

No. 704,531.

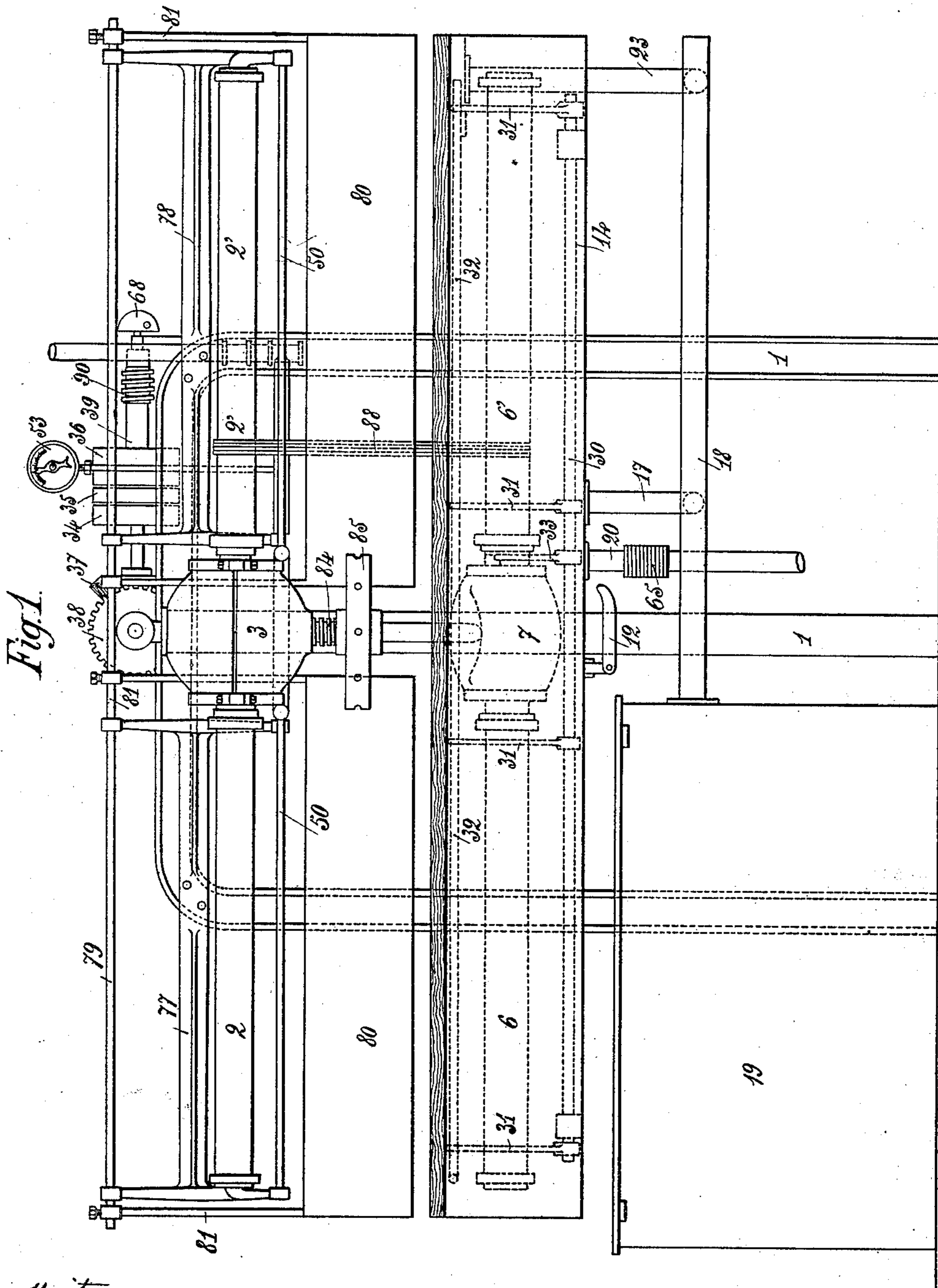
Patented July 15, 1902.

M. FRINGS.
MERCERIZING MACHINE.

(Application filed Dec. 11, 1900.)

(No Model.)

3 Sheets—Sheet 1.



Witnesses
J. B. Ferkam
W. R. Edelen

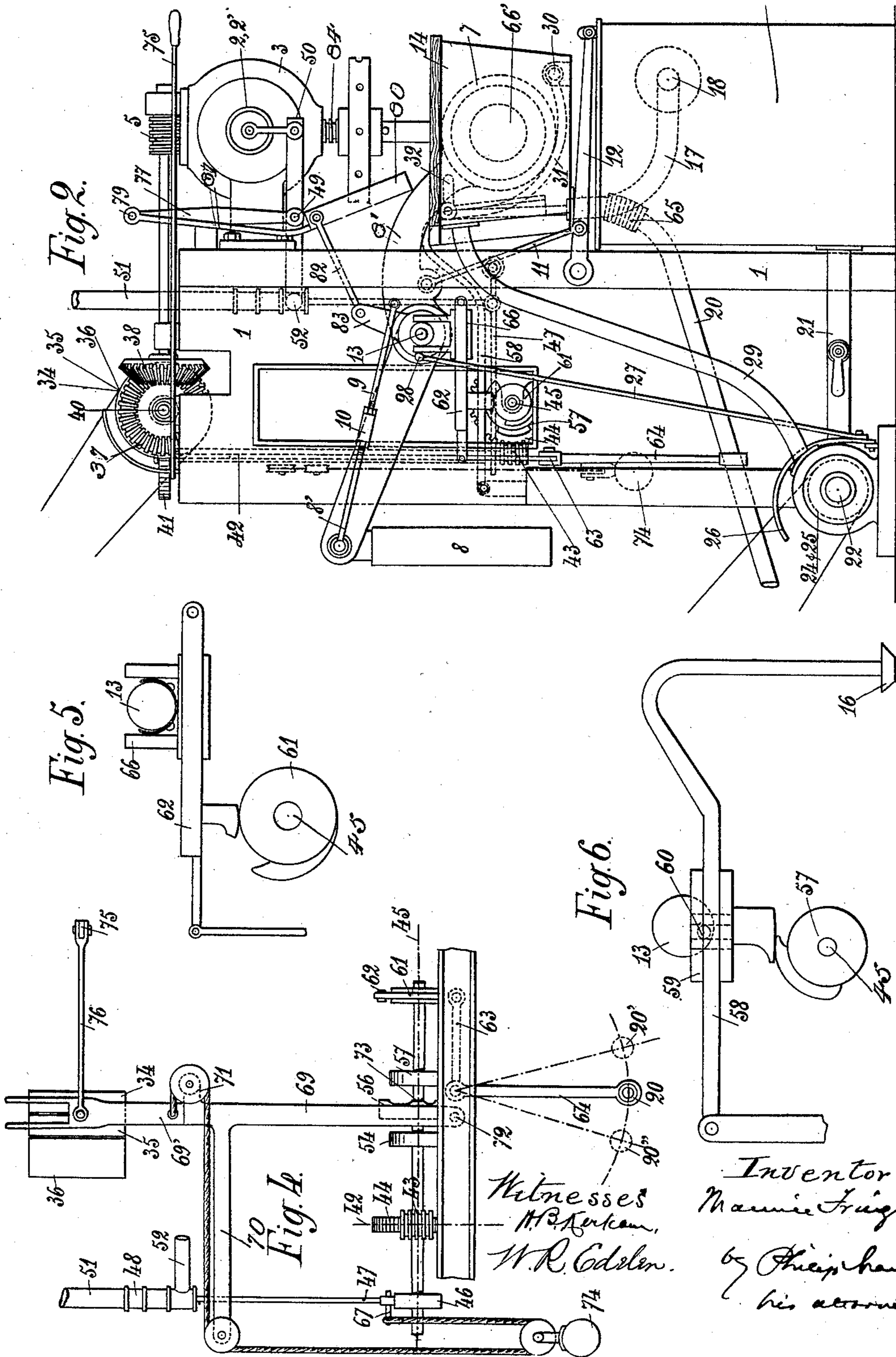
Inventor
Maurice Frings,
by Philip H. H. H. H.
his attorney

M. FRINGS.
MERCERIZING MACHINE.

(Application filed Dec. 11, 1900.)

(No Model.)

3 Sheets—Sheet 2.



Inventor
Maurice Frings
by Philip H. H. H.
his attorney

M. FRINGS.
MERCERIZING MACHINE.

(Application filed Dec. 11, 1900.)

(No Model.)

3 Sheets—Sheet 3.

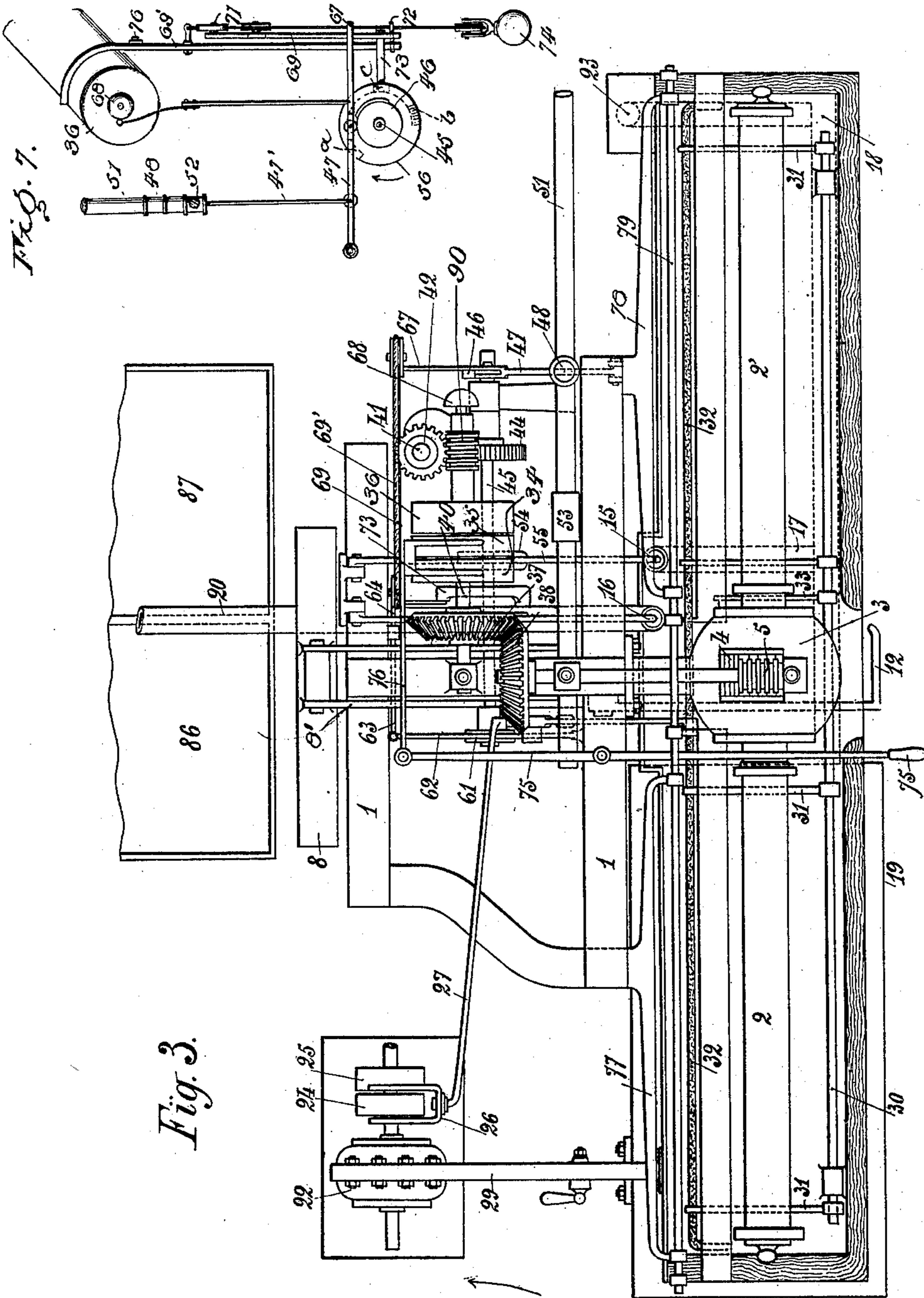


Fig. 3.

Witnesses.
J. B. Berkham
W. R. Edelen

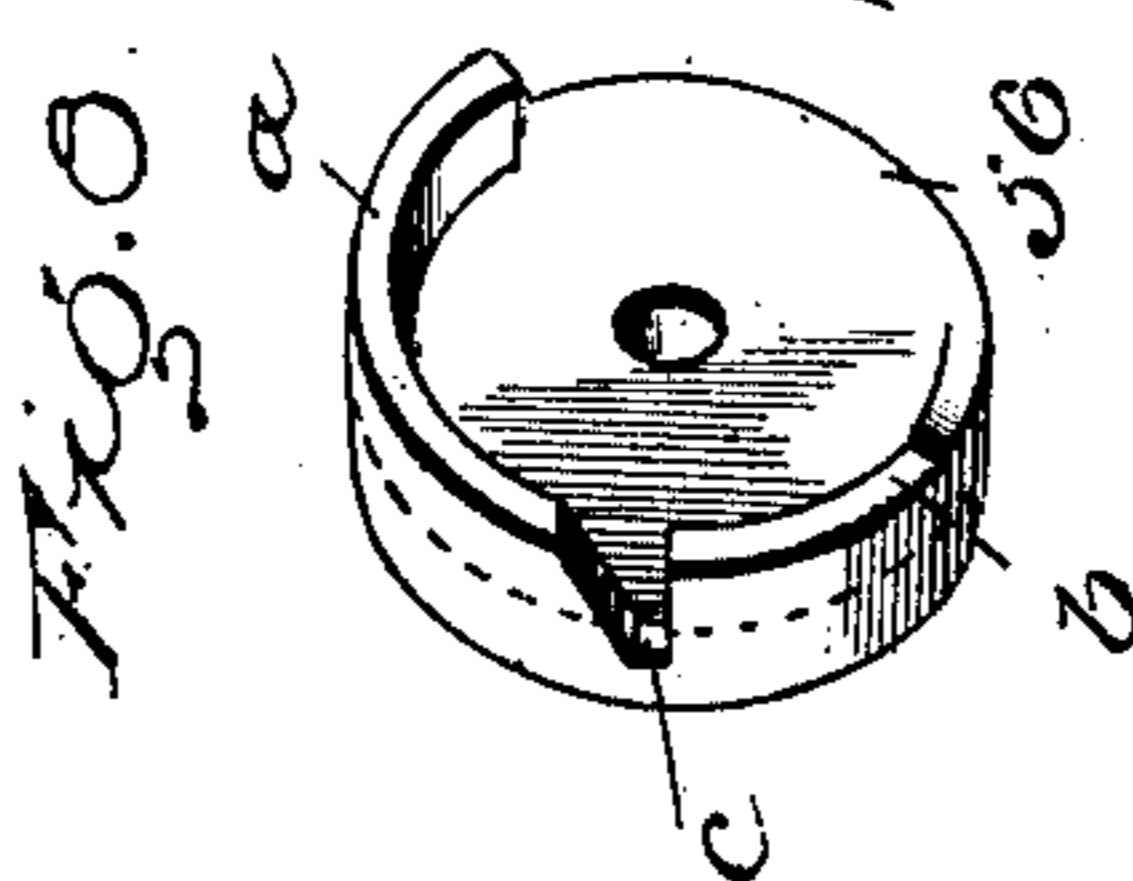


Fig. 2.

Inventor
Maurice Frings
by Philip H. Harris,
his attorney.

UNITED STATES PATENT OFFICE.

MAURICE FRINGS, OF PARIS, FRANCE.

MERCERIZING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 704,531, dated July 15, 1902.

Application filed December 11, 1900. Serial No. 39,541. (No model.)

To all whom it may concern:

Be it known that I, MAURICE FRINGS, constructing engineer, a resident of 131 Rue St. Denis, in the city of Paris, in the Republic of France, have invented new and useful Improvements in and Connected with Mercerizing-Machines, which improvements are fully set forth in the following specification.

This invention relates to a new mercerizing-machine. Mercerizing, an operation intended to impart a silky luster to cotton, consists in washing the material with soda and then washing and rinsing it with water.

The mercerizing-machines employed at present in dyeing require the services of several men and necessitate a considerable expenditure of power. Moreover, as the hanks of cotton have to be removed from the soda-bath in order to be washed and rinsed it will be seen that this operation cannot be carried out with any great degree of regularity.

My improved machine comprises two rollers mounted on ball-bearings, the one roller having a rotary motion for carrying the hanks along and the other being furnished with an arrangement enabling it to be raised and lowered, so as to allow of the hanks being stretched and put in place, and is also provided with arrangements by means of which the various operations constituting the mercerizing (admission and discharge of the soda, draining, admission and discharge of the water, washing, and rinsing) can be carried out automatically. The machine has important advantages which will be considered in due course.

In order that my invention may be clearly understood, I have annexed to this specification two sheets of drawings, in which—

Figure 1 is an elevation; Fig. 2, a side view; Fig. 3, a plan. Figs. 4, 5, 6, 7, and 8 are views in detail of certain mechanical parts of the machine.

The machine comprises a cast-iron frame 1, made of various pieces, with projections and recesses, so as to allow the different parts which effect the automatic motion to be fixed and to afford an easy passage for the same.

In the front and in the upper part of the machine are two rollers 2 2', formed by a single shaft having shoulders and bearings and covered with hardened india-rubber or

ebonite for the sole purpose of insuring a smooth and non-slippery surface for the hanks. The shaft forming the two rollers 2 2', Figs. 1, 2, and 3, is supported in the center on ball-bearings in a casing 3, Figs. 1, 2, and 3, fixed to the frame by a bracket adjoining the said casing. In the interior of the casing 3 and keyed to the roller-shaft is a wheel 4, Fig. 3, which is actuated by a worm 5, Figs. 2 and 3. This wheel is constantly immersed in the oil contained in the casing in order to insure smooth and easy working. The lower shaft forming the two lower rollers 6 6', Figs. 1 and 2, also rotates on ball-bearings in a casing 7, the weight of which, added to that of the rollers, is balanced by a counterweight 8, through the medium of cast-iron arms 8', which connect this counterweight with the casing. Moreover, these arms 8' are furnished with adjusting-screw arrangements 10 and 9, so that in case of breakage the counterweight is held up without danger. In addition to this, on one of the arms a rod 11 is linked, which is connected to the operating-lever 12. The whole arrangement oscillates around a shaft 13, to which several levers are keyed that actuate certain rods, the object of which will be explained in due course.

Immediately below the shaft forming the lower rollers is a vat 14 of trapezoidal form intended to contain in turn the soda and the water. This vat is furnished with the outlet-valves 15 and 16, the one, 15, for the soda communicating with a pipe 17, which conveys through a second pipe 18, Fig. 1, that is joined to it, the soda to the recuperating-vat 19, described later on, and the other valve 16 for the water communicating with a pipe 20, that conveys the rinsing-water into a vat with two compartments. Further, the upper edges of the vat 14 are covered with wood, so as to prevent the hanks from coming into contact with the sheet-iron sides.

Below one of the ends of the vat 14 is a soda-recuperating reservoir 19, Fig. 2, in the form of a parallelepipedon divided into compartments by means of sheet-iron, on which latter are placed soda-crystals. The soda returning to the reservoir by means of the pipe 18 passes over the crystals, takes any desired quantity, and is again conveyed to the vat 14.

On the reservoir 19 are placed the suction-pipe 21, Figs. 2 and 3, of a centrifugal pump 22 and the return-pipe 18, from which branch off the pipe 17, corresponding with the soda-discharge valve 15, and an overflow-pipe 23, Fig. 3. The pump 22 is furnished with two pulleys 24 and 25, the one fixed, the other loose, and the belt of which is shifted by a fork 26, attached to a rod 27, which is connected with a lever 28, Fig. 2, keyed to the shaft 13. The pump feeds the soda into the vat 14 by the tube 29.

In the interior of the vat 14 is the rock-shaft 30, carrying levers 31, to the extremities of which a rod 32, preferably of Malacca cane, is fixed, which is intended to raise the hanks at the end of an operation. This shaft, and consequently the Malacca-cane rod, are controlled by a lever 33, Figs. 1 and 3, having a recess in which a catch fixed on the casing engages.

The principal gearing mounted on the frame in the upper part of the machine comprises a shaft 40, on which three pulleys 34, 35, 36 are mounted, Figs. 1 and 2. The first pulley 34, keyed to the shaft, operates the bevel-gearing 37, 38 to rotate the shaft carrying the worm 5, which imparts motion to the upper rollers. The second pulley 35 is mounted on the sleeve 39, loose on the shaft and carrying the worm or screw 90, Figs. 1 and 3. The third pulley 36 is mounted loosely on the sleeve 39. It follows, as will be hereinafter described, that when the belt is on the pulleys 34 and 35 at the same time the rollers and the worm 90 are actuated, and when the belt is on 35 and 36 at the same time the worm 90 only is actuated, and finally when the belt is on the pulley 36 the machine is entirely out of gear. The worm 90 actuates a wheel 41, Fig. 3, which may be replaced by other wheels of different diameters added to the machine with a view to making the total operations continue for a longer or shorter time. This wheel 41 is keyed to a vertical shaft 42, at the end of which another worm 43 is mounted, which operates a wheel 44, keyed to the shaft 45, Figs. 2 and 3, carrying the cams which render the motion automatic. The first cam 46, Fig. 4, actuates a forked lever 47, connected to the flap of a water-valve 48, Fig. 3, in order to admit the water into the vat by the tubes 49 and 50, Figs. 1 and 2, through the medium of the supply-pipe 51 and the branch pipe 52. The pipes 49 and 50 are perforated for dividing the water into numerous jets, which strike with a force that can be regulated as desired the interior and exterior of the hanks. The pipe 49 effects the external rinsing, the tube 50 the internal rinsing, of the hank. On the pipe 52 a manometer 53, Fig. 1, is mounted, which indicates the pressure of the water intended for rinsing. The second cam 54 is intended to enable the soda contained in the vat 14 to be discharged through the pipe 17 by opening valve 15. The third cam 56, Fig. 4, is intended to effect

stoppage of the hanks while the soda is being drained off, an operation which takes place immediately after the washing with soda. This arrest is effected, as will be seen presently, by means of the mechanism illustrated in Figs. 4 and 7. When the rinsing is finished, this same cam produces a complete stoppage of the machine. The cam 57 is formed so as to raise the valve 16 through the medium of the lever 58 at a given moment and to open the communication between the vat 14 and the discharge-pipe 20, which is furnished with special mechanism, as will be shortly seen. The lever 58, Fig. 6, is furnished with a slide-piece 59, which by means of a finger 60, mounted on the shaft 13, renders the lever dependent upon the cam 57 as regards being raised and on the shaft 13 for being lowered. The cam 61, composed of three disks of the same thickness joined together by two bolts running through them, has an equally distinct outline and actuates a lever 62, Figs. 2, 3, and 4, which controls bell-crank levers 63 and 64, attached to the water-discharge pipe 20, so as to impart to this pipe at a given moment and under the influence of the cam 61 a motion from right to left or from left to right. To allow of this movement of the pipe 20, it is formed with a flexible portion 65. The lever 62, Fig. 5, is made dependent upon the cam 61 for being raised and by means of a slide-piece 66 upon the shaft 13 for being lowered. The forked lever 47, controlled by the cam 46 through the medium of a roller, carries on one of the branches 67 of its fork a rod which communicates with a sounding-gong 68.

The arrangements illustrated in Figs. 4 and 7 consist of two lever-arms 69 and 69', pivoted at 72, on the former of which are two cast-iron arms 70 and 71, carrying two rollers. The upper part of the principal arm 69', Fig. 4, carries the fork that shifts the belt on the driving-pulleys. This shifting-fork oscillates around the pivot 72 and is connected with a hand-lever 75 through the medium of a rod 76. Further, a chain or cord passing over the roller at the end of arm 71 and that at the end of the arm 70 connects the fork with the extended arm 67 of the fork-lever 47, in which is fixed the roller having contact with the cam 46. One of the lever-arms, 69, pivoted at 72, carries in its lower part a catch-arm 73, rigidly projecting therefrom, which is constantly drawn to the side of the cam 56 by a counterweight 74. This cam is formed with two projections *a* and *b* and a recess *c*, Fig. 8, and changes in the operation of the machine are effected by the different positions of catch 73 on cam 56. When the catch 73 occupies recess *c*, the arm 69', which is constantly in contact therewith, is at the extreme left with the belt on the loose pulley. The machine is then out of gear. When the machine is started, the arm 69' being forced toward the right (placing the belt on pulleys 34 and 35) against catch 73 the latter is forced from recess *c* and

onto projection *a*. The time which the catch remains on this projection corresponds to the period of washing of the hanks in the soda. When the projection *a* has passed from under catch 73, the latter falls onto the plane portion of the cam 56, causing the lever-arms 69 and 69' to move under the pull of counterweight 74 toward the left, drawing the belt onto pulleys 35 and 36, thereby arresting the movement of the hanks whose washing in the soda is completed. As long as the plane portion of the cam remains in contact with catch 73 the hanks remain motionless. It is during this period that the soda drains from the hanks. When the dripping has ceased and at the moment when the projection of cam 46 comes in contact with the roller of lever 47 to cause the rinsing-water to flow, the second elevation *b* of cam 56 again forces the catch 73 toward the right, which causes a displacement of the belt onto pulleys 34 and 35, thereby placing the hanks in motion. When the rinsing is concluded—that is to say, when the projection of cam 46 is entirely clear of the roller of lever 47—the recess *c* of the cam 56 is immediately in front of the catch 73. The latter under the pull of the counterweight enters the recess, drawing the levers 69 and 69' to the left, thereby causing the belt to pass onto the loose pulley 36 and stopping the machine. The counterweight 74 constantly pulls the arm 69 toward the left—that is to say, always holds catch 73 against the face of cam 56 and arm 69' toward the right—that is to say, toward its abutment—and retains the roller of shaft 47 on cam 46. This arrangement enables the machine to be arrested when the cam is placed in an acting position. In fact, whatever be the position of the catch 73 on cam 56 the lever 69', which oscillates freely around pivot 72, can always be pushed toward the left and against the action of the counterweight to place the belt on the loose pulley 36 without displacing lever 69. As soon as lever 75 is released lever 69', under the action of counterweight 74, which, owing to pulley 71, draws said lever constantly toward the right—that is to say, against the catch 73—returns, with the belt, to the position it occupied at the moment of stopping.

On the upper part of the frame and at each side of the machine two H-shaped castings 77 and 78 are placed, Fig. 1, carrying in the lower part the water-pipe 50 and in the upper part an iron rod 79, which serves as axis for a water-deflector 80, oscillating around 79 on arms 81, Fig. 1. The arms 81 are made dependent upon the movement of the lower rollers through the rod 82, joined to a lever 83, keyed to the shaft 13.

On the upper casing 3 a screw 84 is mounted, which engages in a screw-thread part in the casing 3 and having keyed to it a wheel or disk 85, the other extremity resting against the external surface of the lower casing 7.

Beneath the machine and opposite the wa-

ter-discharge pipe 20 is a reservoir divided into compartments 86 and 87, intended the one for collecting the water that is rich in soda and the other for receiving the rinsing-water, which contains but little soda.

The principal parts of the machine having been described, its working will now be considered. At the end of an operation, the hanks having been rinsed and drained and then arranged as shown in Fig. 1, where a hank is represented at 88, the screw 84 is screwed up in the casing 3, so as to enable the hanks to be loosened, and the operating-lever 12 is raised. In consequence of the arrangement of the parts it follows that the arm supporting the lower rollers 6 6', balanced by the counterweight 8, ascends. The hanks are then completely relaxed. In the first movement the catch placed on the lower casing has taken hold of the lever 33 and transmits motion to the Malacca-cane rod 32, which brings the lower portion of the hanks out of the vat 14, the watershed descends, and the lever 28, mounted on the shaft 13, is lowered, setting the centrifugal pump 22 in action. By this same movement the finger 60, fixed on the shaft 13, closes the rinsing-water-outlet valve 16 in causing the catch of the lever 58 to slide onto the cam 57, and at the same time the lever 62, which controls the pipe 20 above the reservoir 87, is lowered in order to avoid any loss of soda in case the valve 16 does not act well, this being assured by the mechanism represented in Figs. 5 and 6. In other words, the cams 57 and 61 are brought back to the starting-point. The workman who attends to the machine can then remove the hanks which have been mercerized. He releases these hanks from the rollers and can put fresh ones in place ready for the operation while the vat is filling with soda. For this purpose he puts them onto the ends of the rollers straddlewise and spreads them out carefully. This having been done, he lowers the lever 12. This movement stretches the hanks in consequence of the descent of the casing 7. The workman then turns the screw 84, which gives the desired space between the two rollers and vigorously stretches the threads of the hanks. The pump conveying the soda into the vat is thrown out of engagement by the movement of the lever 12, and the soda, which might run over the vat in consequence of the immersion of the lower roller into the vat, runs off through the overflow 23 in order to return to the reservoir 19 by the tube 18. The workman then sets the machine going by means of the hand-lever 75, which brings the belt from the loose pulley 36 onto the two pulleys 34 and 35 at the same time. In consequence of the arrangement which has been seen the upper rollers are rotated, as also the lower shaft 45, bearing the cams. The form of the cams is such as to allow this washing with soda to be effected for a certain time. As soon as such time has elapsed the cam 54 raises the soda-outlet

valve 15. The soda runs out through the pipe 17 and returns to the recuperating-reservoir 19. At the same time as the outlet of soda is effected the plane portion of the cam 56 comes in front of the catch 73 on the lever 69, Fig. 4. The result is an inclination of the arm 69', which is drawn by the counterweight 74, and consequently the passing of the belt over the two pulleys 35 and 36.

The rollers are no longer actuated, and the lower gearing alone continues to rotate. The stoppage of the hanks is intended to allow of their draining, the duration of which is nearly equal to that of the washing with soda which falls from the hanks drop by drop and always returns to the recuperating-reservoir 19 by the pipes 17 and 18. When this draining is ended, the cam 46 raises the lever 47, which opens the water-valve. The water enters through the perforated tubes 49 and 50, and the jets converge toward the hanks. At this moment the projection *b* of the cam 56 has come in front of the catch 73; the lever 69' has oscillated, and the belt is replaced on the pulleys 34 and 35, the hanks again being put in motion, and the rinsing, the final operation of the mercerizing, takes place. The water entering through the pipes 49 and 50 mixes with the soda with which the hanks are impregnated and forms a solution rich in soda, which it is economical not to allow to be lost. With this object as soon as the water enters the soda-outlet valve closes and the cam 57 raises the water-outlet valve through the medium of the lever 58. The water that is rich in soda then discharges through the pipe 20 and falls into a vat 86, from which it may be afterward drawn for use in other operations after being freshly saturated. At the expiration of a certain time the water which runs off into pipe 20 contains no more soda. The cam 61 then raises the lever 62 and through the medium of the levers 63 and 64 moves the tube 20 from 20' to 20'', Fig. 4. The water then runs in pipe 20 into the vat 87. Further, the cam 61 being formed of three disks can be adjusted at will, and this enables to collect only the water that is rich in soda to any extent that may be desired. The cam 46 continuing to rotate returns to its normal position, the rod of the valve is lowered, the valve closes, the rinsing is then ended, and the rod fixed on the arm 67 of the lever 47 releases the sounding-gong, which announces that the operation is ended and calls the attention of the workman in charge of the machine. At this moment the shaft 45, having effected a complete revolution, brings back the cam 56 to its first position, and the catch 73, dropping into recess *c* in this cam, causes the fork under the strain of the counterweight 74 to return again onto the pulley 36 and effects the automatic arrest of the machine. In order to commence a fresh operation, it is sufficient to slacken the screw 84 to raise the lever 12, remove the hanks, and put in fresh

ones in the manner referred to in connection with the beginning of the working of the machine.

It will be easily seen in considering the working of the new machine described above what numerous advantages it possesses. The workman having charge of the machine can easily look after four or five machines. His whole work consists in removing the hanks which have been mercerized and replacing them by others. Again, this machine effecting entirely automatically the operation of treating with the soda and rinsing, working with great regularity and recuperating the soda solution to the desired extent, requires but little power (about one-eighth horsepower) for mercerizing two kilograms of cotton in hanks in consequence of its easy bearings, while effecting the spreading of the hanks perfectly and their impregnation without straining the fiber.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. In a mercerizing-machine, an upper roller and driving means for the same, a lower stretching-roller over which the hanks pass from the driving-roller, a vat for containing mercerizing liquid, an operating-lever for lowering the stretching-roller into and elevating it from the vat, and counterbalancing means for the stretching-roller.

2. In a mercerizing-machine, rollers over which the hanks are strung, a vat for containing mercerizing liquid, driving means for rotating the rollers and moving the hanks to carry them through the mercerizing liquid in the vat, an automatically-controlled mercerizing-liquid supply for the vat, an automatically-controlled mercerizing-liquid outlet for the vat, and an automatically-controlled rinsing-liquid inlet and outlet for discharging said liquid into and withdrawing it from the vat.

3. In a mercerizing-machine, a vat, a rinsing-liquid inlet for discharging said liquid into the vat, two vessels or a chamber for the rinsing liquid, and an automatically-controlled outlet for drawing part of the rinsing liquid from the vat into one of said vessels and part into the other.

4. In a mercerizing-machine, two rollers over which the hanks are strung, a vat, means for rotating the rollers to move the hanks through the vat, a tank for mercerizing liquid, automatically-controlled supply and return means for drawing mercerizing liquid from said tank into the vat and for returning it from the vat to the tank, automatically-operating rinsing means for subjecting the hanks to the action of a rinsing liquid after they have been subjected to the mercerizing liquid, two tanks or vessels for receiving the rinsing liquid, and an automatically-controlled outlet for withdrawing rinsing liquid

rich in mercerizing liquid into one tank and rinsing liquid free from mercerizing liquid into another tank.

5. In a mercerizing-machine, a vat, feed mechanism for moving the hanks through a mercerizing solution in the vat, an automatically-controlled outlet for withdrawing the mercerizing solution from the vat, automatically-operating stopping means for arresting the hanks-feed mechanism to permit the hanks to drain, automatically-operated starting means for throwing the hanks-feed mechanism into operation after the mercerizing solution has been withdrawn from the vat, and rinsing means for the hanks.

6. In a mercerizing-machine, a vat, two rollers over which the hanks are adapted to be stretched, driving means for rotating one of the rollers to move the hanks, lowering and raising means for lowering one of the rollers into and elevating it from the vat, mercerizing-liquid-supply means, automatically-operated controlling means for said mercerizing-liquid-supply means whereby said liquid is supplied to the vat upon elevation of said roller and said supply stopped upon lowering of the roller, starting means for throwing the roller-driving means into operation, and automatically-operating stopping means for throwing the roller-driving means out of operation after a predetermined time.

7. In a mercerizing-machine, a vat, two rollers over which the hanks are adapted to be stretched, driving means for rotating one of the rollers to move the hanks, lowering and raising means for lowering one of the rollers into and elevating it from the vat, mercerizing-liquid-supply means automatically operating to supply said liquid to the vat upon the elevation of said roller, automatically-operating means for arresting the mercerizing-liquid-supply means to stop the supply of said liquid upon lowering of the roller, starting means for throwing the roller-driving means into operation, an automatically-controlled mercerizing-liquid outlet for the vat, stopping means for throwing the roller-driving means out of operation after a predetermined time, and rinsing means adapted to automatically rinse the hanks.

8. In a mercerizing-machine, a vat, two rollers over which the hanks are adapted to be stretched, driving means for rotating one of the rollers to move the hanks, lowering and raising means for lowering one of the rollers into and elevating it from the vat, mercerizing-liquid-supply means automatically operating to supply said liquid to the vat upon the elevation of said roller, automatically-operating means for arresting the mercerizing-liquid-supply means to stop the supply of said liquid upon the lowering of the roller, starting means for throwing the roller-driving means into operation, and automatically-controlled mercerizing-liquid outlet for the vat, automatically-operating spraying means for spraying the hanks with the rinsing liquid, and an automatically-controlled rinsing-liquid outlet for drawing said liquid from the vat.

9. In a mercerizing-machine, a vat, two rollers over which the hanks are adapted to be stretched, driving means for rotating one of the rollers to move the hanks, lowering and raising means for lowering one of the rollers into and for elevating it from the vat, mercerizing-liquid-supply means automatically operating to supply said liquid to the vat upon the elevation of said roller, automatically-operating means for arresting the mercerizing-liquid-supply means to stop the supply of said liquid upon the lowering of the roller, starting means for throwing the roller-rotating mechanism into operation, and automatically-controlled mercerizing-liquid outlet for the vat, stopping means for throwing the roller-driving means out of operation for a predetermined time, automatically-operating spraying means for spraying the hanks with a rinsing liquid, starting means for again throwing the roller-driving means into operation, and stopping means for arresting the operation of the entire machine.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

MAURICE FRINGS.

Witnesses:

J. ALLISON BOWEN,

ANTONIO FERNANDO DE LA CALLE.