

(No Model.)

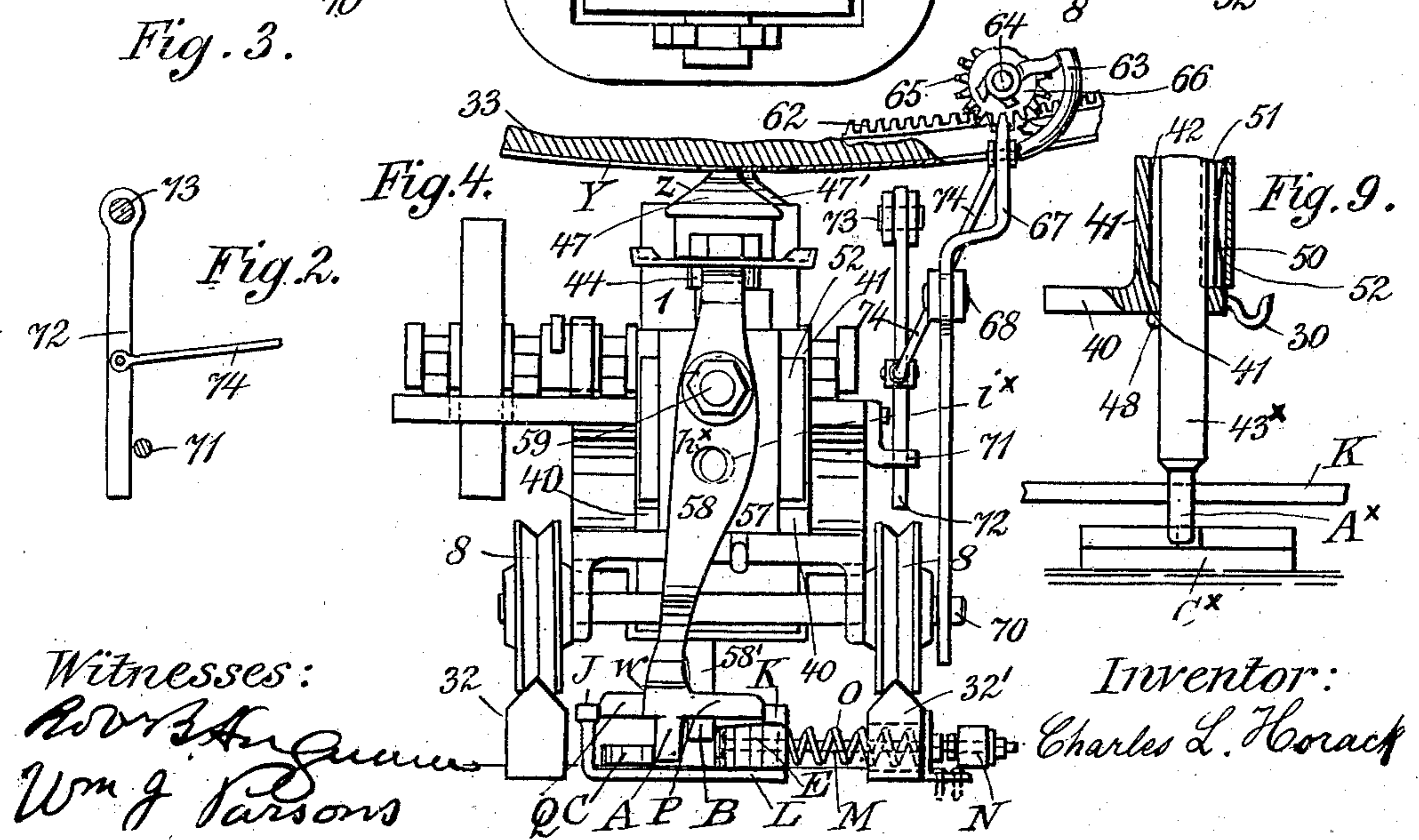
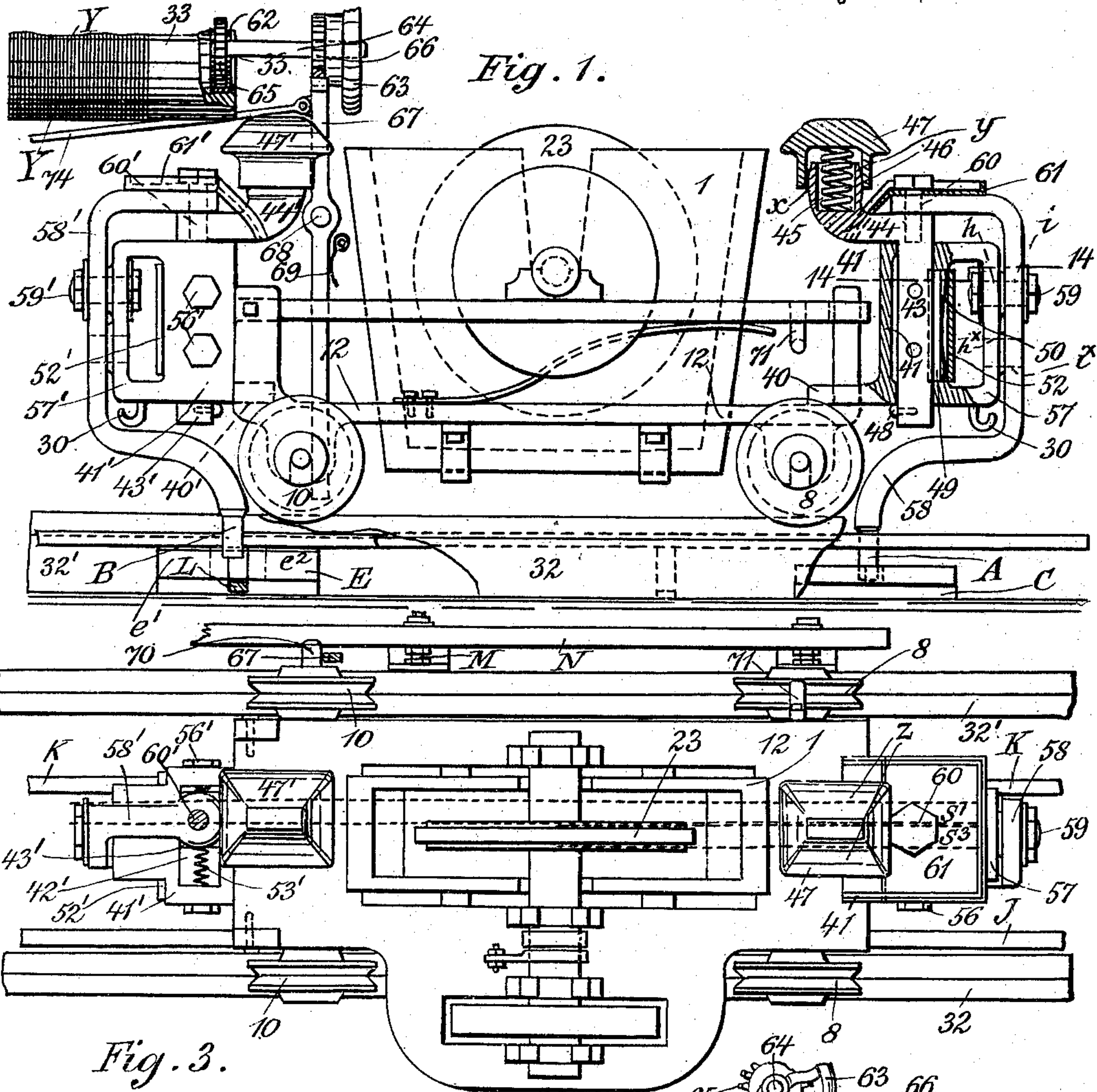
2 Sheets—Sheet 1.

C. L. HORACK.

METHOD OF AND APPARATUS FOR PRINTING YARNS.

No. 603,992.

Patented May 10, 1898.



Witnesses:  
Wm J. Parsons

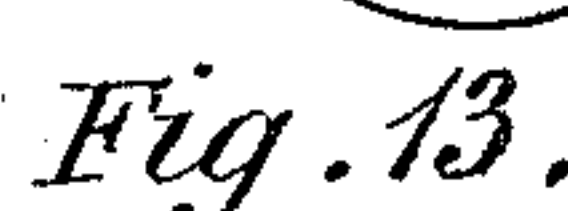
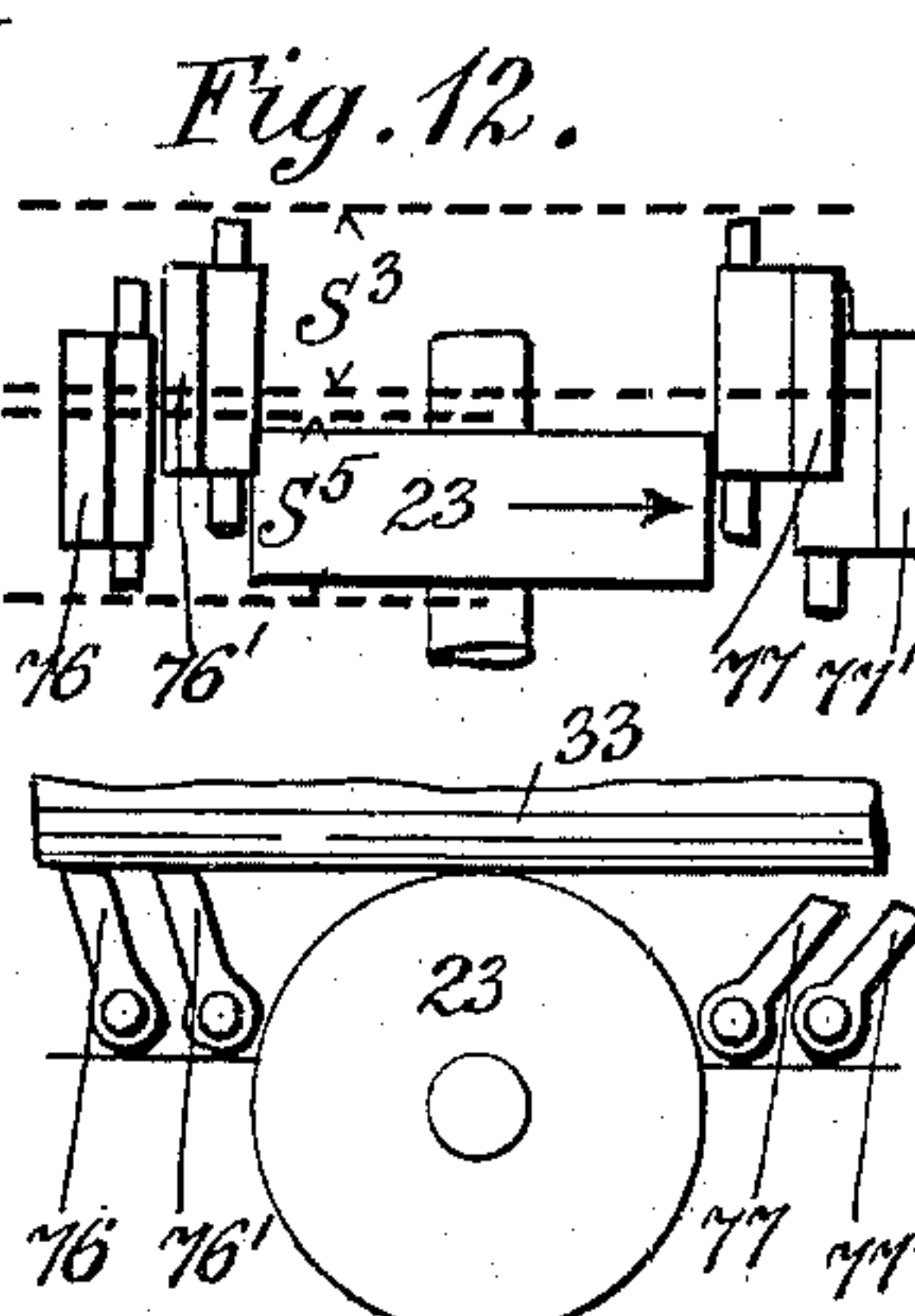
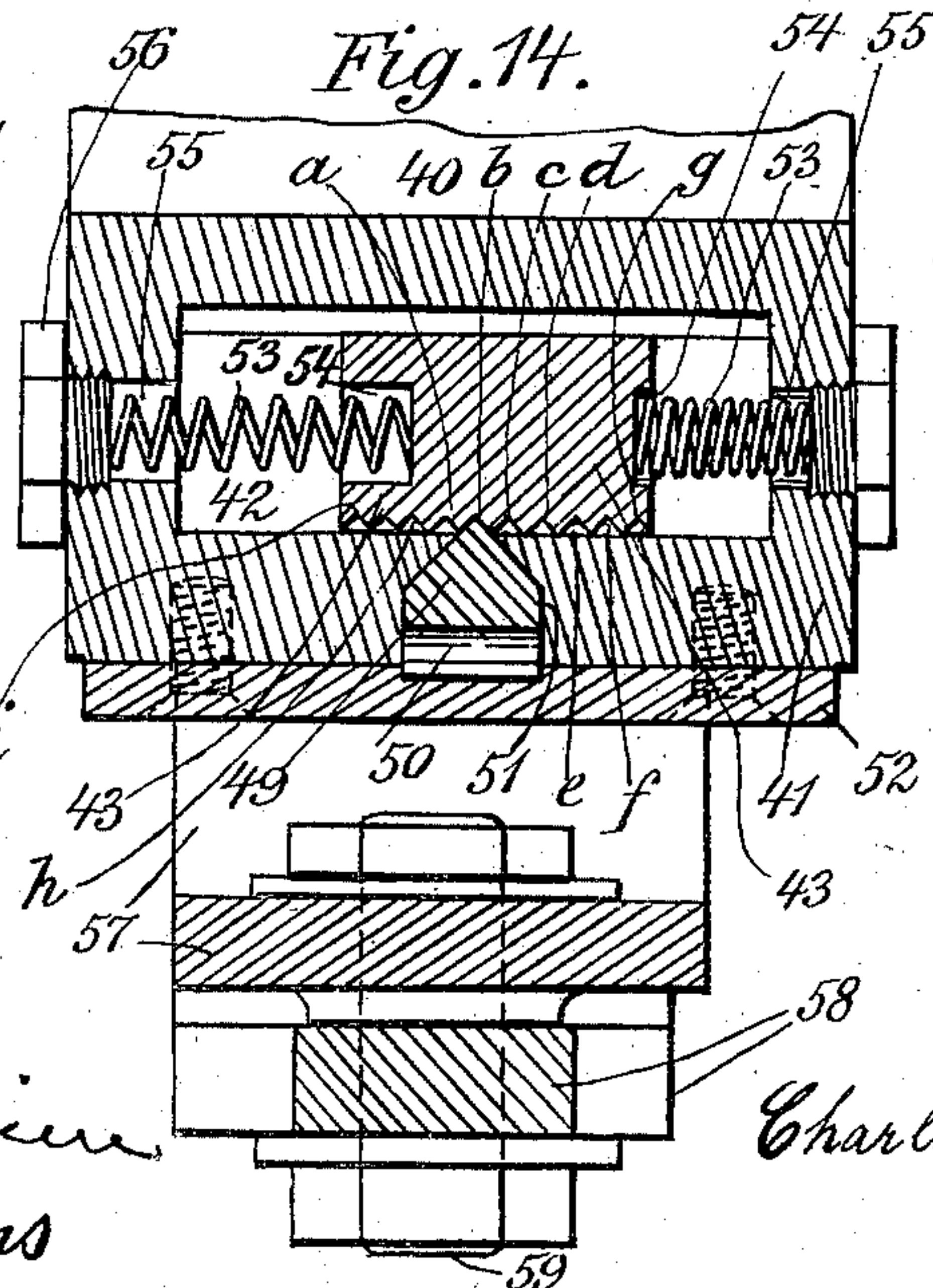
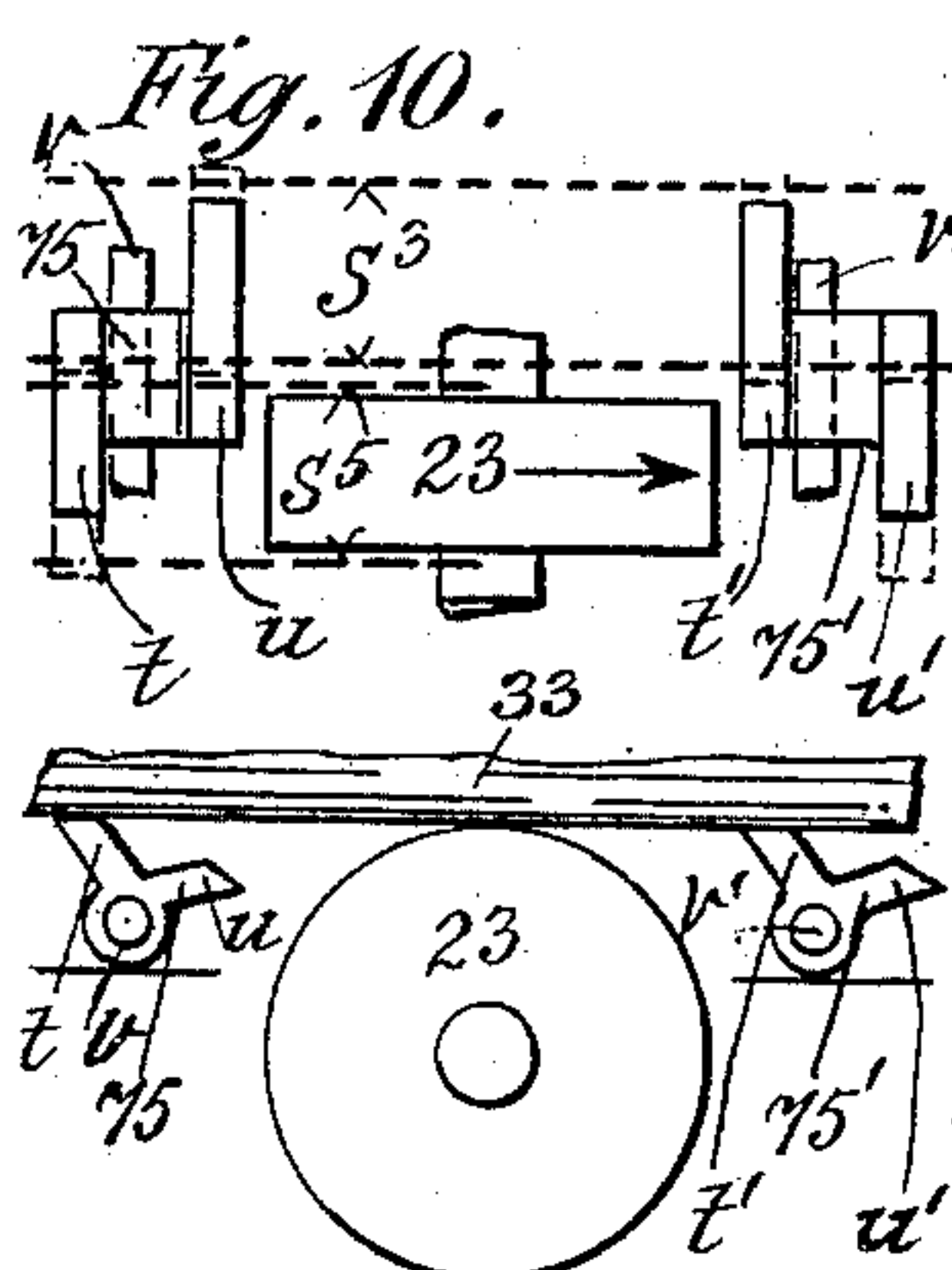
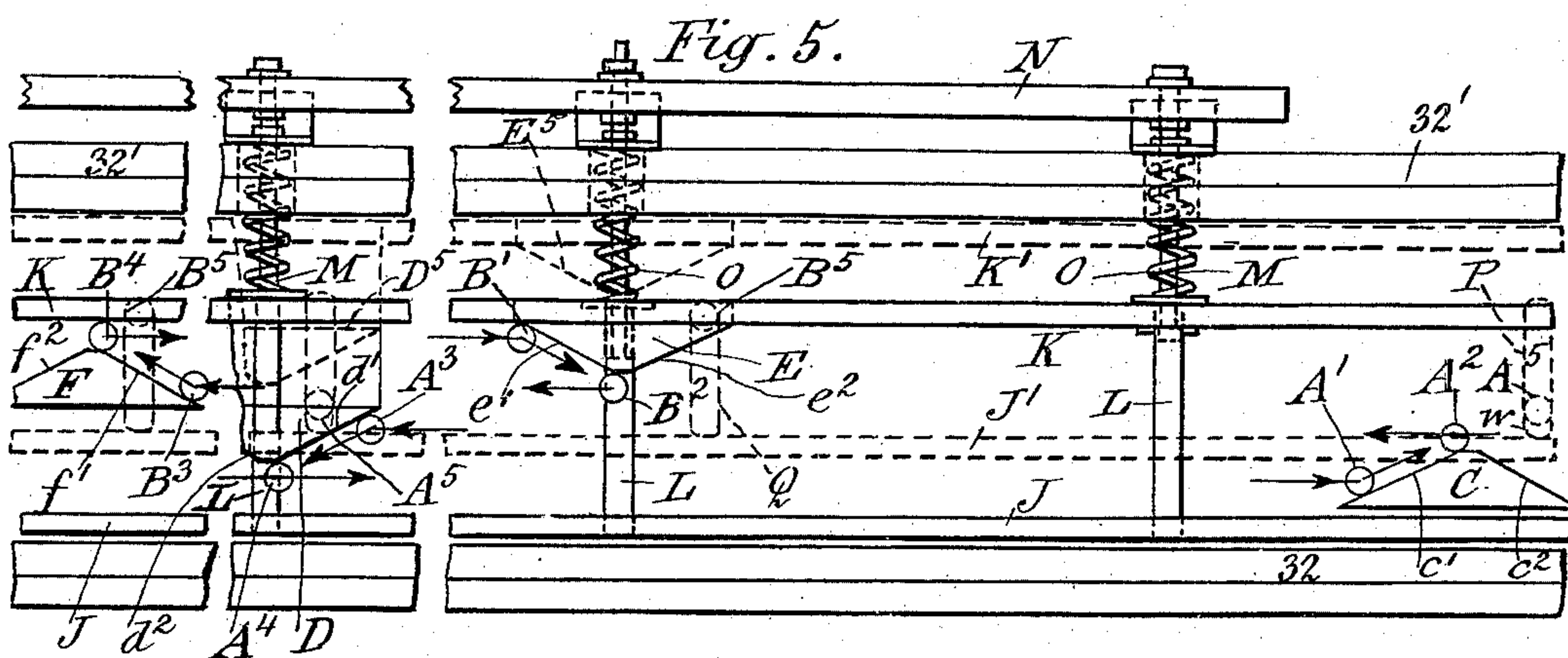
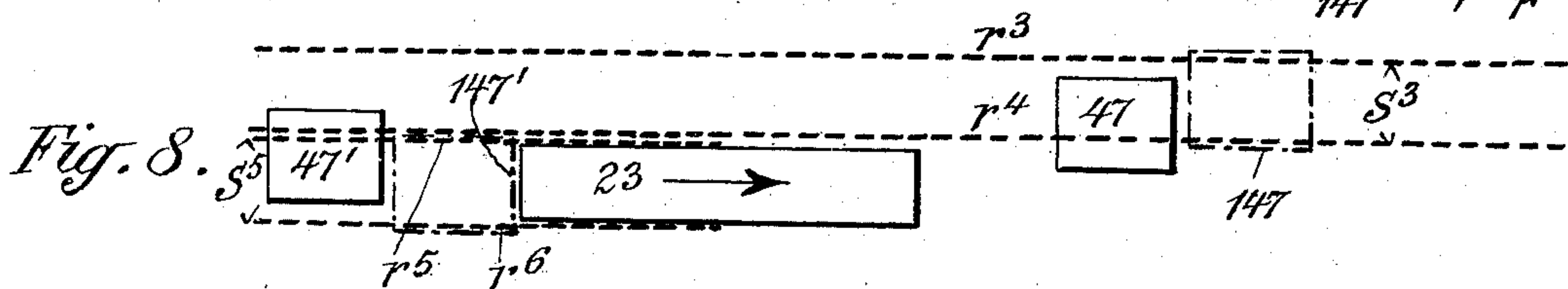
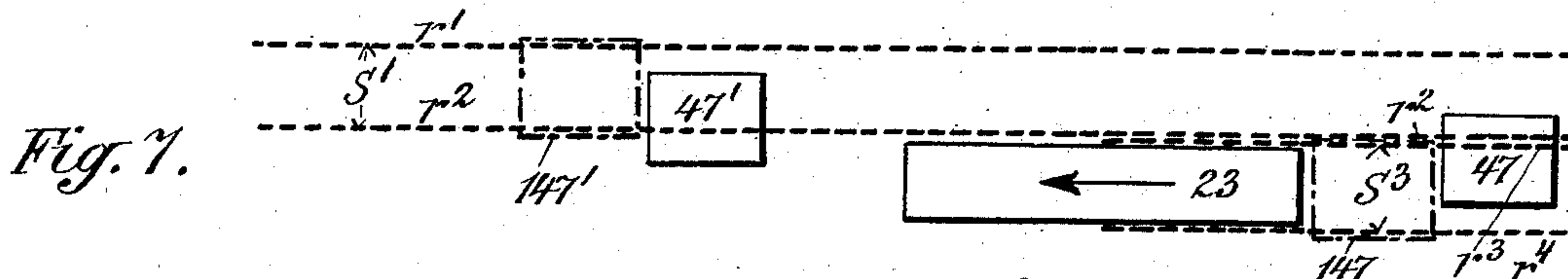
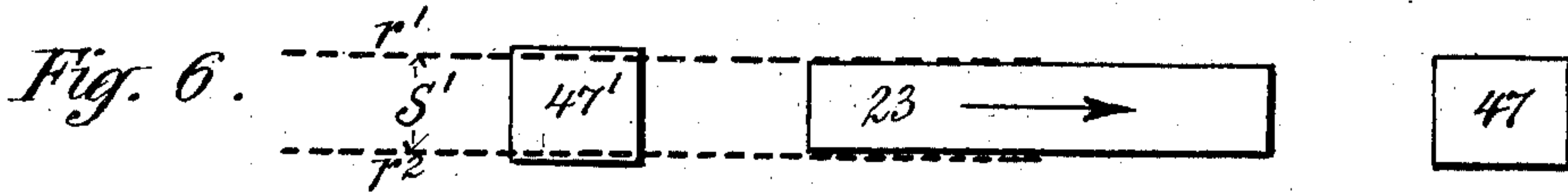
Inventor:  
Charles L. Horack



2 Sheets—Sheet 2.

# METHOD OF AND APPARATUS FOR PRINTING YARNS.

Patented May 10, 1898.



Witnesses  
Rob<sup>t</sup> B. Huggins  
Wm<sup>m</sup> J. Parsons

Inventor:  
Charles L. Horack



# UNITED STATES PATENT OFFICE.

CHARLES L. HORACK, OF BROOKLYN, NEW YORK.

## METHOD OF AND APPARATUS FOR PRINTING YARNS.

SPECIFICATION forming part of Letters Patent No. 603,992, dated May 10, 1898.

Application filed October 29, 1897. Serial No. 656,766. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES L. HORACK, a citizen of the United States, and a resident of the city of Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Methods of and Apparatus for Printing Yarns, of which the following is a specification.

My invention refers to methods of and apparatus for coloring or printing yarns, and more particularly yarns used in the manufacture of tapestry and velvet carpets.

My improved method is capable of being carried out wholly or partly by means of appliances actuated directly by the hands of the operators or by mechanical and automatic means superintended and directed in general only by the operator. In the latter case I prefer to employ an apparatus as now commonly used in printing such carpet-yarns, which consists of a drum around which the yarn is wound, and a color-carriage with color-wheel adapted to apply streaks of color to the yarn side by side while traveling underneath the drum and to apply thereto the structural improvements above referred to.

The objects of my invention are to provide suitable methods for applying coloring-matter to yarn and for spreading and forcing such coloring-matter along into and through the yarn and to thereby distribute such coloring-matter in approximately uniform manner or approximately equalize the same, whereby particularly also after the yarn shall have been subjected to the usual steaming or scouring process and after having been woven into a fabric portions of threads of the same shade may be made to appear substantially uniform.

Further objects of my invention are to provide suitable spreading, rubbing, or scraping devices in such proper relations with the color-wheel that the method above referred to may be properly carried out automatically with the aid of such appliances and that color applied to the yarn in streaks by said wheel may be distributed over and through the yarn in approximately uniform manner, so that after such yarn has been subjected to the usual steaming and scouring processes and after it has been woven into the fabric it shall

appear substantially uniform in shades and colors throughout.

Further objects are to provide proper means for varying the positions of such spreading or scraping means with reference to each other, so as to be able to not only place and maintain the same in such relative positions in regard to each other and to the color-wheel as will permit of their simultaneously covering outer ridges of successive streaks in a series of streaks of the same color, but of also covering single streaks and the first and last streaks only in such a series without necessarily overlapping adjoining streaks.

Further objects are to provide proper means for readily adjusting the apparatus so as to permit, while alternately using color-wheels of different widths, of the use of the spreading devices proportioned accordingly; also, to so shape and arrange the supports of such spreading or scraping devices that the operative surfaces of the latter will readily adapt themselves to any irregularities in the surface of the yarn-drum and the yarn covering it.

A further object is to make suitable provision for preventing the swinging of the drum until the color-carriage with its color-wheel and with the spreading devices mounted thereon have passed entirely from underneath the drum and from contact with the same.

I accomplish these and other useful objects by the method and means hereinafter described, and set forth more particularly in the claims.

Having in my United States Letters Patent No. 590,547 set forth the general advantages of automatic scraping of the yarn performed substantially simultaneous with the printing operation proper by the color-wheel and how the yarn is effected thereby, I will not repeat this statement here.

In the accompanying drawings, forming part of this specification, and wherein like letters and numerals of reference refer to corresponding parts, Figure 1 is a side elevation, partly in section, of an apparatus constructed according to my invention, the color-carriage being placed in a position near the end of the drum, where the shifting of the spreaders and



automatic releasing of a device for locking the color-drum in its proper position take place, Fig. 2 being a side elevation of a portion of the releasing mechanism near the left-hand end of the drum, which coacts with a portion of such device shown at the right-hand end of the drum in Fig. 1. Fig. 3 is a ground plan of Fig. 1, the drum being omitted as well as the drip-pan underneath the left-hand spreader. Fig. 4 is an end view of Fig. 1, looking toward the left; and Fig. 5, a ground plan of the track carrying the color-carriage and of shifting blocks and devices employed in operating said blocks for the purpose of adjusting the positions of the spreaders. Figs. 6, 7, and 8 are diagrammatic representations, in plan views, of different relative positions in which the color-wheel and the spreaders may be placed in an apparatus above referred to. Fig. 9 shows a vertical section of the lower portion of the supporting device of the spreader doing away with certain features of the corresponding supporting device illustrated in Figs. 1, 2, and 3. Figs. 10 and 12 are diagrammatic representations in ground plan of color wheel and spreaders so arranged with reference to each other as to illustrate some of the features of my invention, Figs. 11 and 13 being corresponding side elevations. Fig. 14 is a horizontal section along line 14-14 in Fig. 1 and is drawn to a larger scale than Figs. 1, 2, 4, and 9.

In carrying out my invention I prefer to employ a color-carriage 12, mounted on wheels 8-8 and 10-10, on which carriage color-box 1 and color-wheel 23 are supported and which is drawn, by means of a cord attached to hooks 30, forward and backward along rails 32, placed underneath and parallel with drum 33, carrying the yarn Y, all in usual manner and as, for instance, described in William Shaw's United States Patent No. 543,512, for the purpose of thus causing the periphery of the color-wheel to apply to the yarn on the drum streaks of color side by side, the arrangement of such streaks with reference to each other as to color and shade being in accordance with the design or pattern to be produced in a tapestry or velvet carpet.

The color-wheel in traveling forward and backward along the drum successively applies streaks of coloring-matter to the yarn, the drum being partially revolved after the production of each streak, so as to bring the yarn in proper position to receive the next streak, successive streaks being indicated by  $S^1 S^2 S^3$ , streaks  $S^1$  and  $S^3$  in Fig. 3 being shown only to indicate the relative position of such streaks after the color-carriage shall have traveled toward the left sufficiently to assume a position underneath the yarn on the drum, the wheel in making each streak producing ridges of coloring-matter  $r^1 r^2 r^3 r^4$ , &c., along its path, while at the same time forcing the coloring-matter into and through the yarn between said ridges. Where at each step the

periphery of the drum is swung to a sufficiently greater extent than the width of the operative edge of the color-wheel amounts to, two ridges, as  $r^2$  and  $r^3$ , may be produced during successive printing operations separate and distinct from each other, as shown in the drawings, while where the peripheral throw of the drum at each step is but slightly in excess of or substantially corresponds with such width of the color-wheel such adjoining ridges, as  $r^2$  and  $r^3$ , will be apt to run into each other and to be consolidated into one ridge. It is the coloring-matter forming these ridges which particularly requires to be distributed laterally and to be forced into the yarn, the comparatively small amount of color between the ridges generally entering into the yarn more thoroughly under the heavy pressure exerted by the color-wheel. I prefer to employ for such purpose appliances constructed as follows:

Referring first to the mechanism attached to the right-hand end of the carriage, 40 is a bracket secured to the carriage, such bracket carrying an upright standard 41, which contains a vertical channel, as 42. 43 is an upright post adapted to slide laterally within said channel without changing its position vertically and without tilting.

44 is an arm extending from the top of post 43 forward and upward toward the color-wheel and containing at its upper end a vertical recess 45, within which a spiral spring 46 is inserted.

47 is a spreader or rubber adapted to travel along the drum, its upper operative surface being of substantially the width of one of the streaks and its under side being constructed as a cap, telescoping over the upper portion of arm 44 in such manner as to be actuated by and to actuate spring 46 as the scraper travels along the yarn on the drum and accommodates itself to such variations as may occur therein. The under side of arm 44 is made to slide along the upper surface of standard 41, and pin 48, inserted in the lower portion of post 43, is made to slide along the lower surface of said standard, thus preventing longitudinal displacement of said post within said standard. The rear face of post 43 is provided with vertical grooves, as  $a, b, c, d, e, f, g, h$ , and  $i$ , &c., Fig. 14, into either of which fits the wedge-shaped front portion of a bar 49 in such manner that when such bar is being pressed forward it will normally confine said post and with spreader 47 firmly in its corresponding position. This forward pressure is produced by a leaf-spring 50, resting against the rear face of bar 49 and inserted within vertical channel 51 in the rear portion of standard 41, said bar and said spring being confined therein by means of cover-plate 52, screwed to the rear face of standard 41.

53-53 are spiral springs inserted in proper sockets 54 in post 43 and in corresponding cylindrical channels 55 in the side walls of



standard 41, the outer ends of such channels being closed by screw-threaded plugs 56. These springs yieldingly resist lateral displacements of post 41, so as to avoid abrupt movements of the same.

57 is a bracket extending rearward from the upper and lower portions of standard 41, and 58 a lever fulcrumed to said bracket by means of a detachable bolt 59 with proper nuts, passing through proper corresponding perforations *h* and *i* in said parts. The upper portion of lever 58 extends forward over post 43 in such manner as to be capable of swinging along its upper surface a pin 60, preferably in screw-thread engagement with post 43 and in sufficient free engagement with said lever, serving to so couple together said lever and said post as to impart lateral movement of the former to the latter in such manner that as the foot of lever 58 is being swung to the left the spreader 47 will be moved to the right, and vice versa.

61 is a pan for receiving and for carrying off, if desired, surplus coloring-matter removed from the yarn by the spreader, which might otherwise flow into channel 42. The same is secured to lever 58 by pin 60 and moves with said lever and with post 43. At the left-hand end of the color-carriage corresponding appliances are provided, indicated by numerals 40' 41', &c.

When a single streak or the first of a series of streaks is to be made, overlapping of the spreader over an adjoining streak of different color should be prevented, and for that purpose spreaders 47 and 47' are placed in the positions shown in Fig. 6 by so swinging levers 58 and 58' as to make bar 49 coact with notch *f* in post 43 and a corresponding bar at the other end of the carriage with a corresponding notch in post 43', the formation of notches *a b c*, &c., and of the portion of bar 49 fitting into the same being such that upon vigorous sideward pressure upon said post in either direction bar 49 will temporarily recede from the notch with which it may be in engagement and will pass through subsequent notches until post 43 comes to rest, when said bar will enter a corresponding notch and will lock said post in position, owing to the action of spring 50. While occupying the relative positions illustrated in Fig. 6, (the arrows wherever applied to the color-wheel illustrating the direction in which it is moving at the time,) spreader 47 is traveling in front of the color-wheel over the portion of white yarn to be covered directly afterward by said wheel, while spreader 47' is covering the entire streak *S'* then in course of application. While streak *S<sup>3</sup>* is being made, I prefer to give to the spreaders the relative positions shown in full lines in Fig. 7, wherein the spreader 47 in the rear of the color-wheel is made to cover the larger portion of streak *S<sup>3</sup>* and the smaller adjoining portion of *S'*, thus covering ridges *r<sup>2</sup>* and *r<sup>3</sup>* and spreading color from the same laterally, while

spreader 47' is made to cover the larger portion of streak *S'* and extending over into the space to be traversed directly by the color-wheel and to be then occupied by streak *S<sup>3</sup>* sufficiently to force color from ridge *r<sup>2</sup>* into the space to be occupied by ridge *r<sup>3</sup>*, thus moistening that portion of the yarn and forcing color into it and making it receptive for the color in said streak *r<sup>3</sup>*. In afterward making streak *S<sup>5</sup>*, I reverse the relative positions of the spreaders, as illustrated in full lines in Fig. 8, spreader 47 thus acting with reference to streak *S<sup>5</sup>* as spreader 47' did during the making of the previous streak with reference to streak *S'* and spreader 47' acting with reference to *S<sup>5</sup>* as 47 did previously with reference to *S<sup>3</sup>*. A subsequent streak *S<sup>7</sup>* would be treated in the same manner as *S<sup>3</sup>*, &c.

The vertical grooves in post 43 are so proportioned that when spreader 47 occupies the position shown in Figs. 3 and 7 bar 49 will coact with groove *e* and when occupying the position shown in Fig. 8 said bar will coact with groove *b*. This condition is illustrated in Fig. 14, the proper relative position of spreader 47' being produced by shifting of its post 43' in analogous manner. I prefer the relative alinements of spreaders as above described, because the edges of the spreaders in the positions shown in Figs. 7 and 8 (which are the positions generally occupied by them) do not coincide, and hence sharp lines in the color which might be produced in the edge of one spreader may then be equalized by the other. It will be seen that under said alinements the color in interior streaks in a series of streaks will receive two rubbings by the spreaders in opposite directions, and thus thorough saturation of the yarn by the color may be accomplished, whereby with the aid of the usual subsequent steaming and scouring processes the yarn will receive its proper colors and shading. This is particularly important with reference to interior portions of streaks, as color must be first transferred thereto laterally from the outer edges of the streaks and must afterward be rubbed into the same in thorough manner. However, I do not wish to confine myself to the relative alinements above described, as good results may be obtained with other alinements. Thus instead of the alinements shown in Figs. 7 and 8 in full lines the spreaders might be placed in the positions shown in broken lines in said figures and indicated by 147 and 147', in which case each spreader is made to cover a complete streak.

By the rubbing and rerubbing of the yarn by means of spreaders of single widths I am enabled to obtain advantages heretofore only secured by the employment of spreaders of double widths. Thus such single spreaders will accommodate themselves better to the unevennesses which frequently occur on the surfaces of yarn-drums. Besides under my invention as described I am enabled to au-



tomatically rub and equalize single streaks, which cannot be accomplished with automatic spreaders of double width.

For the purpose of alternately placing the spreaders into the positions illustrated in full lines in Figs. 6, 7, and 8, after swinging the drum in each case into its proper new position I prefer to employ shifting means as follows: The lower extremities A of lever 47 and B of lever 47', preferably made cylindrical, are adapted to travel along suitable shifting blocks C, D, E, and F, placed between the track-rails, as shown more particularly in Fig. 5. When spreader 47 is to be moved from its position shown in Fig. 8 to that shown in Fig. 7, foot A has to be moved in the opposite direction, and this is accomplished by guiding said foot along slanting surface  $c'$  of block C from its position  $A^1$  to its new position  $A^2$  in the direction of the arrow. While spreader 47 is placed as in Fig. 7, lever-foot A will travel from  $A^2$  to  $A^3$ , where it will engage with surface  $d'$  on block D and will be guided along said surface  $d'$  to position  $A^4$ , which corresponds with the alinement of position  $A^1$ , to which position foot A is returned upon the return travel of the carriage. In positions  $A^2$  and  $A^4$  foot A just clears the shifting blocks laterally, and thus, after proper locking of post 43 has occurred, when foot A reaches either of said positions without any further shifting taking place, the lateral shifting of post 43 being solely due to the side-ward thrust upon lever 58, imparted to it during the travel of foot A along surfaces  $c'$  and  $d'$ , respectively. If, however, for any reason proper locking of post 49 should not have occurred at positions  $A^2$  and  $A^4$  and foot A during such further travel of the color-carriage in the same direction should have a tendency to swing backward, the outer slanting surfaces  $c^2$  and  $d^2$  of blocks C and D would on the return trip again force foot A into its proper position and then secure proper locking of post 43. The shifting of foot B of lever 58' is accomplished in analogous manner, the travel of foot B being indicated by course  $B^1$   $B^2$   $B^3$   $B^4$ , while spreader 47' moves from the position shown in Fig. 8 to that in Fig. 7 and back again, such shifting being accomplished by means of shifting blocks E and F, provided with proper guiding-surfaces  $e'$   $e^2$  and  $f'$   $f^2$ , respectively. Shifting blocks C and E are placed near the right-hand end of the yarn-drum and blocks D and F near the left-hand end in such positions that blocks E and D will compel the lateral shifting of the spreaders promptly after the spreader nearest to the drum has passed from underneath it. When the spreaders are to be moved from either of the positions shown in Figs. 7 and 8 to those shown in Fig. 6, I employ the following apparatus:

J and K are two longitudinal bars placed between rails 32 32' higher than the shifting blocks and joined together by tie-pieces L. Shifting blocks C and F are stationary,

while blocks E and D are firmly secured to corresponding tie-pieces L in such manner that upon lateral movement of said bars into their extreme opposite positions J' and K' (shown in dotted lines in Fig. 5) said blocks will move with the same.

M M are rods serving to connect bar K with a beam N on the other side of rail 32' in such manner that by moving beam N away from rail 32' bars J and K will be drawn toward the same, springs O, around belts M, serving to force said bars back into their original positions when the thrust on beam N ceases. Said beam N may be actuated by hand, treadle mechanism, or in any other suitable manner, and in addition to springs O any suitable positive locking mechanism may be used for holding bars J and K in their normal positions. Said bars are employed to actuate levers 58 and 58', said levers being so shaped and so provided with suitable projections directly opposite bars J and K that such engagement will be had with said bars upon shifting the same laterally that when these bars are shifted as far as practicable toward rail 32' into positions J' K' the feet of said levers will be forced thereby into the positions  $A^5$  and  $B^5$ , (shown in dotted lines in Fig. 5,) which correspond with the positions of the two spreaders in Fig. 6, and that when said bars are returned to their original positions, either by the action of springs O or by any other suitable means, the spreaders will be forced either into the positions shown in Fig 7 or into those shown in Fig. 8, according to the position of the carriage, beyond one or the other end of the drum, where such shifting must always be accomplished.

Referring first to lever 58, when the carriage is at the right-hand end of the drum its lower end will then occupy either a position as  $A^1$  or as  $A^2$  or an intermediate position laterally, and the movement of bar J toward rail 32' will wherever the end of said lever may be at the time cause the bar to so coact with portion W of lever 58 as to carry its end A into the corresponding position  $A^5$ . The same will occur if the carriage be located at the left-hand end of the drum. If the carriage be at the right-hand end of the drum, upon finishing the first of a series of streaks the foot of lever 58 must be brought from  $A^5$  into a position, as  $A^2$ , when the second streak is to be printed, so as to place the spreader 47 in the position shown in Fig. 7. For such purpose the spur P is provided near the lower end of lever 58, said spur being of such length that when the foot A of said lever is at  $A^2$  said spur will contact with bar K, and therefore movement of said bar into its normal position will force foot A from  $A^5$  into position  $A^2$ . At the left-hand end of the drum foot A will likewise be forced into a position, as  $A^3$ , (which is in the same alinement with  $A^2$ ,) and from there shifting block D, which, as stated before, moves with bar K and which had previously been located in position  $D^5$ ,



(shown in dotted lines,) will conduct said foot along one of its guiding-surfaces  $d'$  or  $d''$  into its proper position  $A^4$ , corresponding with the position of scraper 47 in Fig. 8. Lever 58' is actuated in similar manner when its foot B passes into and out of the position  $B^5$ . Its spur Q is of such length that when bar J is shifted to J' said bar and said spur will be in contact and said foot will occupy position  $B^5$ , while the return of bar K to its normal position will so bring it in contact with said lever 58' that it will be brought in a position in the alinement  $B^4 B'$ , and if at the right-hand end of the drum movable shifting block E, which has previously been occupying the position  $E^5$ , will then force foot B into its proper position  $B^2$ . The top of shifting block D is lower than the bottom of B, so as to avoid conflict between these parts.

I prefer to make the front and rear faces X and Y of that portion of arm 44 which telescopes with the lower hollow portion of spreader 47 convex, allowing there enough play between these telescoping parts to permit the spreader to tilt or rock forward and rearward sufficiently to accommodate itself properly to the portions of the drum to which it is applied. To the sides Z of the spreader I prefer to give a sufficient gradual slope to guard against cutting of the yarn by the longitudinal edges of the rubbing-surface in case accidental lateral displacement of the spreader should be brought about while the same is in contact with the yarn.

In the construction illustrated in Fig. 9 post  $43^x$  is shown to be extended downward sufficiently to bring its foot  $A^x$  opposite a proper shifting block  $C^x$ , to be actuated directly by enforced contact with its deflecting-surfaces. In view of the explanations given above as to the rules governing proper arrangement of shifting blocks and of bars J and K it is not deemed necessary here to set forth how such arrangements should be made with reference to this particular case.

While the direct contact of the foot  $A^x$  of post  $43^x$  with shifting block  $C^x$  somewhat simplifies the construction, certain advantages are sacrificed thereby which the use of levers, as 58, offers. Thus by changing the fulcrumage of such levers greater or less lateral displacement of posts  $43$   $43'$  and of the spreaders can be obtained while using the same shifting blocks, providing such posts be furnished with a sufficient number of vertical notches, as shown in Fig. 14. This is particularly desirable when, say, color-wheels of half or double widths and in combination therewith spreaders of half or of double widths are to be used. Besides when employing levers, as 58, a considerable lateral travel of the foot A of such lever can be made to produce comparatively small lateral displacement of the spreader, and thereby more perfect adjustment of its movements can be secured. When the fulcrumage of lever 58 is to be changed, as referred to above, pin 59

must be withdrawn from holes  $h$  and  $i$  and must be inserted instead in other suitable holes, as  $h^x$  and  $i^x$ .

Operators in seeking to expedite the work are apt to throw or partly revolve the drum too quickly and before the color-wheel and the spreaders have entirely passed from underneath it, and particularly from contact with the yarn. This tends to cause derangement of the apparatus and of the yarn and irregularities in the work, and especially in the alinement of the streaks near the end of the drum. To guard against this, I employ the following appliances:

62 is an interior gearing at that end of the drum where the printer stands while operating the machine.

63 is a hand-wheel on shaft 64, operating a pinion 65 in mesh with the gear-wheel 62 for the purpose of properly revolving the drum after the printing of each streak.

66 is an additional toothed wheel having the same number of teeth as pinion 65, and 67 a lever fulcrumed on shaft 68, which shaft may be mounted upon any suitable part of the drum-supporting frame. This lever, actuated by its own weight and by a spring 69, if desired, is normally held at its upper end in locking contact with toothed wheel 66, thereby preventing the turning of hand-wheel 63 and of revolving of drum 33.

70 is a projection on the axle of wheels 10 or on any suitable portion of the carriage-body, so placed as to come in contact with the lower end of lever 67 as soon as spreader 47' has emerged from underneath the drum and to swing said lever out of engagement with toothed wheel 66, and to thus permit revolving of the drum. Just after the carriage and spreader 47 have passed from underneath the left-hand end of the drum a projection 71 on the right-hand portion of the carriage will strike a lever 72, so placed and fulcrumed at 73 as to throw lever 67, through the instrumentality of a connecting-rod 74, out of its locking engagement, and relocking will be prevented until the carriage starts upon its return trip, when lever 72 is permitted to re-assume its vertical position. By so adjusting the positions of levers 67 and 72 and of the appliances for shifting levers 58 and 58' that lever 72', as well as the shifting devices, will be actuated substantially simultaneously immediately after the spreader behind the color-wheel emerges from underneath the drum, as shown in the drawings, the promptest possible operation of the apparatus is made possible.

In Figs. 10 and 11 I have shown rockers 75 and 75' mounted in front and in the rear of color-wheel 23, arms  $t$  and  $t'$  being held in their operative positions simultaneously when the wheel 23 is traveling toward the right, and arms  $u$  and  $u'$  being so held in contact with the yarn while said wheel is traveling toward the left, the alternate tilting of the rockers, as well as of hinged levers, as shown in Figs.



12 and 13, being produced by any suitable tilting mechanism—such, for instance, as shown in United States patents to Hughes, No. 246,778, or Skinner, No. 264,112—arms of the two rockers 75 and 75' for such purpose being either joined together by a connecting-rod or operated independent of each other. The operative faces of said arms may be made as shown in full or in dotted lines in Fig. 10 or of any other suitable widths and alignments, so as to produce proper rubbing and re-rubbing of the yarn thereby. When a single streak is to be rubbed, all the arms should be held out of contact with the yarn—for instance, by lowering in known manner the standards carrying bearings of axles *v v'*—unless some of the spreaders be made to cover only the streak in course of application, when such spreaders might be maintained in contact with the yarn at all times.

In Figs. 12 and 13 I show hinged spreaders 76 and 76' held in contact with the yarn simultaneously on one side of the color-wheel while traveling toward the right and hinged spreaders 77 and 77' adapted to be held against the yarn when traveling toward the left in positions either as indicated in Fig. 12 or in any other suitable positions.

It will readily be seen that many features referred to above might be varied without departing from the spirit of my invention. Thus the support for a spreader might be shifted laterally or otherwise, so as to alternately assume and to be locked in positions to the right and to the left of the color-wheel while the same is traveling toward the left and then toward the right, corresponding with alternating operative positions of the spreader on opposite sides of said wheel.

Any suitable form of spreaders and any suitable number and arrangement of supporting-springs may be used in place of those illustrated.

In the business of printing carpet-yarns a very great number of different shades and colors are employed, and it is a peculiarity of some of the coloring substances so used that they will more readily and thoroughly enter into and spread through the yarn if rubbing action is applied thereto substantially simultaneously with the printing operation, while in regard to others a short interval between the printing and the rubbing operation—such as is afforded between the printing of different streaks—secures the best results. By rubbing one portion of a streak substantially simultaneously with the printing operation while imparting the first rubbing to another portion of said streak during a subsequent printing operation, as explained above, good results may be accomplished with the aid of the subsequent steaming and scouring process in either case.

I claim—

1. In the art of printing and coloring yarns, the method herein described of successively applying streaks of color to yarn and par-

tially equalizing the same, which consists in printing such a streak, subjecting during its printing a portion only of its width to rubbing action, then printing another streak and during the printing of the same subjecting a portion of the width of said successive streak and rubbed and unrubbed portions of the previous streak to rubbing actions.

2. In the art of printing and coloring yarns, the method herein described of successively applying streaks of color to the yarn and partially equalizing the same, which consists in printing such a streak, subjecting during its printing a portion only of its width to rubbing action, then printing an adjoining streak and during the printing of the same subjecting a portion of the said successive streak and an adjoining portion of the former streak left unrubbed during the printing of the same and a portion of the former streak rubbed during the printing of the same, to rubbing action.

3. In the art of printing and coloring yarns, the method herein described of successively applying streaks of color to the yarn and partially equalizing the same, which consists in printing such a streak, subjecting during its printing a portion only of its width to rubbing action, then printing an adjoining streak and during the printing of the same subjecting a portion of the said successive streak to rubbing action and simultaneously subjecting a portion of the former streak left unrubbed during the printing of the same to two independent rubbing actions and also subjecting a portion of said former streak previously rubbed to an additional rubbing action.

4. In the art of printing and coloring yarns, the method herein described of successively applying streaks of color to the yarn and partially equalizing the same, which consists in printing such a streak, subjecting during its printing a portion only of its width to rubbing action, then printing an adjoining streak and during the printing of the same subjecting a portion of the width of said successive streak to a rubbing action and simultaneously subjecting a portion of the former streak previously rubbed to an additional rubbing in a direction opposite to that of the previous rubbing.

5. In apparatus for printing yarns, the combination with the yarn-drum, the color-carriage and the distributing-wheel, of a support carrying a suitable rubbing-surface, mechanism for shifting said support into varying positions corresponding with varying operative positions of the rubbing-surface and means for enforcing sliding contact between said rubbing-surface and the yarn on the drum.

6. In apparatus for printing yarns, the combination with the yarn-drum, the color-carriage and the distributing-wheel, of a support carrying a suitable rubbing-surface, mechanism for shifting said support, and means in-



dependent of the color-carriage adapted to lock said support in varying positions corresponding with varying operative positions of the rubbing-surface.

5 7. In apparatus for printing yarns, the combination with the yarn-drum and the distributing-wheel, of a spreader secured in proper relation with the color-wheel, and means for moving said spreader laterally with reference  
10 to the path of the color-wheel.

8. In apparatus for printing yarns, the combination with the color-wheel, of a spreader in proper relation thereto, a support for said spreader adapted to move laterally with reference to the path of the color-wheel and secured against up-and-down movement, and means for producing such lateral movement of said support.

9. In apparatus for printing yarns, the combination with the yarn-drum and the distributing-wheel, of a support carrying suitable spreading means and mechanism for alternately locking the same in different positions whereby spreading means are applied to the  
20 yarn alternately in different positions laterally relative to the path of the color-wheel, and mechanism for shifting the support of the spreader laterally.

10. In apparatus for printing yarns, the combination with the yarn-drum and the distributing-wheel, of spreading means, and mechanism for alternately producing rubbing contact between portions of such spreading means and the yarn on the drum in different positions, laterally, relative to the path  
30 of the color-wheel.

11. In apparatus for printing yarns, the combination with the yarn-drum and the distributing-wheel, of spreading means in front  
40 and in the rear of the color-wheel and means for applying operative portions of such spreading means to the yarn in varying positions laterally, relative to the color-wheel.

12. In apparatus for printing yarns, the combination with the yarn-drum adapted to be swung step by step and the distributing-wheel, of two sliding spreaders adapted to travel one behind the other and adjusted to have one edge of the forward spreader extend  
50 laterally beyond the corresponding edge of the rear spreader and to have the other edge of the rear spreader extend laterally beyond the corresponding edge of the forward spreader, the minimum aggregate widths of the operative surfaces of said spreaders being equal to the peripheral travel of the drum during two successive steps.

13. In apparatus for printing yarns, the combination with the distributing-wheel  
60 adapted to apply successive streaks of color to yarn, of two spreaders one overlapping the other and adapted to jointly cover a portion only of the streak in course of application and a portion of previously-printed yarn, and  
65 means for holding said spreaders in such positions.

14. In apparatus for printing yarns, the

combination with the distributing-wheel adapted to apply successive streaks of color to yarn, of two spreaders, one overlapping the  
70 other and adapted to jointly cover a portion only of the streak in course of application and a portion only of the adjoining streak previously printed, and means for holding said spreaders in such positions.

15. In apparatus for printing yarns, the combination with the distributing-wheel adapted to apply successive streaks of color to yarn, of two spreaders, one overlapping  
75 the other and adapted to jointly cover a portion only of the streak in course of application and a portion only of the adjoining streak previously printed, and means for holding said spreaders in such positions.

16. In apparatus for printing yarns, the combination with the yarn-drum and the distributing-wheel, of two spreaders one overlapping the other, one adapted to cover a portion of the streak in course of application and a portion only of the adjoining streak previously made, and the other adapted to cover  
85 a portion only of the previous streak, and means for holding said spreaders in such positions.

17. In apparatus for printing yarns, the combination with the yarn-drum and the distributing-wheel, of two spreaders adapted to travel one behind the other and adjusted to have one edge of one of said spreaders extend laterally beyond the corresponding edge  
90 of the other spreader and means for reversing the relative lateral positions of such edges.

18. In apparatus for printing yarns, the combination with the yarn-drum and the distributing-wheel, of a spreader alined with the  
95 path of said wheel, and means for placing it out of alinement therewith.

19. In apparatus for printing yarns, the combination with the yarn-drum and the distributing-wheel, of two spreaders alined with  
100 each other and means for placing the same out of alinement with each other.

20. In apparatus for printing yarns, the combination with the yarn-drum and the distributing-wheel, of two spreaders placed out  
105 of alinement with each other and with the color-wheel, and means for placing said spreaders in alinement with each other and with said wheel.

21. In apparatus for printing yarns, the combination with the yarn-drum and the color-wheel, of a spreader in front of the color-wheel and covering the larger portion of the adjoining streak previously made and a portion of the path to be traversed by the  
110 color-wheel while making the streak in course of application, and a spreader in the rear of the color-wheel covering a smaller portion of the adjoining streak previously made and portion of the streak in course of application.  
120

22. In apparatus for printing yarns, the combination with the yarn-drum and the color-wheel, of a spreader, and means for moving the same laterally, such spreader being  
125  
130



provided with a laterally-sloping surface extending downward and outward from its contact-surface.

23. In apparatus for printing yarns, the combination with the yarn-drum and the distributing-wheel, of a spreader, a support upon which the same is mounted, and means for producing a parallel movement of said support laterally.

24. In apparatus for printing yarns, the combination with the yarn-drum and the distributing-wheel, of a spreader, a support for said spreader adapted to be moved laterally and provided with suitable recesses, and a spring-catch adapted to engage with such recesses.

25. In apparatus for printing yarns, the combination with the yarn-drum and the distributing-wheel, of a spreader, an upright support for the same, longitudinal grooves in said support, and an elongated spring-actuated projection adapted to engage with said grooves.

26. In apparatus for printing yarns, the combination with the yarn-drum and the distributing-wheel, of a spreader, a support for the same adapted to move laterally, means for producing such movement and a spring for yieldingly resisting the same.

27. In apparatus for printing yarns, the combination with the yarn-drum and the distributing-wheel, of suitable spreading means, mechanism for alternately applying such means in different operative positions, and a spring adapted to assist such mechanism.

28. In apparatus for printing yarns, the combination with the yarn-drum and the distributing-wheel, of suitable spreading means, mechanism for alternately applying such means in different positions with reference to said wheel, and springs for yieldingly resisting such movements in either direction.

29. In apparatus for printing yarns, the combination with the color-wheel, of a spreader in proper relation thereto, a sectional support on which said spreader is mounted, and a spring between the sections forming said support, one of the sections being provided with convex surfaces engaging with proper surfaces of the other section.

30. In apparatus for printing yarns, the combination with the yarn-drum and the distributing-wheel, of a spreader capable of lateral movement, a shifting block having a lateral deflecting-surface, a shoe adapted to travel along the same and means for imparting movement from said shoe to said spreader.

31. In apparatus for printing yarns, the combination with the yarn-drum and the distributing-wheel, of a spreader capable of lateral movement, a shifting block having a proper deflecting-surface, and a lever interposed between said block and said spreader.

32. In apparatus for printing yarns, the combination with the yarn-drum and the distributing-wheel, of a spreader capable of lat-

eral movement, a shifting block having a proper deflecting-surface, a lever interposed between said block and said spreader, and means for varying the fulcrumage of said lever.

33. In apparatus for printing yarns, the combination with the yarn-drum and the distributing-wheel, of a spreader capable of lateral movement, a shifting block having a proper deflecting-surface, a shoe adapted to travel along the same, means for imparting movement from said shoe to said spreader, and mechanism for shifting said spreader independent of said shifting block.

34. In apparatus for printing yarns, the combination with the yarn-drum and the distributing-wheel, of a spreader capable of lateral movement, a shifting block having a proper deflecting-surface, a shoe adapted to travel along the same, means for imparting movement from said shoe to said spreader and mechanism for displacing said shifting block.

35. In apparatus for printing yarns, the combination with the yarn-drum and the distributing-wheel, of a spreader capable of lateral movement, a shifting block for said spreader, and means for displacing said spreader and shifting block simultaneously.

36. In apparatus for printing yarns, the combination with the yarn-drum and the distributing-wheel, of two spreaders, supports on which said spreaders are mounted, each support having provided for it a pair of shifting blocks at opposite ends of the drum, independent of the shifting blocks for the other spreader, and joint means for displacing two of said shifting blocks.

37. In apparatus for printing yarns, the combination with the yarn-drum and the distributing-wheel, of two spreaders, proper supports for the same adapted to be moved laterally, and a joint shifting device adapted to simultaneously so move said supports.

38. In apparatus for printing yarns, the combination with the yarn-drum and the distributing-wheel, of a spreader, two bars joined together and shifting means interposed between said bars and said spreader and adapted to be actuated by each of said bars alternately in different directions.

39. In apparatus for printing yarns, the combination with the revoluble yarn-drum, the color-carriage and a color-distributor, of a locking device for preventing revolving of the drum, comprising gearing in proper engagement with the drum, a brake for locking said gearing, a lever actuating said brake and a tilting device connected with the carriage adapted to engage with said lever.

40. In apparatus for printing yarns, the combination with the revoluble yarn-drum, the color-carriage and a color-distributor, of a gearing for revolving the drum, a hand-wheel for actuating said gearing, a gear-wheel on the same shaft with said gear-wheel, levers



67 and 72, connection 74, between the same, and arms on the carriage adapted to engage with said levers.

41. In an apparatus for printing yarns, the  
5 combination with the yarn-drum, the color-carriage and the distributing-wheel, of a spreader, a suitable support for said spreader, means for moving said support laterally and a drip-pan adapted to move with said support.  
10 42. In apparatus for printing yarns, the combination with the yarn-drum and the dis-

tributing-wheel, of mechanism adapted to apply rubbing means to a single streak only, or to two streaks simultaneously.

In testimony that I claim the foregoing as  
my invention I have signed my name, in pres-  
ence of two witnesses, this 28th day of Octo-  
ber, 1897.

CHARLES L. HORACK.

Witnesses:

J. E. M. BOWEN,  
HENRY E. JOËL.