

No. 719,398.

PATENTED JAN. 27, 1903.

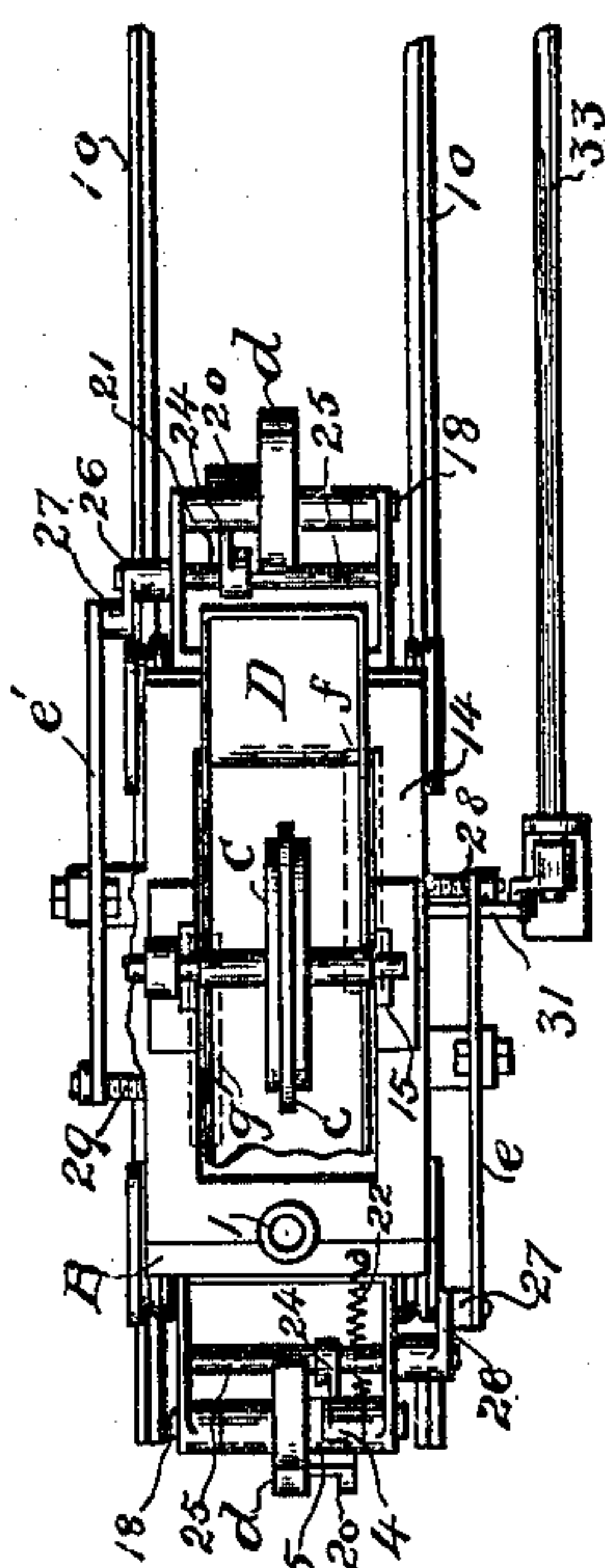
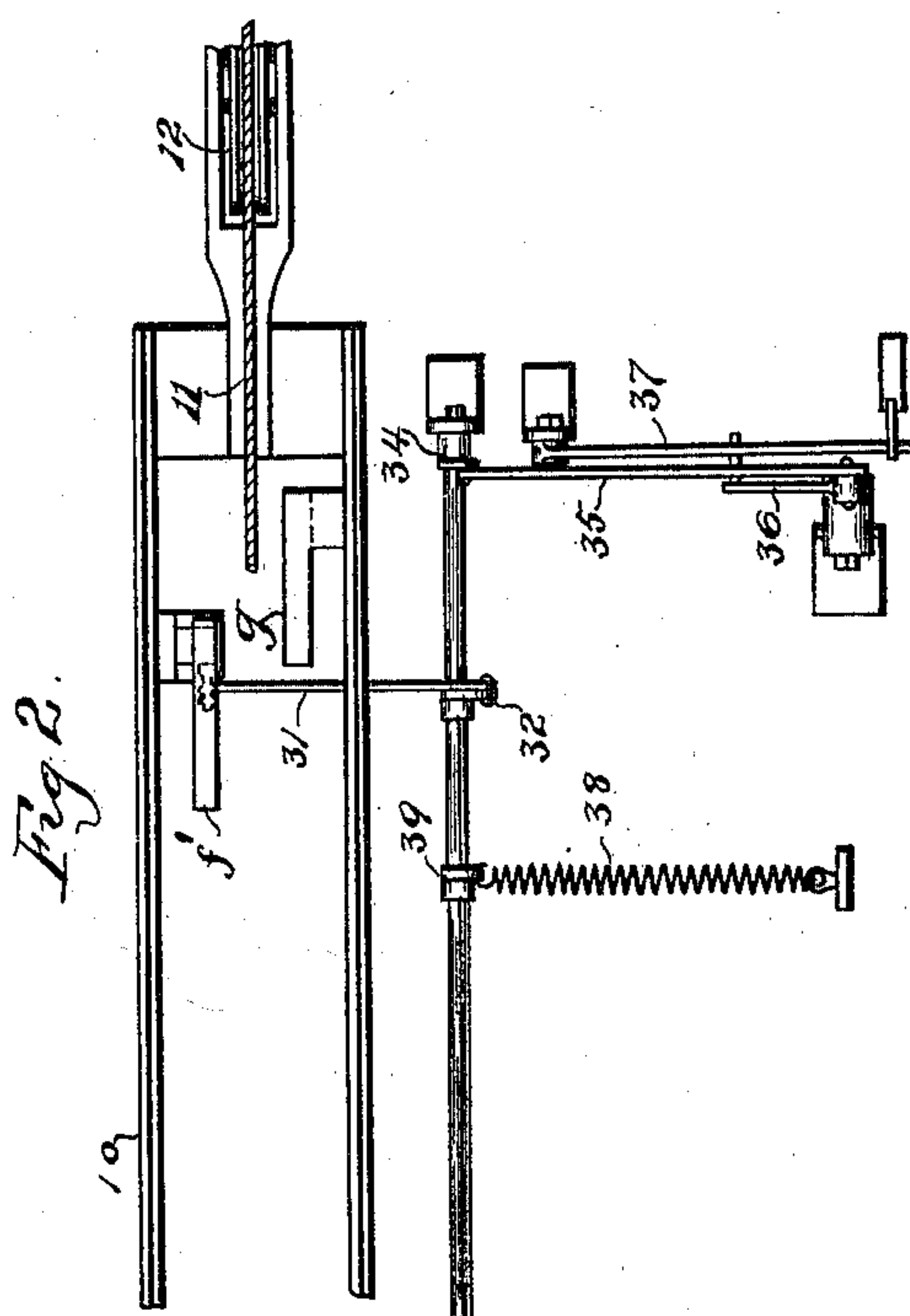
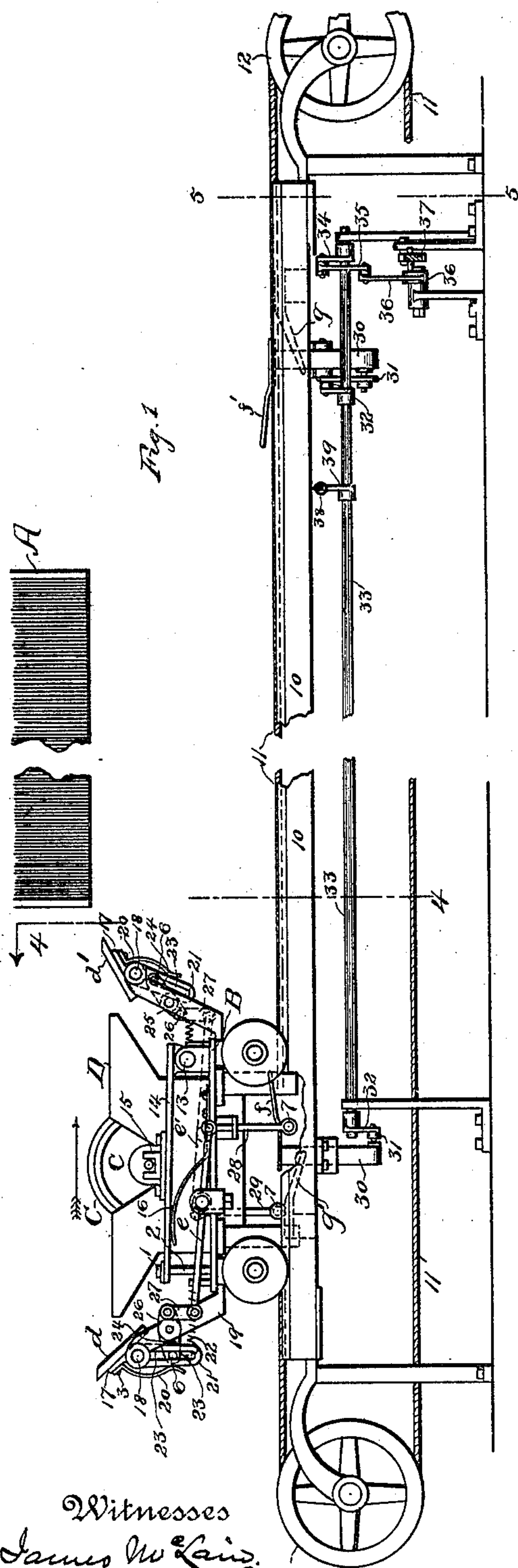
W. J. WEBB.

METHOD OF PRINTING OR COLORING YARN OR SIMILAR MATERIAL.

APPLIOATION FILED JUNE 21, 1902.

NO MODEL.

3 SHEETS—SHEET 1.



Witnesses
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Ralph M. Laid.

Inventor
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By his Attorney
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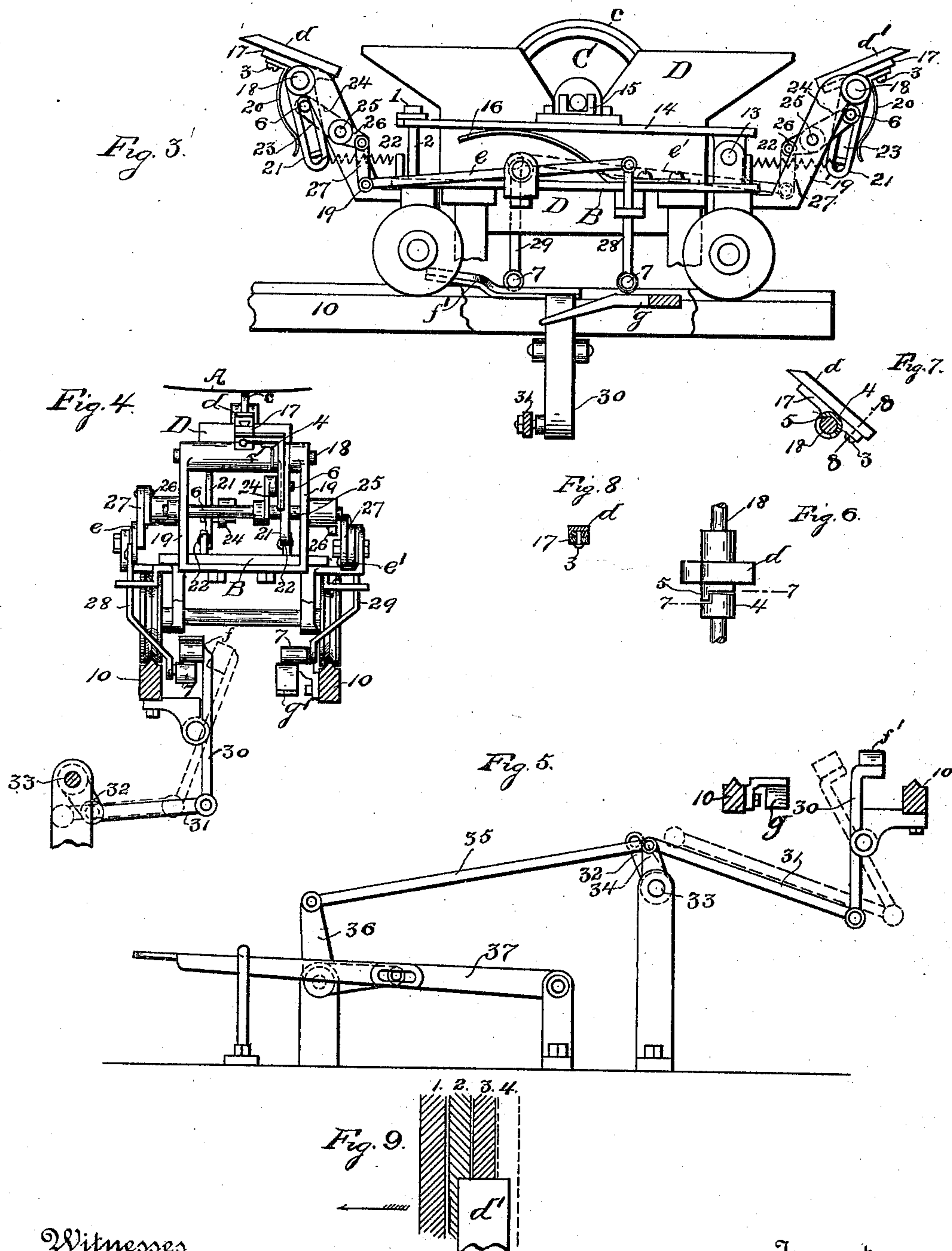
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METHOD OF PRINTING OR COLORING YARN OR SIMILAR MATERIAL.

APPLICATION FILED JUNE 21, 1902.

NO MODEL.

3 SHEETS—SHEET 2.



Witnesses
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PATENTED JAN. 27, 1903.

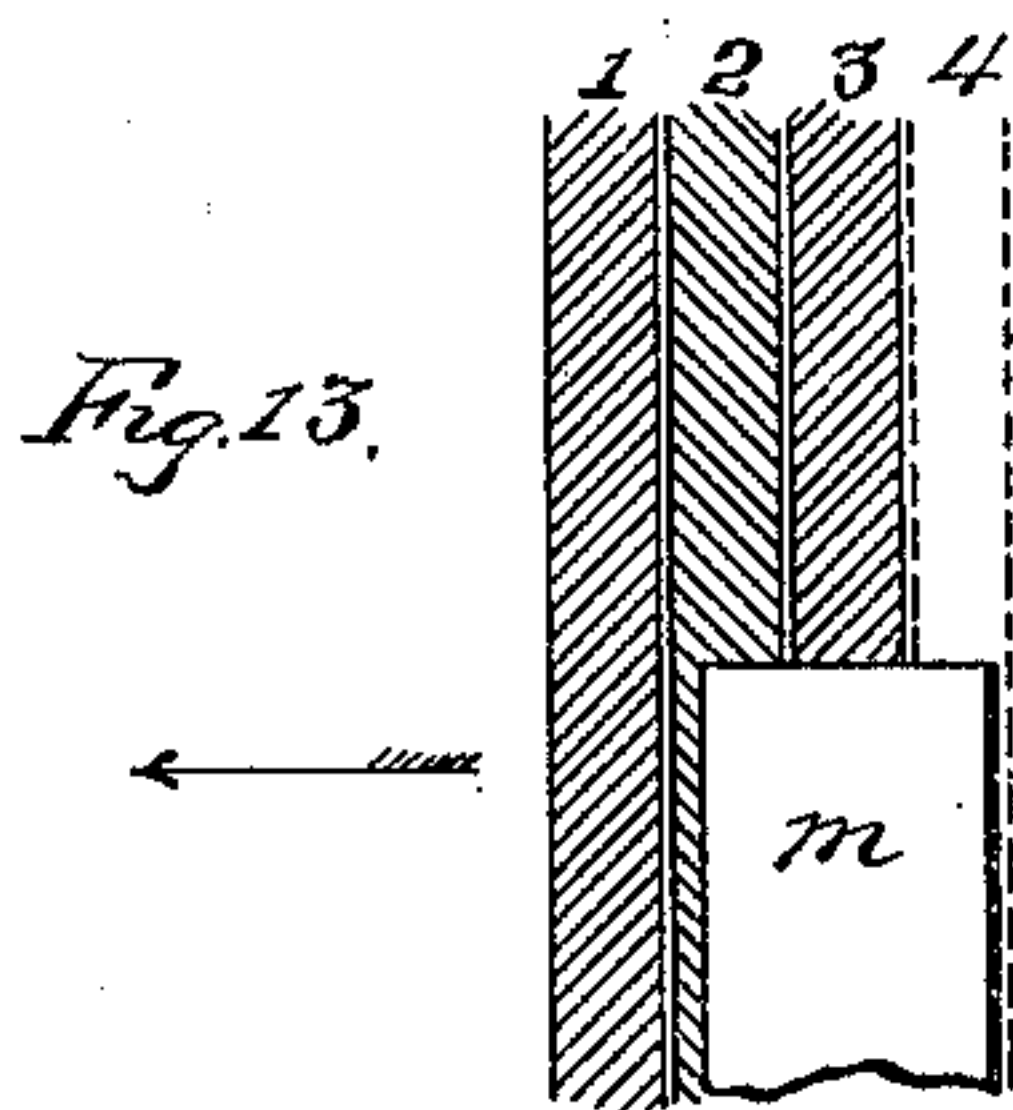
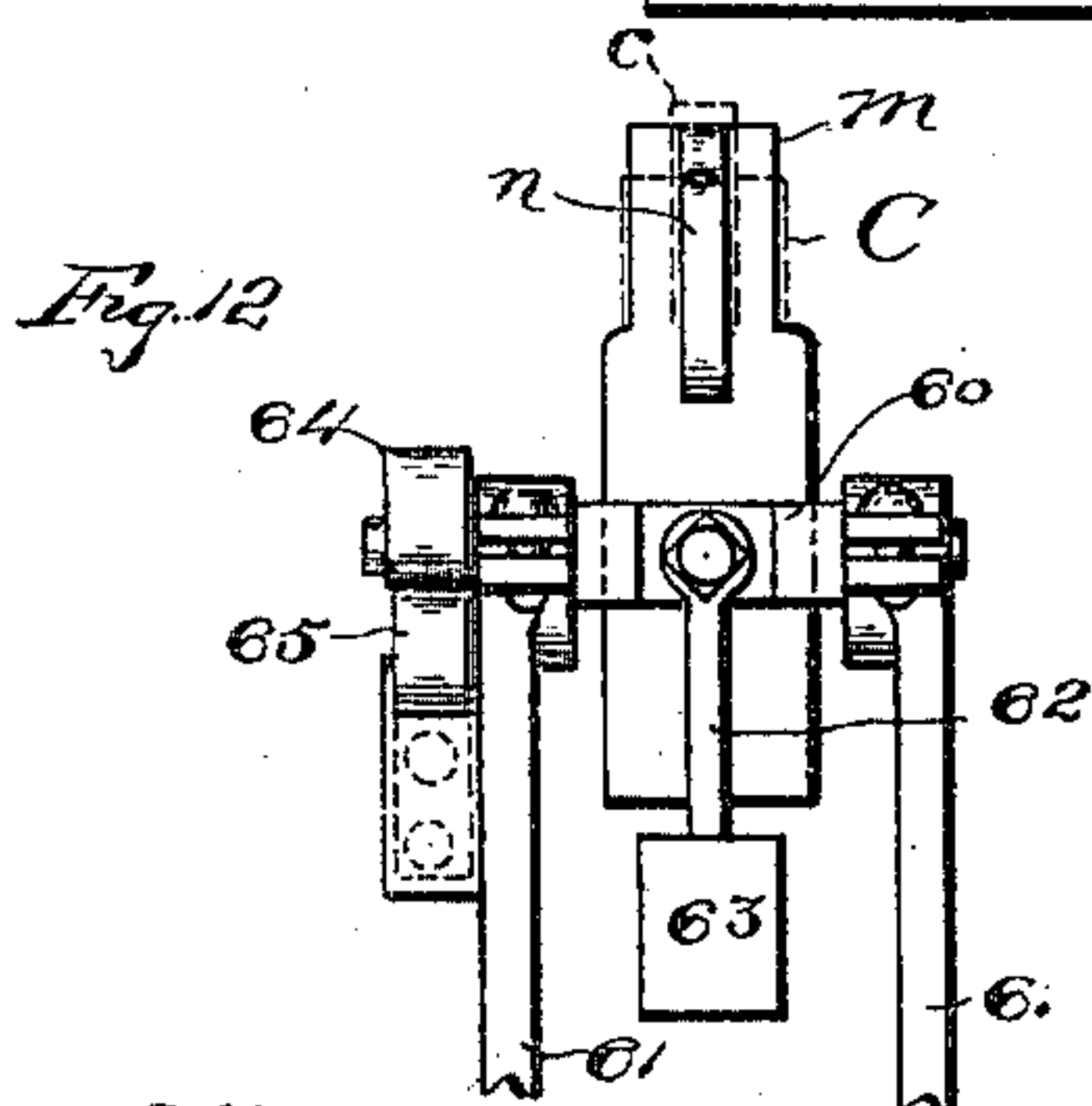
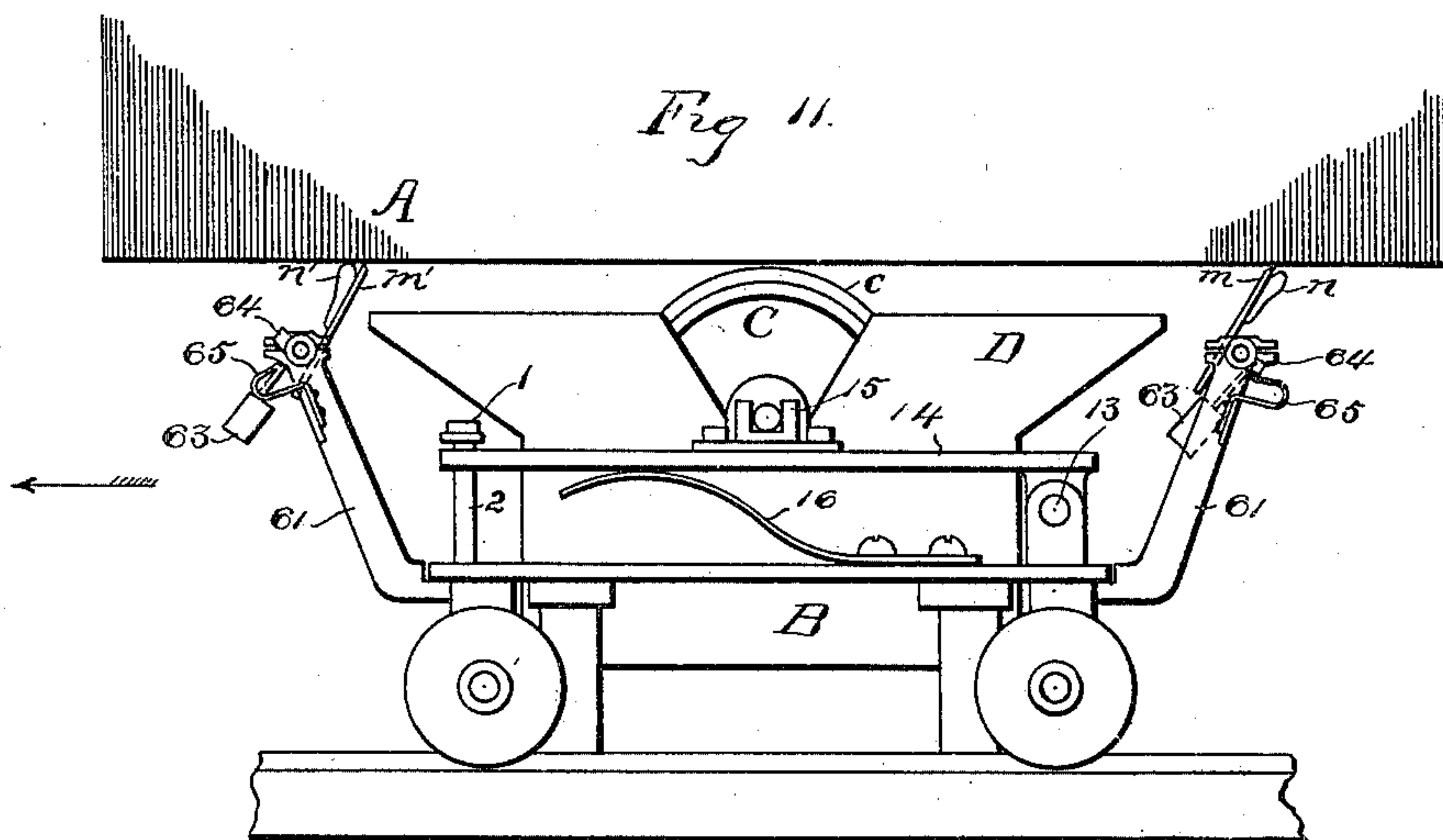
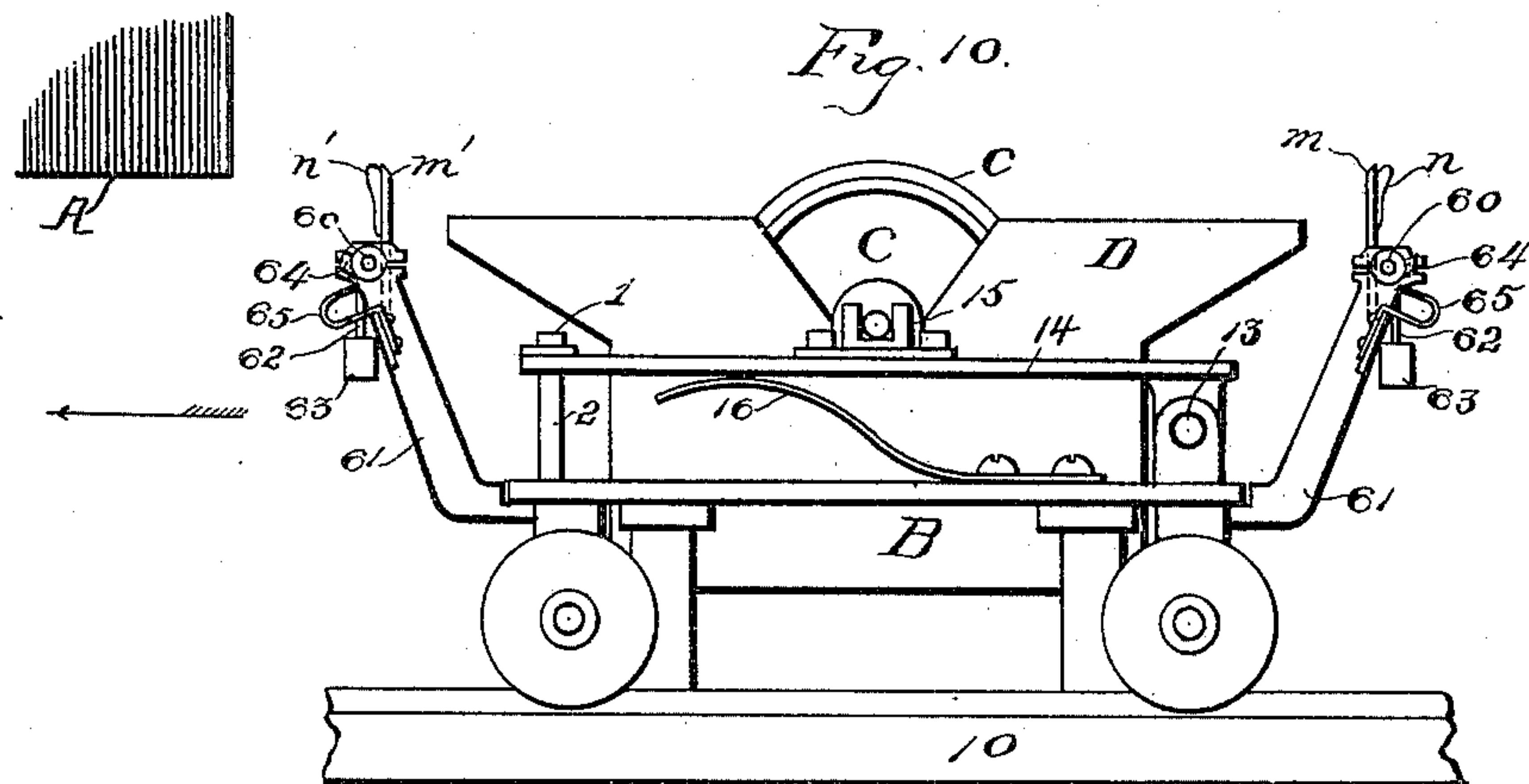
W. J. WEBB.

METHOD OF PRINTING OR COLORING YARN OR SIMILAR MATERIAL.

APPLICATION FILED JUNE 21, 1902.

NO MODEL.

3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

WILLIAM J. WEBB, OF YONKERS, NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE CARPET YARN PRINTING COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

METHOD OF PRINTING OR COLORING YARN OR SIMILAR MATERIAL.

SPECIFICATION forming part of Letters Patent No. 719,398, dated January 27, 1903.

Original application filed October 25, 1897, Serial No. 656,277. Divided and this application filed June 21, 1902. Serial No. 112,616. (No specimens.)

To all whom it may concern:

Be it known that I, WILLIAM J. WEBB, a citizen of the United States, residing at the city of Yonkers, county of Westchester, and State of New York, have invented certain new and useful Improvements in Methods of Printing or Coloring Yarn or Similar Material, of which the following is a specification.

This application is a subdivision of my application for patent for improvements in methods of and apparatus for coloring yarn or similar material, Serial No. 656,277, filed October 25, 1897; and the present application relates to improvements in methods for coloring yarn or similar material by applying to the yarn successive streaks of color arranged side by side, the object of the invention being to produce such approximately uniform coloring of the yarn as will finally with the aid of the usual steaming and scouring processes secure uniform appearance of the various shades in the finished yarn and in the fabric into which it is woven.

My improved method may be carried out by hand-tools or by apparatus of various forms. In the following specification two different kinds of such apparatus are described, the same being in each case applied to a machine of a general class now in common use for printing or coloring carpet-yarn.

In printing yarn for tapestry and other carpets the yarn is usually wound upon a drum and then the color is applied by means of a color-applying device—such as a wheel, bar, or other equivalent device—a wheel termed the “color-wheel” being the appliance very generally used for that purpose, such wheel running in a box or trough called the “color-box,” which is carried by a carriage reciprocating longitudinally of the drum. At each reciprocation of the carriage the color-wheel applies to the yarn a streak of color slightly exceeding in width the width of the wheel, and the drum is rotated step by step for making the successive streaks, a wide stripe of a color being obtained by applying two or more streaks of the same color, and different color-boxes and color-wheels being substituted for streaks of different colors. In this printing

operation a ridge of color is formed at each side of the color-wheel—that is, between two adjacent stripes—and it is usual to employ devices known variously as “rubbers,” “scrapers,” “spreaders,” or “equalizers,” and to which the generic term “rubbers” will be applied herein for distributing the color contained in these ridges and rubbing the color into and through the yarn, these rubbers being mounted to reciprocate with the color-wheel and follow it in printing. Usually a pair of such rubbers are employed, located on opposite sides of the color-wheel and automatically thrown into and out of operative position to act alternately as the color-carriage moves in opposite directions and arranged so that they may both be thrown out of operative position when required to avoid rubbing streaks of different colors into each other. A single rubber may be used also and shifted from one side of the color-wheel to the other.

I provide an improved method of printing or coloring yarn or similar material which consists, broadly, in printing coloring-matter upon the yarn in streaks side by side and wetting portion of the stripe of yarn which is to be subsequently printed upon by forcing color from the adjoining streak then being printed laterally upon such unprinted yarn, subjecting it there to a rubbing operation, and then printing a streak on the yarn so treated, and I preferably also rub simultaneously a portion of the next previously printed streak, so as to distribute the color laterally in both directions from the streak last printed and rub it into the yarn. In employing this method I avail myself of the capillary attraction of fibrous substances upon liquids and semi-liquids, which will cause the color as it is rubbed from the streak in course of application over, unto, and into the unprinted yarn to moisten such unprinted yarn and to thus make it more capable of receiving and absorbing color printed upon it subsequently. By so treating approximately one-half of the stripe of yarn which is to receive the following streak of color and also simultaneously rubbing about one-half of the width of the

next previously printed streak I give to all parts of the yarn (except to the end streaks in a series of streaks, as hereinafter explained) a double rubbing, thereby securing a very complete absorption of the color by the yarn.

The color may be distributed more or less upon the unprinted portion of the yarn; but it is desirable to distribute the color over a width of unprinted yarn equal to a considerable portion of the width of a streak of color, and I prefer to extend the rubbing operation over substantially one-half or more of the stripe of yarn to which the next streak of color is to be applied, and I prefer to extend the rubbing operation similarly over the next previously printed stripe.

In carrying out this invention I may use a rubber of any suitable form by making it of such width and so positioning it relatively to the color-wheel or equivalent color-applying device as to subject the yarn to a rubbing operation as required by my method; and these rubbers may be mounted and operated in any suitable manner.

The invention includes, therefore, certain improved methods of printing and distributing color upon yarn and similar material, which will be fully described hereinafter and specifically pointed out in my claims.

For the purpose of illustration I have shown in the accompanying drawings a yarn-printing machine by the use of which I have successfully carried out my improved methods and a modified form of machine which I have also employed for such purpose, and these I will now describe.

In the drawings, Figure 1 is a side elevation of the first form of apparatus shown with cam-operated mechanism for reversing the rubbers, the yarn-drum being indicated, but broken away. Fig. 2 is a plan view of the same, the yarn-drum being omitted. Fig. 3 is a side elevation of the color-carriage and track with both rubbers in inoperative position. Fig. 4 is a section on line 4 of Fig. 1 with the drums indicated above the color-wheel in printing position. Fig. 5 is a cross-section on the line 5 of Fig. 1 with the color-carriage and drum omitted. Figs. 6, 7, and 8 are details of the rubber hereinafter referred to. Fig. 9 is a diagrammatic view showing in plan successive stripes of printed yarn and the relation of the rubbers thereto. Fig. 10 is a side elevation of another form of machine in which the rubbers are reversed by contact with the drum as the carriage moves beneath the drum for the printing operation, the carriage being shown as it moves toward the left toward the drum. Fig. 11 is a similar view showing the carriage beneath the drum and moving to the left during the printing and rubbing operation. Fig. 12 is a rear elevation of one of the rubbers and its mounting, the color-wheel being indicated in dotted lines projected slightly above the rubber for purpose of illustration, so as to show the side-wise relation of the rubber to the wheel. Fig.

13 is a diagram of this construction similar to Fig. 9.

Referring now especially to the construction illustrated in Figs. 1 to 9, A is the yarn-drum, which may be mounted to rotate step by step in any suitable manner for printing the successive stripes. Below the yarn-drum A the frame of the machine is provided with rails 10 for supporting the wheeled carriage B, which is reciprocated by a cable 11, passing over pulleys 12 and actuated in any suitable manner. Hinged at 13 in the carriage B is a plate 14, which carries the color-wheel C, running in a removable color-box D, which is supported in an opening in said plate, the face *c* of this color-wheel C acting to apply the color to the yarn. At opposite sides of the color-box the plate 14 carries bearings 15 for the shaft of the color-wheel, by which the color-wheel may be rotated by any common or suitable means. The color-wheel is yieldingly pressed against the yarn by a spring or springs 16, secured to the carriage B and engaging the under side of the plate 14, and the upward movement of the plate and color-wheel is limited by a nut 1 on a bolt 2, passing through an opening in the end of the plate 14 and acting as a stop for the plate. At each end of the carriage is mounted a rubber *d d'*, these rubbers being mounted on rearwardly-inclined supports 17, the outer portions of their upper surfaces forming rubbing-surfaces, which in the operative position of the rubbers make contact with the yarn upon the drum. These rubbers are preferably constructed of a block of semiyielding material, such as hard vulcanized rubber, which is rearwardly beveled at its outer end to provide inclined rubbing-surfaces, as shown, although it will be understood that the rubbers of this machine may be otherwise constructed, so far as the carrying out of the present invention by means of such rubbers is concerned. The connection between each rubber and its support 17 is preferably such as to permit of the adjustment of the rubber up and down, the connection in the present case being formed by mounting the rubber to slide on a dovetailed block entering a similar groove in the rubber, as shown in Fig. 8, the rubber being held in adjusted position by a set-screw 3. Thus the rubber may be readily adjusted relatively to the drum or removed for repairs or replacement. The rubbers are mounted and actuated so as to be moved automatically into and out of position to engage the yarn, the rubber behind the color-wheel being in operation and the rubber in front of the color-wheel being thrown out of operation as the color-wheel moves in opposite directions for printing successive stripes. For this purpose the construction shown is as follows: Each of the supports 17 is loosely journaled on a shaft 18, carried by brackets 19 at the ends of the carriage, and each support carries a spring 20, the lower end of which engages a link 21, also journaled loosely on

the shaft 18, and through which spring as the link 21 is swung outwardly the rubber is moved into and held in operative position, thus being held yieldingly against the yarn by the spring 20 when in operation. Movement to inoperative position is accomplished by swinging the link 21 inwardly and with the engagement of a projection 4 on the hub thereof with a similar projection 5 on the hub of the support 17, as shown in Figs. 6 and 7. This movement of the rubber to inoperative position may be assisted by a spring 22, connected to the link 21 and to the carriage, which spring will also assist in retaining the rubber in inoperative position. The link 21 of each rubber is provided with a slot 23, which receives a pin 6, carried by an arm 24 on a rock-shaft 25, mounted in the brackets 19. The rock-shaft 25 carries a second arm 26, which is connected by a link 27 to a lever *e* or *e'*, corresponding, respectively, to the rubbers *d* *d'*, these levers *e* *e'* being pivoted in suitable supports on the frame to rock vertically. Each of these levers *e* *e'* has pivotally connected to it a free and a depending rod 28 or 29, corresponding to the respective levers *e* *e'* and rubbers *d* *d'*, these rods being provided at their lower ends with a bowl 7 for engagement with cams at opposite ends of the movement of the carriage for actuating the levers *e* *e'* to throw the rubbers into and out of operative position. The rods 28 29, levers *e* *e'*, and the connection of the latter to the rubbers are arranged on opposite sides of the carriage, and the cams coacting with the bowls 7 are similarly arranged and are as follows:

The bowl 7 on rod 28 coacts with cams *f* *g*, respectively, for lowering and raising the rod 28 and the bowl 7 on rod 29 with similar cams *f'* *g'*, the cams for the respective rods and the corresponding rubbers being reversed, so that each end of the machine carries a raising and lowering cam for throwing one of the rubbers out of operative position and the other into operative position. The operation of this tripping mechanism for the rubbers will be readily understood from a brief description.

In the position shown in Fig. 1, in which the carriage has completed its movement to the left and is about to move under the drum A and toward the right for printing another stripe on the yarn, the bowl 7 on rod 28 running on the under side of the cam *f*, as the carriage approached the end of its movement to the left, has depressed the rod 28, and thus rocked the lever *e* so as to raise its outer end and thus, through the link 27 and arm 26 has rocked the rock-shaft 25 so as to move the arm 24 downward and by the pin 6 moving in the slot 23 has thrown the link 21 outward and through the spring 20 raised the rubber *d* into operative position, so that it will engage the yarn behind the color-wheel C as the color-carriage moves to the right for printing the next stripe. At the same time the bowl 7 on rod 29, running on the upper side of cam

g', has raised the rod 29 and rocked the lever *e'*, so as to lower its outer end, and thus through rock-shaft 25 and its connections has moved the arm 24 upward and by the pin 6, moving in the slot 23, has thrown the link 21 inward, aided by the spring 22, and thus through the projections 4 5 rocked the rubber *d'* downward from its raised operative position in which it has acted upon the yarn during the carriage movement just completed into its lowered inoperative position, so as not to engage the yarn in front of the color-wheel C on the next printing movement. This position of all the parts is shown in Figs. 1 and 2, the same position of the rubber *d'* being shown also in Fig. 4. As the color-carriage B moves to the right in printing the next stripe the rubbers *d* *d'* remain in the same positions until the printing of the stripe has been completed and the color-carriage reaches the limit of its movement to the right corresponding to its position at the left, as shown in Fig. 1, when the rubbers are reversed, the rubber *d'* being raised into operative position by the bowl 7 on the end of rod 29 coacting with cam *f'*, and the rubber *d* being lowered into inoperative position by the bowl 7 on the end of rod 28 coacting with cam *g*, the action of these cams and connections to the respective rubbers being the same as previously described in connection with the reversal of the rubbers at the completion of the previous movement to the left. It will be seen that the arms 24 in moving upwardly and downwardly, so as to move the links 21 in and out, move past their horizontal position, so that the pins 6 in the slots 23 act to lock the links and rubbers in the position to which they are thus moved, so as to lock them in operative or inoperative position.

For throwing both the rubbers *d* *d'* out of operation, which is desirable in many cases, so as to prevent different colors being rubbed on the same surface, the cams *f* *f'*, by which the rubbers are thrown into operative position, are made adjustable into and out of position for engagement with the bowls 7 of the depending rods 28 29, these cams *f* *f'* being shown for this purpose as carried by vertical levers 30, pivoted on the frame of the machine and connected by links 31 to arms 32 on a horizontal rock-shaft 33, which is actuated by an arm 34, connected by a link 35 to a vertical bell-crank lever 36, connected to a treadle 37, so that by depressing the treadle the shaft 33 is rocked and through the links 31 rocks the levers 30, so as to throw the cams *f* *f'* inward from the position shown in full lines in Figs. 4 and 5 to the position shown in dotted lines in the same figures, so that these cams will be inside the path of the bowls 7, and the bowls 7 will pass the cams without engagement therewith. On releasing the treadle the cams will be thrown outward into operative position by the spring 38 acting on arm 39 on the rock-shaft 33, as shown in Figs. 1 and 2, and the rubbing ac-

tion of the apparatus will be resumed. The position of the parts with both rubbers in operative position is shown in Fig. 3.

The relation of the rubber to the printing-face *c* of the color-wheel *C* and to the stripes of printed yarn and ridges formed between the same is shown in Figs. 2, 4, and 9, this being the preferred width and arrangement of the rubber, the rubber being placed centrally to the color-wheel, so as to overlap equally on both sides of the stripe of yarn being printed and of such width as to distribute and rub the color laterally over a considerable portion, preferably substantially one-half or more, of the previously-printed stripe of yarn and of the unprinted yarn to which the next streak of color is to be applied.

As shown in Fig. 9, two stripes 1 2, numbered in the order of printing, have been printed, stripe 3 is being printed with the rubber in operation, and the position of stripe 4, which is the next stripe to be printed, is indicated in dotted lines, the operative surface of the rubber *d* thus acting upon the whole of the stripe 3 of yarn being printed with the ridges on each side of the same, substantially one-half of the unprinted yarn which will form stripe 4 when the next streak of color is applied, thus distributing and rubbing color from stripe 3 over the adjoining unprinted yarn to the extent of substantially one-half of the width of a streak of color or printed stripe of yarn. This width and arrangement of the rubber provides for a double rubbing of all parts of the color-streaks with the distribution of the color from each streak over such an extent of the adjoining portion of the yarn as to secure the wide distribution of the color, which is desirable for uniformity. It will be understood, however, that the rubber may overlap, more or less, upon the adjoining unprinted portion of the yarn, so as to secure a wider or less wide distribution, without departing from the invention, considered broadly. It will be understood also that the rubber may overlap, more or less, upon the previously-printed portion of the yarn on the opposite side of the streak of color being applied and that if it is not desired to rub the color twice in opposite directions, as by the construction shown, the rubber may be constructed and arranged so as to overlap and distribute color upon the unprinted portion of the yarn without overlapping upon the previously-printed portion of the yarn. It will be understood that both rubbers when of the width and positioned as shown will be thrown out of operation in printing the first and last stripes of a series of the same color, so that they will not be used except when at least three stripes of the same color are to be printed, and when but three stripes are to be printed the rubbing operation will be used only in printing the second stripe.

It will be understood that the invention may be applied in connection with rubbers

of various forms and that when the rubbers are automatically thrown into and out of operative position any suitable device may be used for this purpose.

In Figs. 10 to 13 I have illustrated another construction to which the rubbers are automatically reversed, so as to throw the rubber in front of the color-wheel out of operative position and the rubber behind the color-wheel into operative position by engagement with the drum itself instead of employing cam mechanism for this purpose, as in the constructions already described. In this construction the rubbers *m m'* are mounted in rocking carriers 60, pivoted in brackets 61 on the carriage, and the carriers 60 have depending rods 62, swinging between the arms of brackets 61 and carrying weights 63, which tend to hold the rubbers *m m'* in vertical position, as shown in Fig. 10. Each of the carriers 60 is provided outside the bracket with an arm or lug 64, adapted to engage the spring 65 mounted on the bracket so that the rubber is held against the yarn by the spring under yielding pressure during the rubbing operation. On the rear side of the plates forming the rubbers *m m'* are mounted riders *n n'*, which engage with the yarn to hold the rubber in front of the color-wheel out of engagement with the yarn, these riders being of such width, as shown in Fig. 12, as not to make contact with the previously-printed stripe of the yarn.

The width and sidewise position of the rubbers *m m'* relatively to the face *c* of the color-wheel *C* is shown in Fig. 12, in which the color-wheel is dotted in position with its face projected above the upper edge of the rubber for purpose of illustration. The relation of the rubber *m* to a series of stripes is shown in diagram in Fig. 13 in the same manner as in Fig. 9, the rubbers in this construction being shown as somewhat wider than the rubbers *d d'* previously illustrated, so as to overlap substantially a half and somewhat more of the stripe of yarn 3 being printed and of the next previously printed stripe 2 and the dotted stripe of yarn 4 to be printed next.

The operation of this machine in reversing the rubbers will be understood from a brief description. In the position shown in Fig. 1 the carriage is ready to move toward the left under the drum *A* for printing a stripe, both the rubbers being held vertically by the weights 63. As the carriage moves under the drum the rider *n'* on the back of rubber *m'* at the left of the carriage and in advance of the color-wheel *C* strikes the drum, and the rubber is thus swung rearward against the resistance of weight 63, so that this rubber *m'* is held out of contact with the yarn as the carriage passes beneath the drum during the printing operation, the rider *n'* bearing against the yarn, as shown in Fig. 11. When the rubber *m* reaches the end of the drum or edge of the yarn which is near the end of the drum, it is swung to the right against the re-

sistance of weight 63 by the engagement of the rubber with the drum, and thus brought into position for the rubbing operation, as shown in Fig. 11, being held under yielding pressure against the yarn on the drum by the weight 63 and by the spring 65, into contact with which the arm or lug 64 on the hub of the rubber has been then brought by this movement. This position of the parts continues during the passage of the color-carriage beneath the drum and the printing of a stripe, each of the rubbers being returned to vertical position, as shown in Fig. 10, by the weights 63 as they pass out from beneath the drum, and the operation being the same as the color-carriage moves to the right for printing the next stripe, except that the rubber *m*, then in advance of the color-wheel, is thrown out and held out of operative position by the rider *n*, and the rubber *m'* behind the color-wheel is thrown into operative position by its engagement with the drum. No means are shown for throwing both the rubbers *m m'* into inoperative position, and it will be understood that such a machine may be used in printing plain or solid color yarn with one of the rubbers always in operation or that both the rubbers may be removed when desired for printing stripes of different colors or moved into inoperative position and held in such position by any suitable means.

I claim—

1. The method of printing and distributing color upon yarn or similar material which consists in applying a streak of color to the yarn and subjecting simultaneously the edge of said streak of color next the unprinted yarn and a portion of the unprinted yarn at the side of said streak to a rubbing operation so as to distribute the color from said streak laterally beyond its deposition on the yarn and upon the unprinted yarn, and subse-

quently applying a streak of color upon the unprinted yarn upon which color has been so distributed.

2. The method of printing and distributing color upon yarn or similar material which consists in applying a streak of color to the yarn and subjecting the entire width of the stripe of yarn upon which said streak of color has been applied and portions of the yarn at each side of said stripe to a rubbing operation so as to distribute the color laterally beyond its deposition on the yarn and upon the unprinted yarn and subsequently applying a streak of color upon the unprinted yarn upon which color has been so distributed.

3. The method of coloring carpet-yarn which consists in successively printing streaks of given widths upon the yarn side by side subjecting the entire width of the color-streak in course of application to a rubbing action and simultaneously subjecting approximately one-half of the width of the adjoining streak previously printed to such action while also spreading color from the streak in course of application over the adjoining unprinted portion of the yarn on its other side to the extent of substantially one-half of the width of a streak and there rubbing it into the yarn simultaneously and then printing a streak upon the adjoining unprinted portion of yarn upon which coloring-matter has been so spread from the streak in course of application.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 6th day of June, 1902.

WILLIAM J. WEBB.

Witnesses:

RICHARD EDIE, Jr.,
ARTHUR LAUD.