(No Model.)

4 Sheets—Sheet 1.

G. H. CRAVEN.

DYEING MACHINE.

No. 519,323. Patented May 8, 1894.

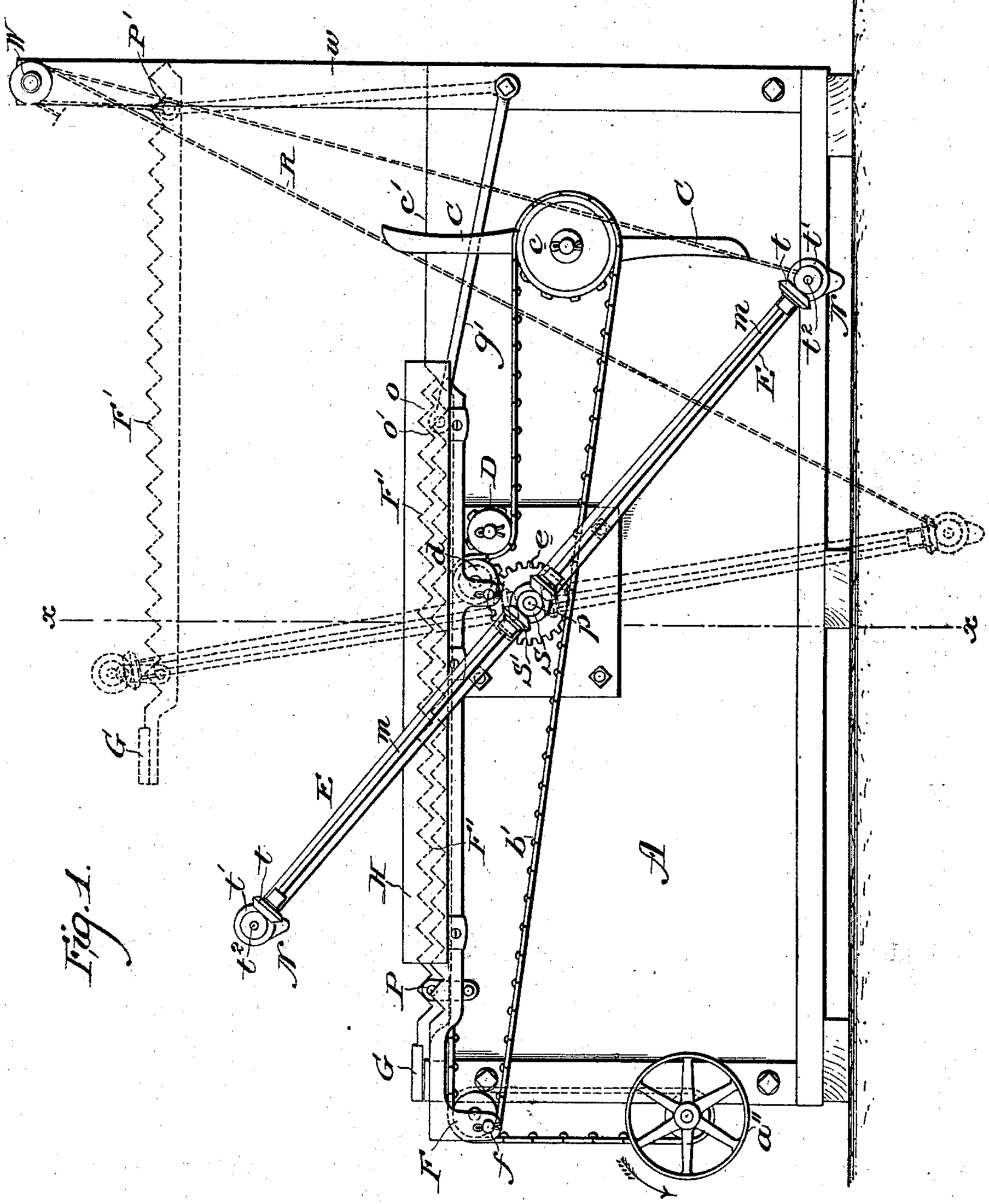

Fig. 1.

WITNESSES:
David S. Williams.
Edw. F. Ayres

INVENTOR:
George H. Craven
by his atty.
Francis J. Chambers

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

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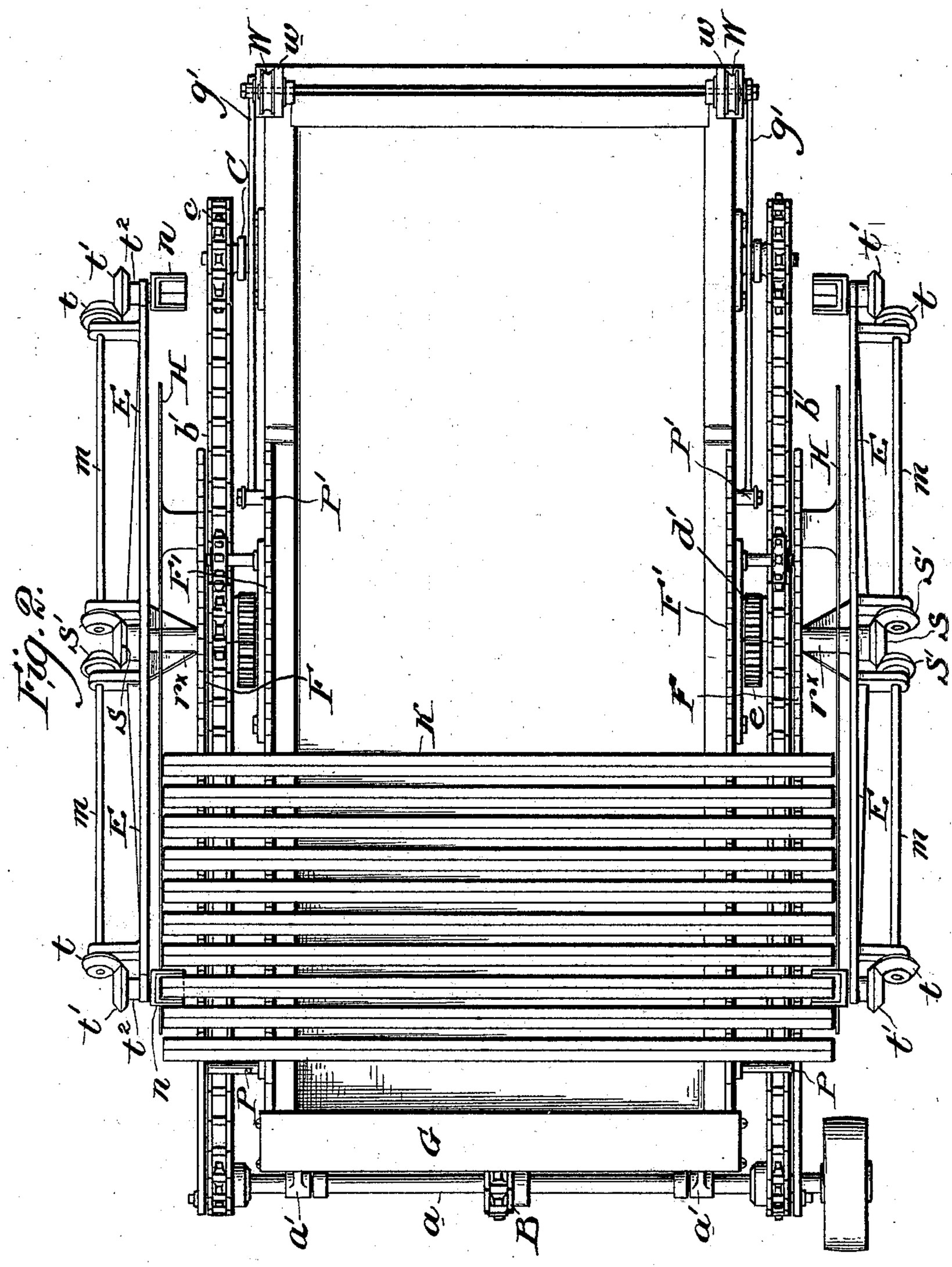

Fig. 2.

WITNESSES:
David S. Williams.
Edw. F. Ayres.

INVENTOR:
George H. Craven
by his atty.
Francis T. Chambers

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

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G. H. CRAVEN.

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Fig. 3.

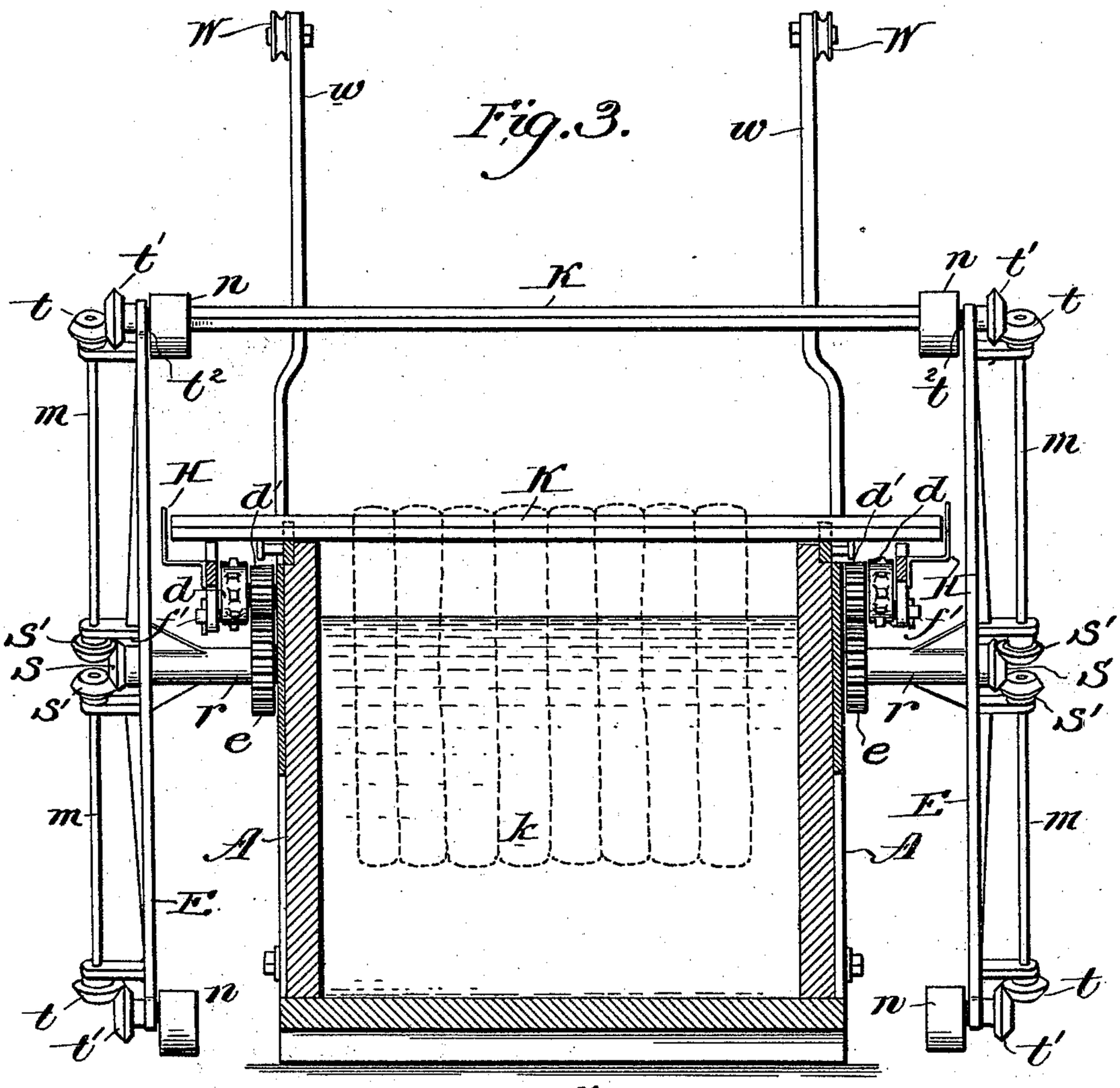
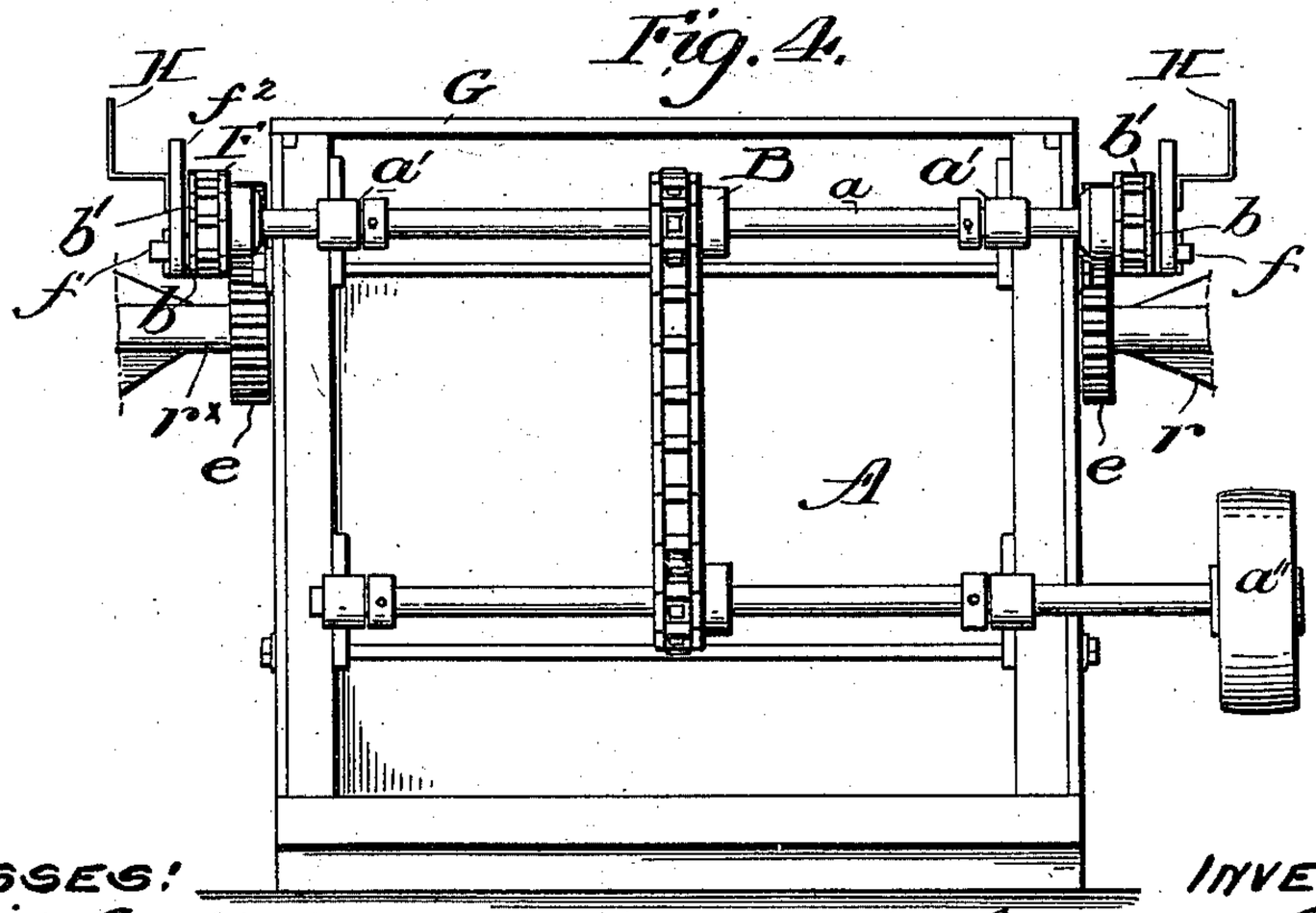


Fig. 4.



WITNESSES:
David S. Williams.
Edw. F. Ayres.

INVENTOR:
George H. Craven
by his atty.
Francis T. Chambers

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

(No Model.) 4 Sheets—Sheet 4.

G. H. CRAVEN.

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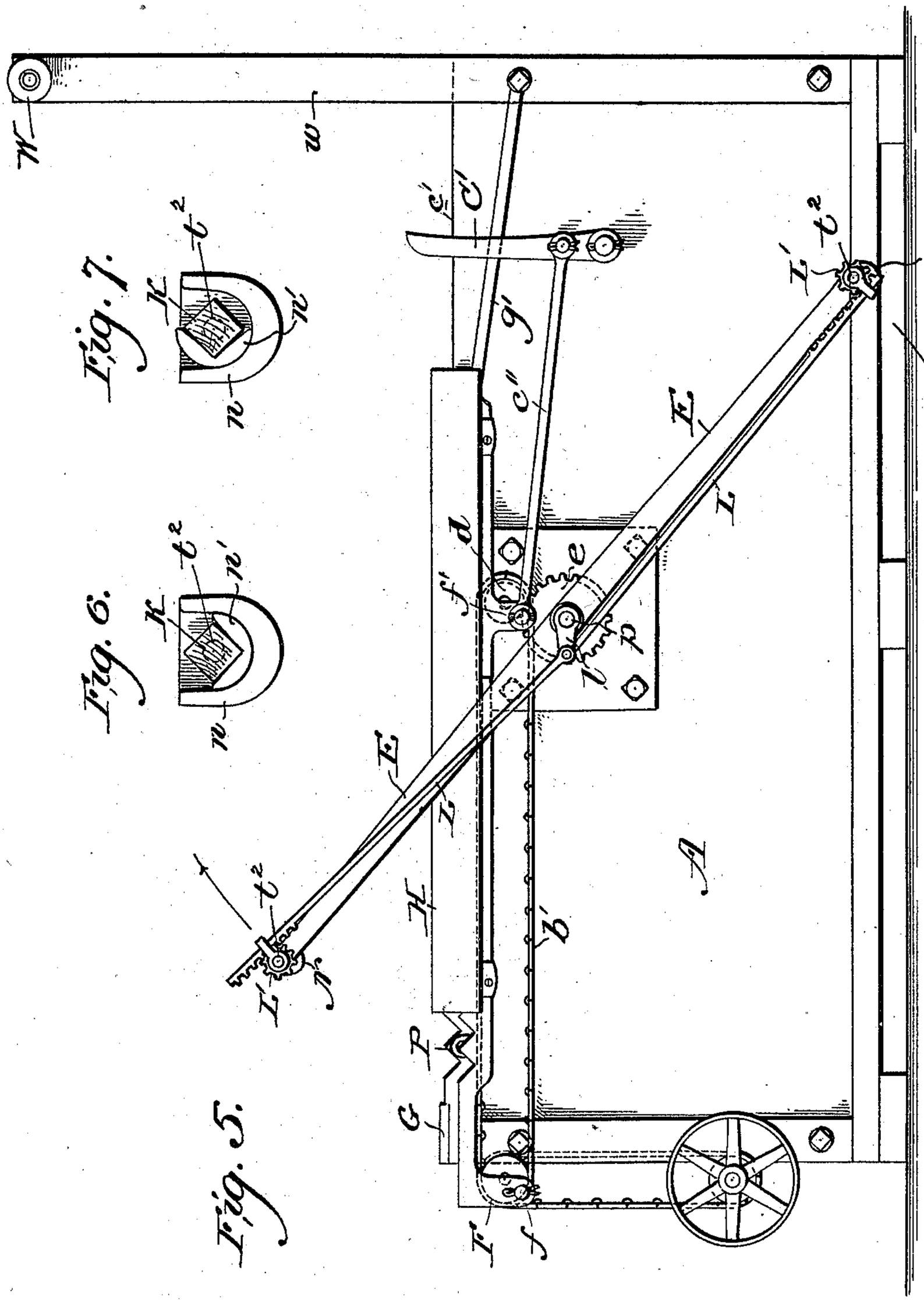

WITNESSES:
David S. Williams.
Edw. F. Ayres

INVENTOR:
George H. Craven
by his atty.
Francis T. Chambers

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

GEORGE H. CRAVEN, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO JAMES S. CRAVEN, OF SAME PLACE.

DYEING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 519,323, dated May 8, 1894.

Application filed January 23, 1893. Serial No. 459,388. (No model.)

To all whom it may concern:

Be it known that I, GEORGE H. CRAVEN, a citizen of the United States, residing in the city and county of Philadelphia, in the State of Pennsylvania, have invented a certain new and useful Improvement in Dyeing-Machines, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to machines for dyeing yarns in hanks or skeins and especially to machines where the yarn is carried forward through the dye liquor in an open tank. As is well known, yarn has a better and more even tint when in addition to the comparatively slow movement of the yarn through the dye liquor, it is given, preferably when first immersed in the dye liquor a sudden push which tends to separate the yarns and permits the dye liquor to more effectually permeate them. This sudden motion of the yarn, called "swilling" has heretofore been done by hand and one of the objects of my invention is to provide automatic means for effecting this swilling, other objects are to provide improved means for advancing and returning the yarn through the tank, for rotating the yarn carrying bars and for raising the whole mass of yarn out of the dye liquor, and my invention consists in means for giving the yarn a quick motion through the dye liquor during a part of its travel and in various details of construction which tend to simplify and improve the action of the machine.

The nature of my improvements will best be understood as described in connection with the drawings in which they are illustrated, and in which—

Figure 1 is a side elevation of a dyeing machine embodying my improvements. Fig. 2 is a top view of the dyeing machine shown in Fig. 1, representing some of the yarn carrying bars in position. Fig. 3 is a section on the lines *x*—*x* of Fig. 1 looking toward the right. Fig. 4 is a view of the left end of the dyeing machine shown in Fig. 1 showing the mode of applying power. Fig. 5 is a view similar to Fig. 1 showing some modifications. Figs. 6 and 7 are views of my improved means for turning the yarn carrying bars, and Fig. 8 is a detail of the forward pins on the racks F′.

A represents a dye tank or vat of ordinary construction in which is contained the dye liquor, and K represents yarn bars on which are hung the hanks of yarn *k* which are to be dyed. On one end of this tank running in bearings *a′* is a shaft *a* which has at each end a sprocket wheel *b*. Power is applied to this shaft at B in any convenient way as by a lower shaft with a pulley *a″*, and all parts of the machine are operated by chains *b′* on the sprockets *b*.

The connections on both sides of the machine are alike and a description of one side clearly describes both.

Pivoted on the side of the tank are sprocket wheels *d* and *c* to which motion is imparted by the chain *b′*. The sprocket wheel *d* has formed with it a gear wheel *d′*, shown in Fig. 3, which meshes with a gear wheel *e* pivoted on the side of the tank at *p*. The gear wheel *e* is fastened on a sleeve *r* and the sleeve *r* carries on its outer end the arms E. The arms E have at their outer end sockets N formed of two parts *n* and *n′* Fig. 6 as will be hereinafter more fully described. The sprocket wheel *c* carries arms C. The sprocket wheels *b* and *d* are of the same size and so move with the same speed and have set in corresponding position, pins; a pin *f*, in the sprocket *b* and a pin *f′*, in the sprocket *d;* carried on these pins is a notched rack F and constitutes a carrier for the yarn carrying bars and which has a rotary motion of as great an amplitude as the distance of the pins *f*, *f′*, from the center of the wheels which carry them, and which rack is designed to carry forward the yarn bars as hereinafter explained.

F′, represents a second rack, also notched to fit the yarn bars which is stationary on the edge of the tank but may be connected to an operating part of the machine and lifted to remove the yarn from the dye tank as will be hereinafter explained. The gears of gear wheels *d′* and *e* are so proportioned that the arms E make one revolution while the sprocket wheel *d* makes two, so that one end of the arm E will pick up a yarn bar from the last notch of the rack F′ as it is placed in this notch of the

rack by the oscillating bars F at each revolution of the sprockets *d* and *b*. The size of the sprocket wheel *c* is also so proportioned that it makes one revolution to every two of the sprockets *b* and *d*, and so one arm C attached to the wheel *c* is in position to push a yarn bar into the first notch of the rack F′ as one is taken from that notch by the oscillating rack F. There is as seen in Fig. 1 an axis *p* projecting from the dye vat A and on this axis rotates the sleeve *r* which carries the gear wheel *e* and bars E. To this pivot is fastened a stationary bevel wheel *s* which meshes with the bevel wheel *s′*, this by means of a rod *m* is connected to a bevel wheel *t* which meshes with a bevel wheel *t′*. The bevel wheel *t* has a shaft *t″* which extends through the arm E and carries the pocket *n′* fastened thereon so that this pocket will turn with the bevel wheel *t′*, but on the inside of the arm E. This pocket is designed to pick up the yarn rods as will be hereinafter more fully described, and is shaped to fit the yarn bars. Outside of the pocket *n′* and loosely pivoted on its shaft *t″* so that it can turn and always preserve its upright position is a second pocket *n*, which will prevent the yarn bar K from falling out of the inner pocket when this inner pocket is turned as seen in Fig. 7. The two form the socket N which picks up a yarn bar and carries it to the rear of the tank and at the same time turns it over.

At the rear of the tank A are two standards *w* carrying pulleys W for raising the racks F′ and the yarn bars when desired. A small idle wheel D is provided to more effectually guide the sprocket chain *b* and guides H for the yarn bars may be used as seen in Fig. 1.

The operation is as follows: Hanks of yarn *k* are hung on rods K and are partially immersed in the dye liquor as is shown in Fig. 3; many bars K can be used at once each fitting into a different notch *o*, *o′*, in the inner racks F′. Power is now applied at B and the sprocket wheels *b* and *d* and the bars E and the sprocket wheel *c* which carries the arms C are all caused to turn. As the wheels *b* and *d* revolve the racks F′ one on each side of the vat have a corresponding rotary motion each point of the bar F describing a circle of as great radius as the distance that the pins *f*, *f′*, of the wheels *b* and *d* are from the center of those wheels. This motion of the bar F is such that it picks up a yarn carrying stick out of one notch *o* of the rack F′ and deposits it in the next notch *o′*, so that with each revolution of the wheels *b* and *d*, the whole body of yarn is carried forward a distance equal to the space between the notches. When a yarn carrying bar reaches the last notch of the frame F′ it is in line with the sockets N on the revolving bar E, since these yarn bars as will be seen from Fig. 3 project some distance from the side of the dye vat and are guided by guides H fastened on the side of the vat. That yarn carrying bar therefore which is in line with the socket N is picked up by the rod E as it revolves and carried to the rear of the vat, and while being so carried is turned over by the gear on the arm E and thus a new portion of the yarn is brought into the dye liquor. When the rod is deposited at the rear of the vat by the rods E it is struck by an arm C fastened on the gear wheel *c* and quickly pushed along the edge *c′* of the tank into the first notch of the rack F′ where it commences its forward journey again. The forward movement of the yarn bars is thus accomplished by two separate means, each of which gives the yarn bars a different speed, one consisting of the rack bars F which slowly move the yarn through the dye, and the other means being the arm C which gives the yarn a sudden forward movement through the dye as soon as it is returned to the rear of the tank by the revolving arms E. This quick movement of yarn in the dye stuff which has heretofore been done by hand, is by my improvement accomplished automatically by the arms C which give the yarn bars a quick forward motion along the edge of the tank and so carry the yarn suddenly through the dye which operates to separate the yarns and gives them more evenness of tint. When it is desired to remove the yarn from the vat the inner rack bars F′ are bodily lifted from their position on the edge of the tank. These racks F′ are connected at the rear by a cross bar G and have at the front two guide arms *g′* which serve to prevent the springing of the disconnected front ends and make a rigid frame of the racks F′. At the forward end of these racks are pins P formed in two parts as seen in Fig. 8 and so arranged that the pins may slide together to be out of the way during the operation of the machine and slid out to come in line with the sockets N of the bars E when the racks F′ are to be raised; and at the rear of racks F′ are pins P′. When it is desired to raise the racks F′ one end of a chain R is fastened to either of the rear pins P′, the chain is passed over pulleys W arranged on the standards *w* at the rear of the vat and the other end of the chain is fastened to the left end of the bar E as seen in Fig. 1, the other end of the bar E raising the forward end of the bar F by means of the sockets N which are in line with the pins P when these are slid out. If now power be applied, or if the bar E be turned by hand the rack bars F′ will be raised and all the yarn will be removed out of the dye liquor as shown in dotted lines in Fig. 1.

Instead of the means described for turning the inner pockets *n′* the device shown in Fig. 5 can be used.

Fastened to the pivot *p* is a plate *l* and pivoted in this plate eccentrically to the main bar E is a rod L which is toothed at both ends and meshes with a toothed wheel L′ which carries the shaft *t″* of the pocket *n′*; as the bar E turns the rod L will move relatively to it and turn the gear wheels L′ and the sockets of the yarn rods.

Various other devices such as an eccentric or any similar device which would readily suggest themselves to a skilled mechanic may be used to turn the pockets n', and I do not wish to be confined to the means shown. By increasing or diminishing the relative size of the bevel wheels or the distance of the rod L from the center of the bar E the distance which the pockets n' are turned can be regulated, and this regulates the amount of yarn which is newly put into the dye liquor each time the yarn is carried from the rear to the front of the tank. Also instead of the sprocket wheel c with the arms C a single reciprocating arm as C′ shown in Fig. 5 may be used, reciprocated from the pin f' of the wheel d. Any velocity of movement desired may be given to this bar C′ by pivoting the connecting bar c very near to the pivot of the bar C′.

There have been described as means for carrying the yarn bar forward a double set of notched racks, and these are the best means that I have contemplated for carrying my invention into effect, but it is evident that many other means may be used without departing from the spirit of my invention. The inner rack F′ may be dispensed with altogether if desired and yarn bars be moved forward on the edges of the tank. The racks F, F′, may be dispensed with and any suitable means such as a reciprocating slide or chains as shown in my Patent No. 417,908, granted December 24, 1889, or any other similar means may be used to give the yarn bars a steady or intermittent forward motion. The raising of the yarn bars and the yarn may be done as has been shown entirely by the action of the machine which is a very great advantage where large weights of yarn have to be raised.

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

1. The combination in a yarn dyeing machine, of the tank, the yarn carrying bars, means for moving said bars from end to end of the tank, and arms pivoted on the opposite sides of said tank adapted to carry the bars from one end of the tank to the other.

2. In a yarn dyeing machine the combination of the tank the yarn carrying bars, means for moving the same along the edge of the tank, and pivoted arms adapted to carry the yarn carrying bars from one end of the tank to the other with sockets at the outer ends of said arms said sockets having pockets for the reception of the yarn carrying bars.

3. In a yarn dyeing machine the combination with a tank of a carrier operating to give the yarn an intermittent forward motion through the tank and means for returning the yarn to the rear of the tank.

4. A yarn dyeing machine having in combination a tank, yarn carrying bars, a carrier for moving the yarn carrying bars forward along the edge of the tank means for returning the yarn carrying bars to the rear of the tank and means adapted to push the yarn carrying bars into the carrier.

5. In a yarn dyeing tank the combination of the tank, yarn carrying bars, two sets of devices arranged to act consecutively for removing the yarn carrying bars forward along the edge of the tank each set giving the yarn carrying bars a different speed and means for returning the bars to the rear of the tank.

6. In a yarn dyeing machine the combination with a tank of yarn carrying bars, means for advancing the yarn carrying bars along the edge of the tank, pivoted arms for returning the yarn carrying bars to their first position and means for rotating the yarn carrying bars.

7. A yarn dyeing machine having in combination a tank, yarn carrying bars, moving racks for giving the yarn carrying bars an intermittent forward motion along the edge of the tank and pivoted bars for returning the yarn carrying bars to the rear of the tank.

8. A yarn dyeing machine having in combination a tank, yarn carrying bars, two sets of devices for advancing the yarn carrying bars along the edge of the tank each set giving the bars a different speed means for returning the yarn carrying bars to the rear of the tank and means for rotating the yarn carrying bars.

9. In a yarn dyeing machine the combination of a tank, yarn carrying bars two sets of devices for advancing the yarn carrying bars along the edge of the tank, one set giving the yarn bars a uniform and the other an intermittent forward motion, with means for returning the yarn bars to the rear of the tank.

10. In a yarn dyeing machine the combination of a tank yarn carrying bars, and several sets of devices for advancing the yarn carrying bars along the edge of the tank each set giving the yarn bars a different rate of speed, and means for returning the yarn carrying bars to the rear of the tank.

11. In a yarn dyeing machine the combination with a tank of a carrier operating to advance yarn carrying bars along the edge of the tank and pivoted arms having sockets in the outer end thereof for engaging with the yarn carrying bars and operating to return the yarn carrying bars to the rear of the tank.

12. A yarn dyeing machine having in combination a tank yarn carrying bars, means for advancing the yarn carrying bars along the edge of the tank, pivoted arms with rotating sockets for rotating the yarn bars, and returning them to the rear end of the tank.

13. In a yarn dyeing machine the combination of the tank the yarn carrying bars devices for moving the same along the edge of the tank, pivoted arms adapted to return the yarn carrying bars from one end of the tank to the other with sockets at the outer end of said arms said sockets having pockets for the reception of the ends of the yarn carrying bars.

14. The combination in a yarn dyeing ma-

chine of the tank the yarn carrying bars, devices for conveying these bars along the edge of the tank, arms on the opposite sides of the tank, sockets N on the outer ends of said arms, pockets in the sockets N for the reception of the yarn carrying bars and devices for operating upon said sockets.

15. In a dyeing machine the combination with a tank, a frame normally supported on said tank, yarn and yarn carrying bars supported on said frame and mechanism for moving the yarn carrying bars along the tank, of means adapted to connect the frame to a moving part of the said mechanism whereby the frame and the yarn carrying bars carried thereby may be raised from the edge of the tank when so connected.

16. In a yarn dyeing machine the combination with a tank, a frame adapted to rest on said tank and support yarn carrying bars, of means as pins P for securing the frame to one end of the arm E and a connection as the band R for securing the other end of the frame to the other end of the arm E, whereby as the arm E is rotated the frame will be lifted from the edge of the tank.

17. In a yarn dyeing machine the combination with a tank, a frame adapted to rest on said tank and support yarn carrying bars, of means for securing both ends of the frame to a moving part of the machine as the arm E whereby as the moving part of the machine is operated the frame and the yarn bars carried thereby will be raised.

GEORGE H. CRAVEN.

Witnesses:
ALF. H. FABER,
EDW. F. AYRES.