(No Model.)

3 Sheets—Sheet 1.

J. M. COLLINS.

DYEING MACHINE.

No. 525,534. Patented Sept. 4, 1894.

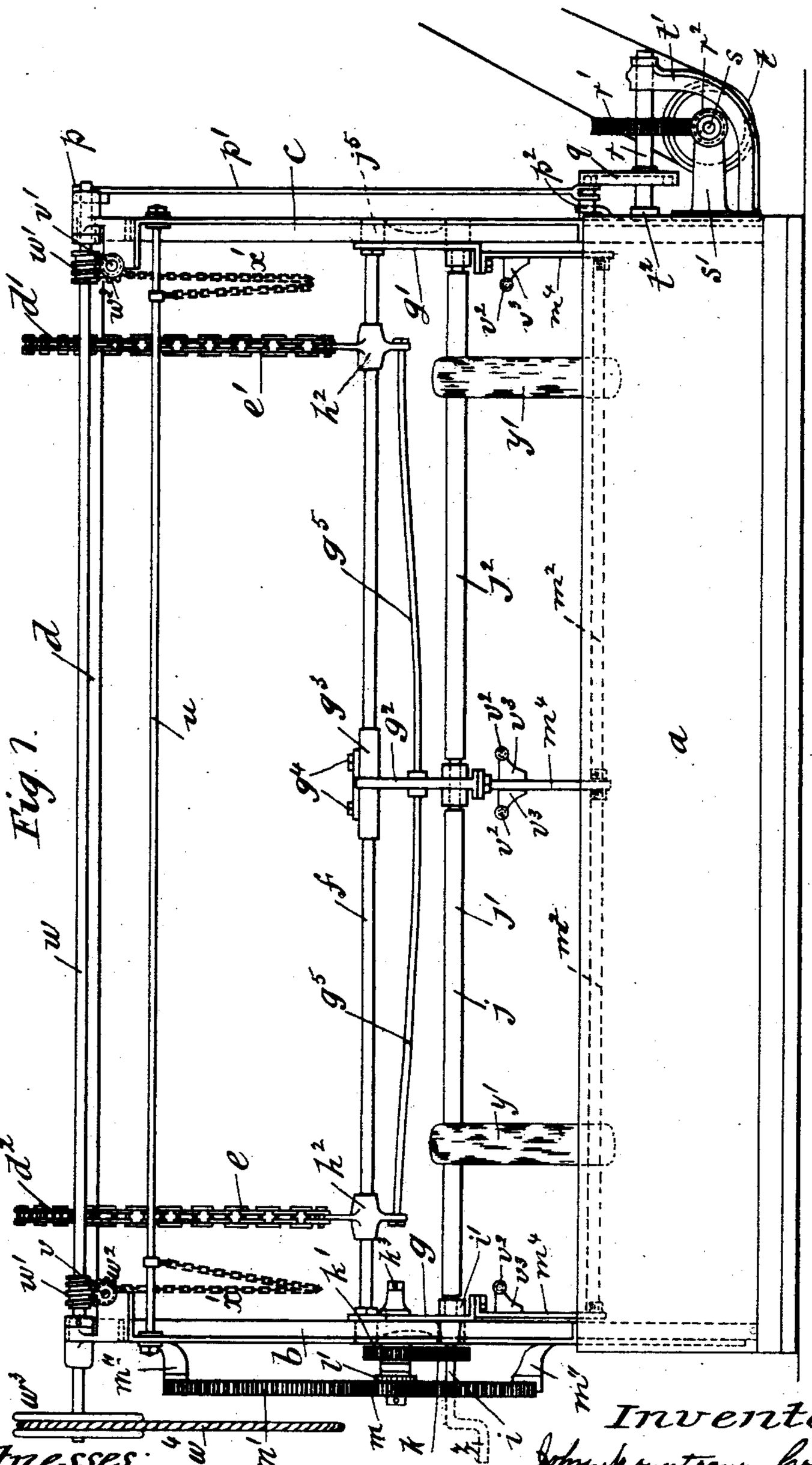

Fig. 1.

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Inventor:
John Mountgomery Collins
By Richards & Co
his Attorneys

(No Model.) 3 Sheets—Sheet 2.

J. M. COLLINS.

DYEING MACHINE.

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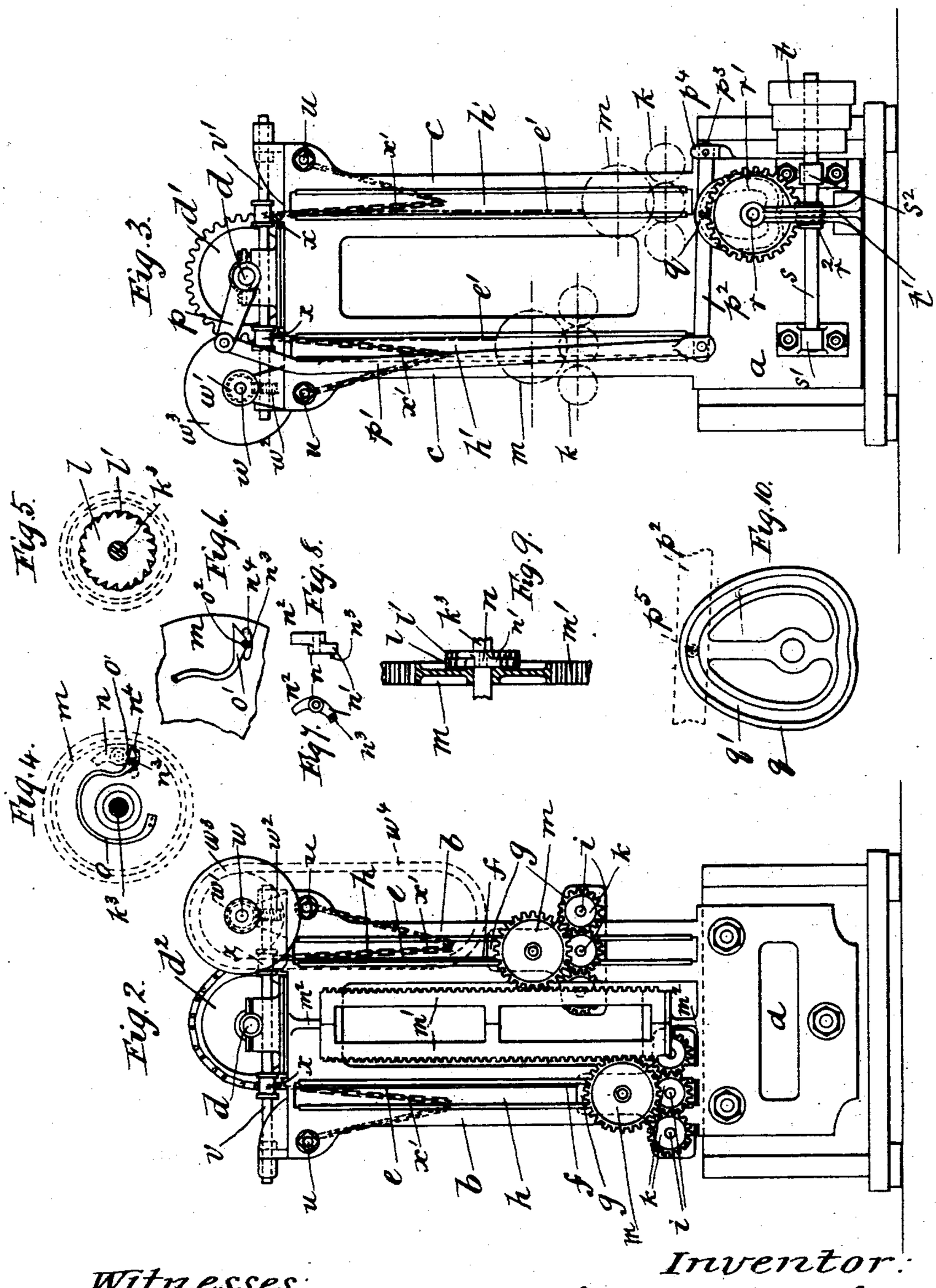

Witnesses:
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(No Model.) 3 Sheets—Sheet 3.

J. M. COLLINS.

DYEING MACHINE.

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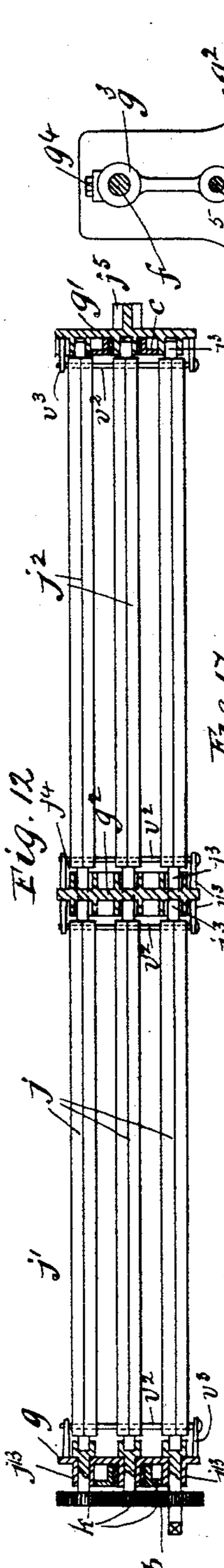


Fig. 12.

Fig. 17.

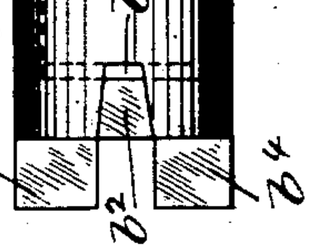


Fig. 16.

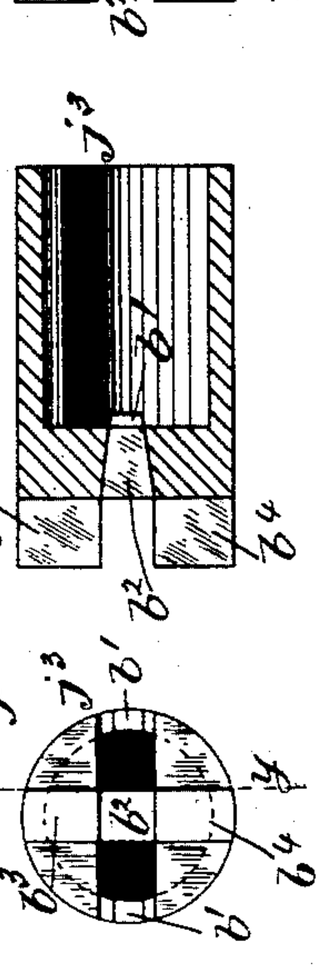


Fig. 15.

Fig. 13.

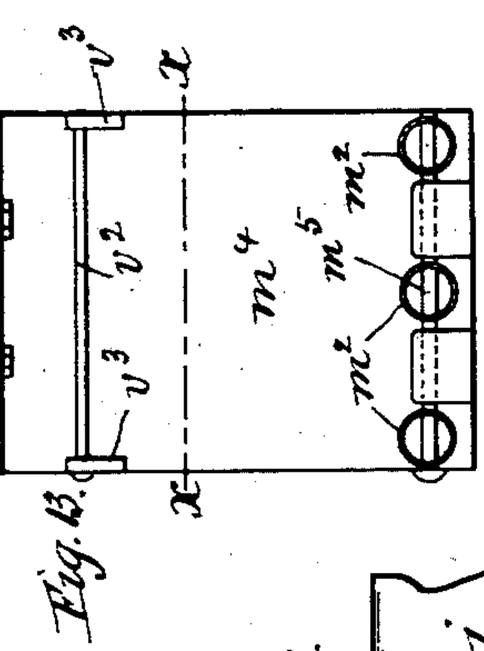


Fig. 21.

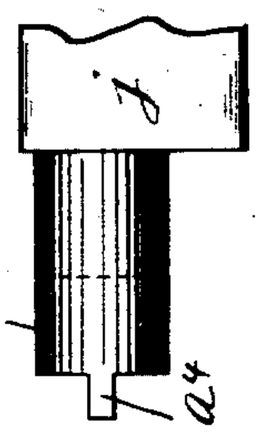


Fig. 20.

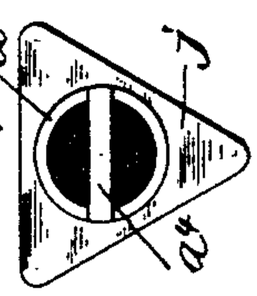


Fig. 19.

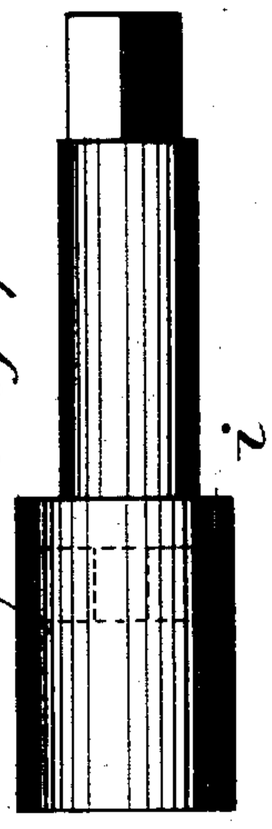


Fig. 18.

Fig. 14.

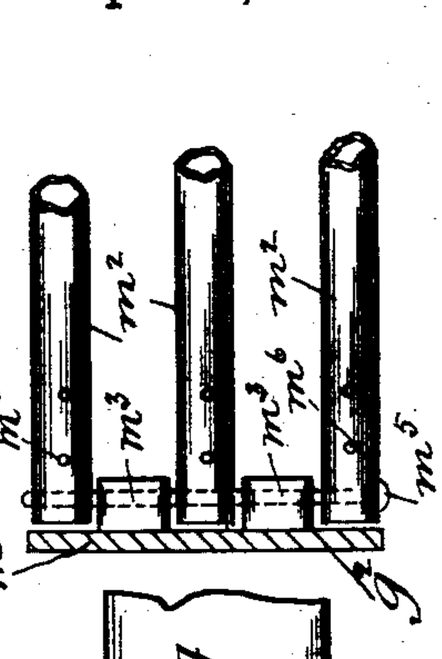


Fig. 23.

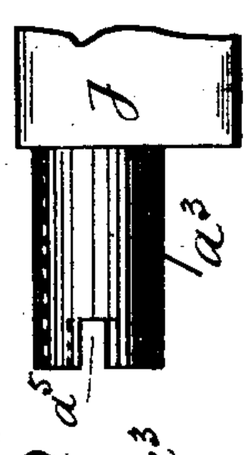


Fig. 22.

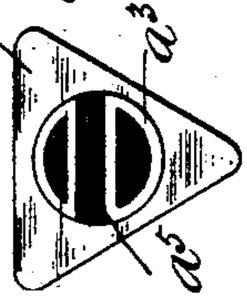


Fig. 11

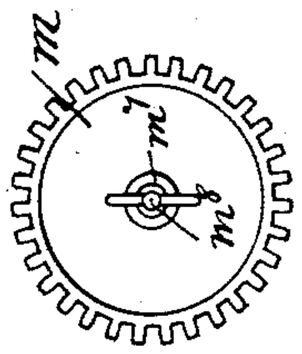
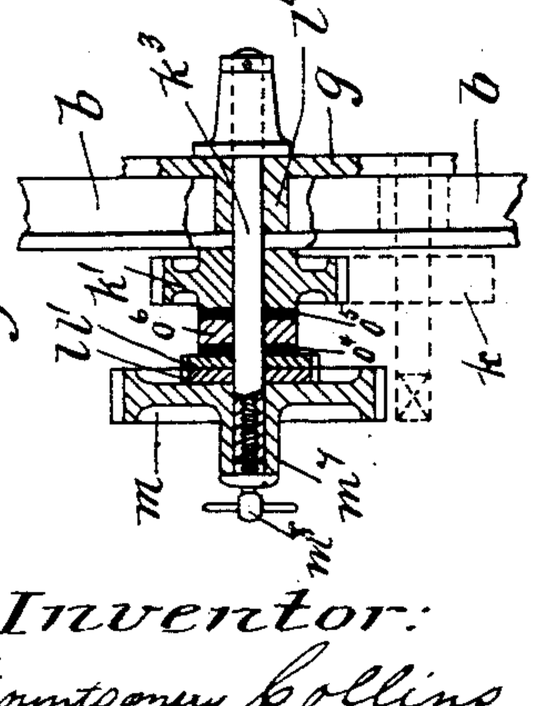


Fig. 24.



Witnesses
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UNITED STATES PATENT OFFICE.

JOHN M. COLLINS, OF GLASGOW, SCOTLAND.

DYEING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 525,534, dated September 4, 1894.

Application filed November 10, 1893. Serial No. 490,540. (No model.) Patented in England August 11, 1892, No. 14,507.

To all whom it may concern:

Be it known that I, JOHN MOUNTGOMERY COLLINS, engineer, a subject of the Queen of Great Britain, and a resident of the city of Glasgow, Scotland, have invented certain new and useful Improvements in and Connected with Machinery for Dyeing and Scouring Yarn, (for which a British patent has been granted, No. 14,507, dated August 11, 1892,) of which the following is a specification.

This invention relates to machinery for dyeing and scouring yarn, and it has for its object to make a simple, cheap, and effective machine for that purpose.

In order that my said invention may be properly understood, I have hereunto appended three explanatory sheets of drawings, wherein—

Figure 1 is a front elevation of the machine. Fig. 2 is an elevation of one end of the machine and Fig. 3 is an elevation of the other end. Figs. 4, 5, 6, 7, 8, 9 and 10 are detail views. Fig. 11 is a side view of the driving wheel of the friction gear. Fig. 12 is a plan view of the yarn carrying poles. Fig. 13 is a side view of the central supporting carrier or plate. Fig. 14 is a section of the plate or carrier on the line x—x Fig. 13. Fig. 15 is a front view; Fig. 16 a longitudinal section on the line y—y (Fig. 15) and Fig. 17 is a side elevation of the ferrule for the ends of the poles. Fig. 18 is a front view and Fig. 19 a side elevation of a socket spindle. Fig. 20 is a front view and Fig. 21 a side elevation of a different construction of ferrule for one end of a pole; and Figs. 22 and 23 are, respectively, front and side views of a ferrule for the opposite end of the pole. Fig. 24 is a section of the friction driving gear for revolving the poles of the machine. Fig. 25 is a side view of the driving wheel of the friction gear.

Reference is made to the drawings whereon the same reference letters wherever repeated indicate similar or like parts.

The machine consists of a dye vat or vessel a, on the ends of which are fitted two vertical frames b, c. The frames support, in bearings, a horizontal shaft d, which extends the full length of the machine and has on it two sprocket or chain wheels d' d^2. Passed over the chain wheels are chains e e', which are connected to two bars f one at each side of the machine. The bars f are fitted in carriers g, g', which slide in slots h, h, h', h', in the vertical frames b, c. The carriers g are made with bearings in them through which pass spindles i having sockets i' on their inner ends (see also Figs. 18 and 19). Fitted in these sockets, of which there are, preferably, three in each carrier g, one on each spindle i, are the left hand ends of the yarn carrying poles which are hereinafter more particularly described. Fitted on each set of spindles i are pinion wheels k which gear with one another. The central pinion of each set also gears with a cog wheel k' (Figs. 1 and 24) which is mounted loosely on a spindle k^3 (Fig. 24) fitted in each carrier g. Two ratchet wheels l, l' (see also Figs. 5 and 9), which are pinned together, are also fitted loosely on the spindle k^3. The ratchet wheels have their teeth cut in opposite directions. A cog wheel m (see also Figs. 4 and 9) is fitted loosely on the outer end of each spindle k^3, and these cog wheels gear with vertical racks m' carried in brackets m'' on the frame b.

Mounted on a stud fitted at the back of each wheel m is a double pawl n (see front and side views, Figs. 7, and 8) the one arm n' of which catches in the ratchet teeth of the ratchet wheel l, while the other arm n^2 catches in the teeth of the other ratchet wheel l'.

A stud n^3 (see Figs. 6, 7, and 8) on the pawl n passes through a slot n^4 in the wheel m and is capable of being moved backward and forward therein so as to change the action of the pawls. To keep the stud n^3 in its various positions a spring o is used. This spring is pinned to the front of the wheel m and is bent as shown at Fig. 4, so that its end, which has a wave-shaped head o' with a cut or recess o^2 in the crest of the wave, bears against the stud n^3. When the stud n^3 is placed in the recess o^2 (as shown at Fig. 6) the pawls are thrown out of gear, whereas, if the stud is moved along the inclined plane at one side or other of the head, one or other of the arms n', n^2, of the pawl, is thrown into gear with one or other of the ratchet wheels l, l'.

The overhead shaft d and chain wheels d', d^2, are caused to partially turn backward and forward so as to alternately, raise and lower the carriers g, g', with their gearing and the

yarn carrying rollers j, into and out of the dye vat or vessel a, by means of a crank p which is connected by a lever p' to one end of a second lever p^2 which latter is fulcrumed, at its other end, p^3 in a bracket p^4 fitted on the right hand end of the dye vat a. (See Fig. 3.) The lever p^2 has on it a stud p^5 (see Fig. 10) which is provided with a small friction roller. The roller on the stud runs in the groove q' of the heart-shaped cam q which is carried on a short shaft r. The cam shaft r has also on it a toothed wheel r' which gears with and is turned by a worm wheel r^2 keyed on a shaft s which is carried in bearings s' s^2. The shaft s is revolved by means of band pulleys t.

t' is a bearing bracket for the outer end of the shaft r.

t^2 is the bearing for the inner end.

u are stays.

y' y' represent hanks of yarn. To lift the yarn out of the vat at any time, the cross shafts v, v' are provided. These shafts are carried in bearings in each frame b, c and are capable of being revolved by means of a long overhead shaft w, which has worms w' at each end. These worms gear with pinions w^2 on the shafts v, v'. Fitted on the shaft w is a grooved pulley w^3 on which is fitted an endless rope w^4.

x are drums or barrels fitted on the cross shafts v, v' and fitted to these drums are four chains x' two at each end of the machine. These chains are provided with hooks at their lower extremities, which, when it is desired to lift the yarn out of the vat, are caught on the bars f and, then, by pulling the rope w^4 and turning the wheel w^3, the drums are caused to revolve and wind up the chains, so raising the bars f, and the four carriers g, g' with their yarn carrying rollers up out of the vat. When it is not desired to raise the yarn up out of the vat the chains x' are slung, as shown, on to the stays u.

Instead of making the poles j, in one piece as usual, they are, under this invention, made in two or more parts j' j^2 as shown at Figs. 1 and 12. The ends of each part or half pole are provided with ferrules j^3, which are shown to an enlarged scale at Figs. 15, 16, and 17. These ferrules which are, or may be, hollow so as to fit on the ends of the poles, are made with recesses, b' at each side and at right angles to the recesses, a solid bridge piece b^2 is left.

b^3 b^4 are two raised parts or projections. With this construction of ferrule no matter how the poles are turned about or interchanged the ferrules b will always lock into each other as the projections b^3 b^4 can always be fitted into the recesses b'. When the ferrules are locked together the projections b^3 b^4, of one ferrule, catch on and hold against the bridge piece b^2 of the other and vice versa.

The left hand or driving ends of the poles j' are fitted into the socket spindles i. These spindles, as shown to an enlarged scale at Figs. 18 and 19, are made, in their socket part i', with a central raised projection c' and four recesses c^2 which appear in plan, see Fig. 18, somewhat like a St. George's cross.

c^3 are triangular shaped projections left in the metal. As will be seen no matter how the poles are shifted about or interchanged the projections b^3 b^4 of the ferrules will always lock into two of the recesses c^2 and the central projections c' of the socket spindles will always lock into the central space left between the projections b^3, b^4, of the ferrules.

Figs. 20 to 23 show modified constructions of ferrules. The ferrule a^2 Figs. 20 and 21 is fitted on one end of a half pole and the ferrule a^3 Figs. 22 and 23 on the other end. The ferrule a^2 is made with a central projection a^4 and the ferrule a^3 with a corresponding recess a^5. When the half poles are locked together the projection on one part fits into the recess of the other. The sockets of the driving spindles would also, in this case, be made with central ribs or projections which would lock or key into the recesses of the ferrules. This construction of ferrule is not so good as the construction hereinbefore described as the poles can only be locked together in one way $i.$ $e.$, when the ferrule a^2 of one pole comes opposite the ferrule of a^3 of another. Should the poles be so turned about that the ferrule a^2 (or a^3) of one pole comes opposite the ferrule a^2 (or a^3) of another, then, of course, they will not lock together.

The sectional poles, of which there are, preferably, three sets at each side of the machine, are supported at either end by the carriers g, g' which slide up and down in the side frames b, c of the machine and in the center by supporting carriers g^2.

The carriers, g, g', g^2, are connected together by the longitudinal bar f. The central carrier g^2 may be made with a sleeve g^3 through which the bar f passes. The carrier g^2 may be capable of sliding on the bar, so as to suit different lengths of sectional poles, and be clamped in place by means of pinching screws g^4. Stays g^5 may connect the plate g^2 with the lifting chain collars h^2. The central carrier g^2 has three holes g^6 (see Fig. 13) for the reception of the abutting ends of the half poles which are so fitted together that the ferrules interlock within these holes. The end carrier g' has also three holes or sockets for the reception of the ferrules at the ends of the half poles j^2. The ferrules at the driving ends of the half poles j' are fitted in the socket spindles i, which pass through and revolve in backwardly extending bearings j^{13} (see Fig. 12) cast on the carrier g. Trough shaped guards j^4 (see Fig. 13) may be cast on the plates g, g', g^2, just below the holes or bearings as the case may be. Projections j^5 may be cast on the plate g' to guide it in its vertical movements within the slot of the frame c. The central bearing j^{13} of the plate g serves in conjunction with the bearing l^4 of

the spindle k^3 of the friction gear (see Fig. 24) as a guide for that plate as it moves up and down in the slot of the frame b.

m^2 (Figs. 1, 13, and 14) are hollow brass or other rods for keeping the yarn stretched. These rods are fitted to snugs m^3 (Fig. 14) on extension plates m^4 attached to the guide plates g, g', g^2. The rods are locked to the plates by means of pins m^5 which are passed through holes in the ends of the rods and in the snugs. The rods have holes m^6 at one end for the purpose of allowing the dye liquor to circulate through them.

The action of the machine is as follows:—The revolutions of the shaft s, operate the cog wheel r' and cam q, and this cam, as it revolves, gives an oscillating motion to the levers p^2, p', and crank p, as a consequence the chain wheels d', d^2, from which are suspended the two sets of sectional poles j with their hanks of yarn, are partially revolved backward and forward. As the sets of poles are so suspended by the chains e, e', passing over the wheels d', d^2, that they balance each other, it follows, that at each partial turn of the wheels d', d^2, in one direction the yarn at one side of the machine will be lowered or dipped into the dye liquor, while the yarn at the other side, will be raised up out of or partially out of the dye liquor; when the wheels partially turn in the opposite direction, the dipping action is reversed.

It will be seen that with this machine the action is continuous, the yarn at one side being dipped while that at the other is being lifted up and vice versa.

As the carriers g and g' are raised and lowered the cog wheels m, run up and down the racks m', and, as a consequence, are revolved. The revolutions of the wheels m, cause, according as the pin n^3, is placed to one side or the other of the niche or recess o^2 in the head o' of the spring o, one or other of the arms of the pawl n to gear with and revolve one or other of the ratchets l, l'. The revolutions of the ratchets cause the cog wheel k' to revolve and through it also the train of pinions k. The revolving motion of the pinions is communicated by the spindles i and sockets i' to the poles j on which the yarn is hung. When the arm n' on the pawl n is made to gear with the ratchet l the pinions k and poles j are made to revolve in one direction, while, when the arm n^2 is made to gear with the ratchet l' the pinions and poles are revolved in the opposite direction.

It is sometimes desirable to revolve the poles, for a short period, very quickly. This can be effected by moving the pin n^3 into the recess o^2 so as to throw the arms of the pawl n out of gear, when this has been done a handle z (see dotted lines Fig. 1) is fitted on the squared outer end of one of the spindles i and the train of pinions quickly revolved by hand.

As it is possible that the yarn may sometimes be caught and held when being turned, and as it is, when so caught likely to break some part of the machinery I provide a friction driving gear to, in such cases, turn without moving the poles or unduly straining the yarn. The gear is shown at Figs. 24 and 11. It consists of the wheel m which is made with a hollow boss m^7 through which passes a tightening screw m^8. This screw works in the spindle k^3. Interposed between the ratchets l and l' and the tooth driving wheel k' are two leather or other soft washers o^4 o^5 and a metal washer o^6. The wheel m is revolved as it travels up and down the rack m' as hereinbefore explained and the wheel k' drives the train of pinion wheels k for revolving the poles. As all the gear is loose on the spindle k^3 it follows, as a consequence, that by slackening the screw m^8 the friction between the wheel k' and washer o^5 can be so reduced that said wheel k' will not be turned or be turned with very little power by the main driving wheel m and also if the screw m^8 is tightened up the friction and power will be increased.

By turning the screw m^8 the gear can be so adjusted that should the yarn catch the wheel k' will slip and not be turned by the wheel m.

The poles j' j^2 may be covered or cased with brass or other suitable metal.

For the purpose of preventing the hanks of yarn, when being turned on the poles, from coming in contact with the carriers g, g', g^2, short cross bars or guards v^2 made of wood or metal are fitted in brackets v^3 cast on or secured to the carriers. These rods prevent the yarn working to the ends of the poles. Of course, if so desired, each pole j may be made in three or more sections, and, in this case, a corresponding number of supporting carriers g^2 would be fitted on the bars f.

The vat a may be divided longitudinally into two compartments by a partition, and, in this case, one compartment may contain a different dyeing liquor from the other, so that the yarn at one side may be dyed a different color or shade from that at the other.

The complete machine and vat a may be mounted on wheels if so desired, for convenience in moving it from one part of the dye house to another.

By making the machine with two sets of susperded balanced poles the cost of construction is reduced, less power is required to drive the machine, the yarn is dipped oftener, and the machine does not require to be made so strong or so heavy as at present. The action is also continuous, for, when the yarn on one side is being raised out of the liquor in the vat the yarn at the other side is being dipped.

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

1. In yarn dyeing and scouring machines the combination with a vat, of two side frames fitted to the ends thereof and supporting an overhead shaft with pulleys thereon and chains passing over said pulleys from which a set of yarn carrying poles is suspended at

each side of the machine, the sets of poles being balanced, said shaft being caused to oscillate and alternately raise and lower the yarn, at each side into the vat, substantially as described.

2. In yarn dyeing and scouring machines the combination with a vat, of two side frames fitted to the ends thereof and provided with vertical guides in which slide carriers supporting two sets of suspended and balanced yarn carrying poles one set at each side of the machine, said poles being rotated when they are raised and lowered by means of gearing meshing with a double rack at one end of the machine, substantially as described.

3. The combination with the vat, of side frames fitted to the ends thereof and supporting an overhead shaft from which two sets of poles are suspended, said shaft being caused to oscillate by means of a cam q which reciprocate levers p^2, p', and a crank p secured to the shaft, substantially as herein before described.

4. The combination with the vat, of the side frames fitted to the ends thereof, the double rack m', gear wheels m meshing therewith, ratchets $l\ l'$, friction disks o^3, o^4 and means for regulating the pressure on said disks, substantially as described.

5. In combination with the yarn carrying poles, interlocking ferrules on the ends thereof each having a bridge piece, projections adjacent thereto and recesses on the opposite sides thereof, substantially as described.

6. In combination with the yarn carrying poles, interlocking ferrules on the ends thereof, a socket spindle in connection with driving means, said spindle having a projection in its socket with recesses on all four sides thereof adapted to engage projections and recesses on the ferrule, substantially as described.

7. The combination in the described machine, with the poles, of carriers $g\ g'\ g^2$, extension plates m^4 and guards v^2 fitted to said plates, substantially as herein before set forth.

In witness whereof I have hereunto signed my name, at Glasgow, Scotland, this 16th day of October, 1893.

JOHN M. COLLINS.

Witnesses:
MELVILLE DUNBAR,
WILLIAM GALL.