shaft 56, and the stud-shaft 46 is coupled with the gear 50. Upon the shifting of the clutch member 45 to lock either of the gear-wheels 47^a 47^b on the main shaft the worm-shaft 24 is rotated through the intervening gearing to effect the turning of the skeins under tension, and consequently the wringing of the same. This being done, the framework, with its appurtenances, may be transferred to another similarly-equipped tank containing cleansing or other liquid and may then be lowered into the latter and agitated therein. The frame may then be raised, as before, and the skeins turned under tension. Finally, the screw-shafts controlling the carriages in operation are coupled with the shaft 37 and the clutch member 45 is engaged with the gear-wheel 47^b, in consequence of which said screw-shafts are properly turned to raise the carriages, and thus remove the tension from the skeins to permit their ready removal from the holders.

We claim—

1. The combination with a tank provided at its respective corners with ledges or supports, of a yarn-carrying frame movable into and from said tank, longitudinal rock-shafts in said frame, stop-arms on said shaft, a vertically-movable slide, link connections between the same and a pair of said stop-arms, and means for actuating said slide, whereby the arms are simultaneously swung toward and from the respective ledges or supports.

2. In a mercerizing apparatus, the combination with a support, a transversely-extending shaft therein, bearings for the outer ends of said shaft, arms supporting said bearings, and diagonal braces converging from the outer ends of said arms to the support, of a vertically-adjustable carriage on said support comprising a body portion, a shaft or shafts extending laterally therefrom, bearings for the outer ends of said latter shafts, arms supporting said bearings, and diagonal braces converging from the outer ends of said latter arms to the carriage-body, together with a nut in said carriage-body, and a screw-shaft engaged with said nut, the last-named arms and braces being located to one side of the arms and braces first named and adapted to move in different planes so as to pass each other.

3. In a mercerizing apparatus, the combination with a support, a transversely-extending shaft therein, bearings for the outer ends of said shaft, arms supporting said bearings, and diagonal braces converging downwardly from the outer ends of said arms to the support, of a vertically-adjustable carriage on said support comprising a body portion, a shaft or shafts extending therefrom, bearings for the ends of said latter shaft or shafts, arms supporting said bearings, and diagonal braces

converging upwardly from the outer ends of said latter arms to the carriage-body, the last-named arms and braces being located to one side of the arms and braces first named, and
5 adapted to move in different planes so as to pass each other.

4. In a mercerizing apparatus, the combination with a tank and a clutch-shaft adjacent thereto, of a frame movable into and from said
10 tank, yarn-supports on said frame, and means for rotating said supports, said means including a shaft and connections adapted to coact with the clutch-shaft when the said frame is raised in respect to the tank.

15 5. In a mercerizing apparatus, the combination with a tank, and a clutch-shaft adjacent thereto, of a frame movable into and from said tank, yarn-supports on said frame, and means for adjusting said supports toward and from
20 each other, said means including clutch mechanism adapted to coact with the said clutch-shaft when the frame is in raised position.

6. In a mercerizing apparatus, the combination with a tank, and a clutch-shaft adjacent
25 thereto, of a frame movable into and from said tank, upper and lower yarn-supports on said frame, means including a clutch device for rotating the upper supports, and means, including a clutch device, for rotating the lower sup-
30 ports, said clutch devices being arranged to coact with the said clutch-shaft when the frame is in the lowered and raised positions respectively.

7. In a mercerizing apparatus the combination with a tank, and a drive-shaft, of a frame
35 movable into and from said tank, upper and lower yarn-supports on said frame, mechanism coacting with the drive-shaft to rotate the lower rollers when the frame is raised, and
40 mechanism coacting with the drive-shaft to rotate the upper rollers when the frame is lowered.

8. In a mercerizing apparatus, the combination with a tank, and a drive-shaft, of a frame
45 movable into and from said tank, upper and lower yarn-supports on said frame, mechanism coacting with the drive-shaft to rotate the lower rollers when the frame is raised, and mechanism coacting with the drive-shaft to
50 rotate the upper rollers when the frame is lowered, together with means for connecting said mechanisms.

9. In a mercerizing apparatus, the combination with a tank, and a drive-shaft, of a frame
55 movable into and from said tank, upper and lower yarn-supports on said frame, mechanism coacting with the drive-shaft to rotate the lower rollers when the frame is raised, mechanism coacting with the drive-shaft to rotate
60 the upper rollers when the frame is lowered, means for adjusting the lower supports toward and from the upper supports, connections movable into and out of operation between said means and the first-named mechanism,
65 gearing between the two mechanisms, and

means for rendering said gearing operative or inoperative as desired.

10. In a mercerizing apparatus, the combination with a tank, and a clutch-shaft adjacent thereto, of a frame movable into and from said
70 tank, yarn-supports on said frame, and mechanism for rotating said supports, said mechanism including a worm-shaft, upper and lower shafts, gearing between said latter shafts and the worm-shaft, means for disconnecting the
75 gearing between the lower shaft and the worm-shaft, and clutch devices for the upper and lower shafts, respectively, said devices being arranged to coact with the said clutch-shaft when the frame is in the raised and lowered
80 positions, respectively.

11. In a mercerizing apparatus, the combination with a tank, of a frame movable into and from the tank, a plurality of yarn-supports on
85 said frame, having vertically-adjustable members, and means whereby the adjustable members of the respective yarn-supports may be independently or simultaneously adjusted.

12. In a mercerizing apparatus, the combination with a tank, of a frame movable into and
90 from the tank, a plurality of yarn-supports on said frame having vertically-adjustable members, screws connected with said members, a shaft, means for operatively connecting or disconnecting any or all of said screws with said
95 shaft at will, a drive-shaft, and reversible driving mechanism between said first-named shaft and drive-shaft.

13. In a mercerizing apparatus, the combination with a tank, of a frame movable into and
100 from the tank, a plurality of yarn-supports on said frame having vertically-adjustable members, screws connected with said members, a shaft, means for operatively connecting or disconnecting any or all of said screws with said
105 shaft at will, a gear-wheel on said shaft, a drive-shaft, two oppositely-disposed gear-wheels thereon coacting with the gear-wheel first named, and means for rendering either of said
110 oppositely-disposed gear-wheels fast on the drive-shaft.

14. In a mercerizing apparatus, the combination with a tank, of a frame movable into and
115 from the tank, a series of yarn-supporting members relatively fixed on said frame, a complementary series of vertically-adjustable supports including carriages, screw devices for adjusting said carriages, a shaft, means whereby any or all of said devices may be connect-
120 ed with or disconnected from said shaft at will, and means for operating said shaft.

In testimony whereof we have hereunto affixed our signatures in the presence of two subscribing witnesses.

ROBERT P. SMITH.
GEORGE E. DRUM.

Witnesses:

EDWIN WOOD,
H. H. SINNAMON.