

No. 764,632.

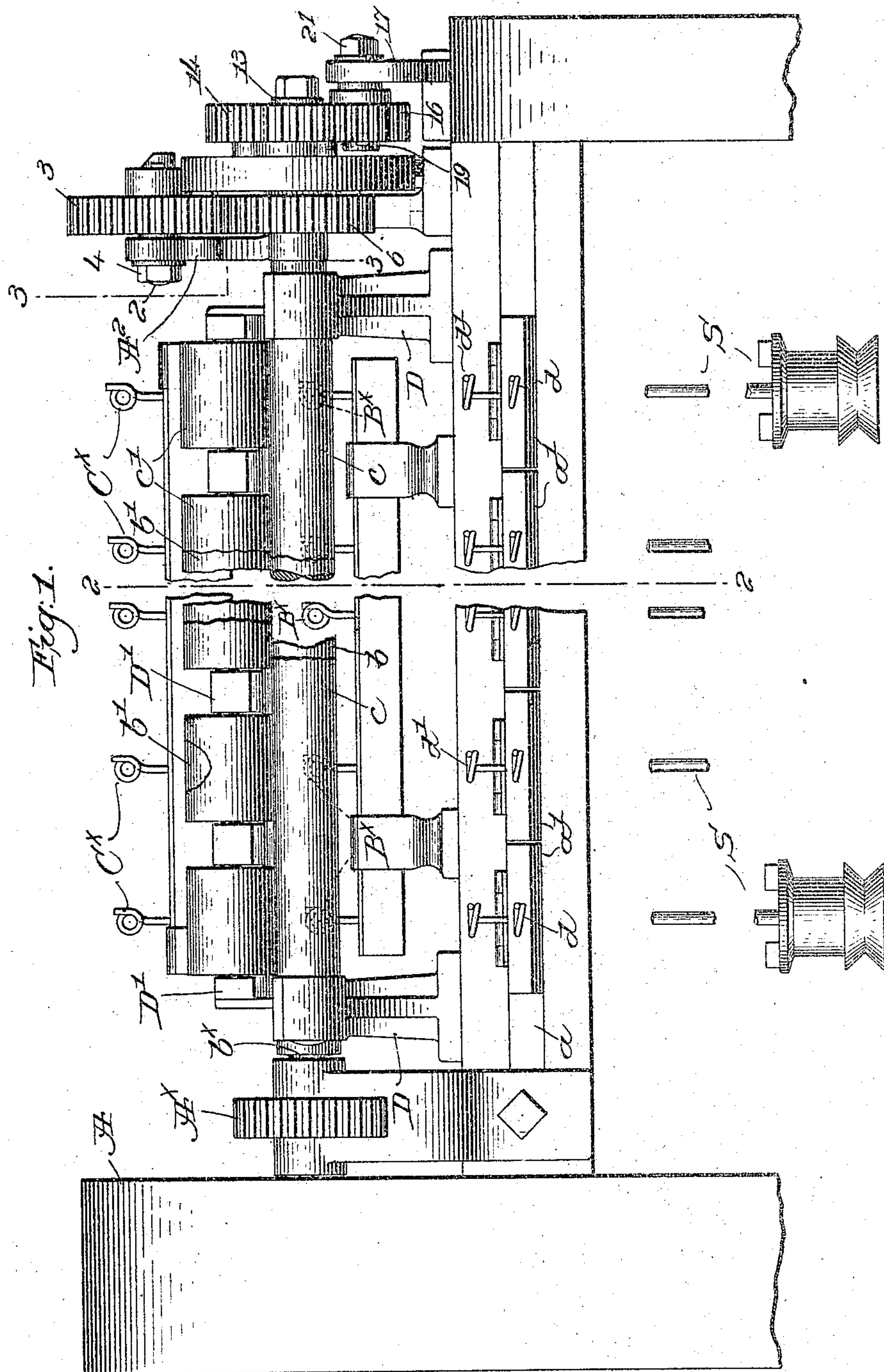
PATENTED JULY 12, 1904.

A. E. RHOADES.
YARN TWISTING APPARATUS.

APPLICATION FILED MAR. 17, 1904.

NO MODEL.

2 SHEETS—SHEET 1.



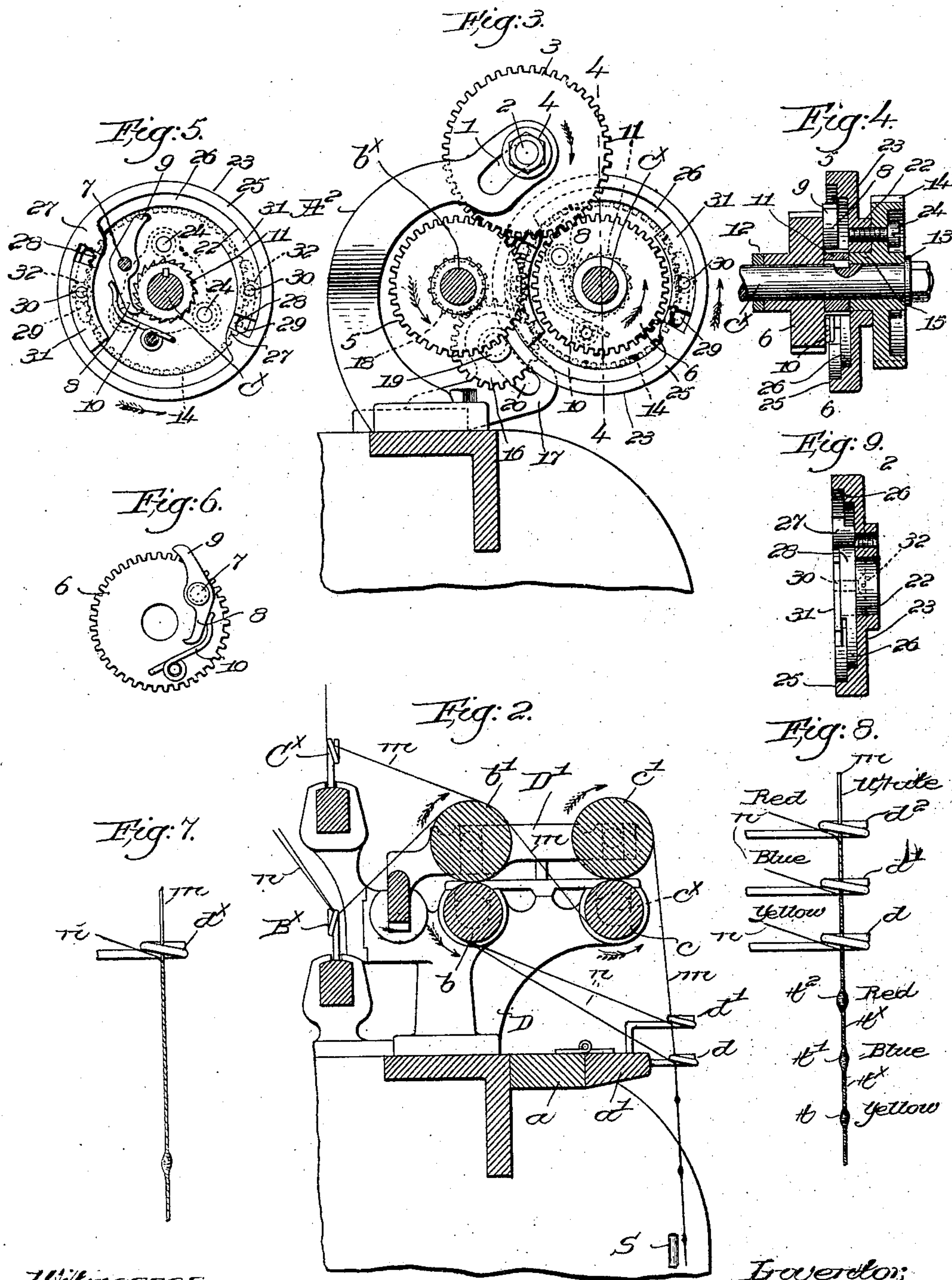
Witnesses,
Edward H. Allen.
Thomas Drummond.

Inventor,
Alfred E. Rhoades,
by Crosby Gregory,
Attys.

A. E. RHOADES.
YARN TWISTING APPARATUS.
APPLICATION FILED MAR. 17, 1904.

NO MODEL.

2 SHEETS—SHEET 2.



Witnesses,
Edward H. Allen.
Thomas J. Drummond.

Inventor,
A. E. Rhoades
by Kirby Gregory
attys.

UNITED STATES PATENT OFFICE.

ALONZO E. RHOADES, OF HOPEDALE, MASSACHUSETTS, ASSIGNOR TO
DRAPER COMPANY, OF HOPEDALE, MASSACHUSETTS, A CORPORATION OF MAINE.

YARN-TWISTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 764,632, dated July 12, 1904.

Application filed March 17, 1904. Serial No. 198,555. (No model.)

To all whom it may concern:

Be it known that I, ALONZO E. RHOADES, a citizen of the United States, and a resident of Hopedale, county of Worcester, State of Massachusetts, have invented an Improvement in Yarn-Twisting Apparatus, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to apparatus for twisting yarn; and it has for its object the production of means for forming a fancy yarn having bunches or enlargements thereon at intervals.

Heretofore two yarns have been so combined in a twister that one yarn will form bunches on the other yarn, so that the main or body yarn may be of one color and the bunches formed by the auxiliary or plaiting yarn of another color. This bunch-forming is effected by making intermittent the delivery of one yarn to the twisting instrumentality and continuously delivering thereto the other yarn, a bunch being formed at each arrest of the main-yarn delivery.

In my present invention I have provided means whereby a fancy yarn of the character specified may be made with bunches of two or more different colors and whereby a plurality of bunches may be formed simultaneously at each arrest of the main or body yarn, the latter forming the core upon which the bunches are formed. By using several bunch-forming yarns of different colors or shades many novel and very striking effects may be produced, the bunches of the several colors used being formed in a regular recurrent series in a given order or sequence.

I have devised novel means for controlling the intermittent rotation of the delivery-rolls and for varying the duration of the rest periods of the core or main yarn.

The various novel features of my invention will be fully described in the subjoined specification and particularly pointed out in the following claims.

Figure 1 is a front view, centrally broken out, of a twisting apparatus embodying one form of my invention, two of the twister-spindles being partially shown with their bases and attached whirls. Fig. 2 is a transverse sectional detail through the yarn-delivering means on the line 2 2, Fig. 1, looking toward the right. Fig. 3 is a similar view on the line 3 3, Fig. 1, looking toward the right, showing the means for driving and controlling the operation of the intermittently-acting delivery-rolls. Fig. 4 is a sectional detail of the clutch and clutch-controller on the line 4 4, Fig. 3, looking toward the left. Fig. 5 is an inner face view of the clutch-controller and the clutch members, taken on the line 5 6, Fig. 4, and looking toward the right. Fig. 6 is an inner face view of the continuously-driven clutch member on the line 5 6, Fig. 4, as seen by looking to the left. Fig. 7 is an enlarged view of a portion of the yarn having a bunch thereon with one of the guides to direct the auxiliary yarn to the main or core yarn. Fig. 8 is a similar view, but showing a series of auxiliary-yarn guides and the several bunches formed at one operation; and Fig. 9 is a section through the clutch-controller on the line 4 4, Fig. 3, looking toward the left.

In the present embodiment of my invention I have shown a twister of somewhat similar general construction to twisting apparatus wherein two sets of delivery-rolls are employed, as is frequently employed for heavy yarns in order to hold the twist of the yarn; but herein the rear set of rolls is continuously driven and the front set is driven intermittently, as will be described, in order to produce bunch-yarn.

Referring to Fig. 1, the twisting instrumentalities or spindles S, the finger-boards a' , mounted on the guide-board a , the head A at the left-hand side of the frame and containing the usual mechanism for positively and continuously driving the rolls b b' , herein shown as the rear set of delivery-rolls, Fig. 2, and the roll-stands D, may be and are sub-

stantially of usual and well-known construction, save in the particulars to be hereinafter referred to.

The stands D support the carriers D' for the top rolls of both the back and front sets of delivery-rolls, the lower back roll b being driven positively from the head motion and having its shaft extended the length of the frame, said roll-shaft b^x at its left-hand end having the usual pinion (not shown) in mesh with the driving-gear A^x , Fig. 1. The front lower roll c extends from one to the other end of the frame and has its shaft extended at the right-hand end at c^x , Figs. 3, 4, and 5, for a purpose to be described, and the front top rolls c' run loosely in bearings in the roll-carriers D' and are driven by frictional contact with roll c . Guide-eyes or pig-tails C^x B^x , behind the rolls, direct, respectively, the main or core yarns m and the auxiliary plaiting or bunch-forming yarns n to the two sets of delivery-rolls, and by reference to Fig. 2 it will be seen that the main yarns m are led forward over the top rolls b' , down under the lower front roll c , and thence around it and up between it and the top rolls c' , the yarns thence passing down through guides (shown as pig-tails or eyes) d d' to the twisting instrumentalities S. The auxiliary yarns n are led from the guide-eyes B^x up over and around the back top rolls b' and between them and the lower back roll b , passing thence forward to and under the guides d d' to the twisting instrumentalities, a guide, as d , being provided for each auxiliary yarn of a set, the guides being shown mounted on the finger-boards a' and in alinement one above the other, the twist holding the auxiliary yarn up against the guide. In Figs. 1 and 2 I have shown two auxiliary yarns for each main yarn, forming a set, and consequently there will be two guides d and d' for each set, it being observed that the main yarn leads through all the auxiliary guides of the set, the auxiliary yarns meeting the main yarn at the guides. In Fig. 8 I have shown a set including three auxiliary yarns, and consequently there are three guides d d' d'' therefor, one above the other, and in like manner for any additional number of auxiliary yarns. So long as the main yarn continues its longitudinal movement, due to continued rotation of the delivery-rolls c c' , the auxiliary yarns will be twisted together therewith in usual manner; but when such movement of the main yarn is arrested each auxiliary yarn will be twisted around the main yarn to form a bunch thereon. As many bunches will be formed simultaneously at each stoppage as there are auxiliary yarns in a set, and if, for instance, the main yarn in Fig. 8 be white and the three auxiliary yarns be red, blue, and yellow, as indicated, a series of bunches of red, blue, and yellow will be formed at each stoppage of the white or main

yarn, as at t t' t'' , and between the bunches the four yarns will be twisted together, as at t^x . The bunches will be formed in recurring series with the colors in the same sequence in each, the space between the bunches being determined by the distance separating the guides d d' d'' .

I will now describe the actuating means for the intermittingly-operating set of delivery-rolls, the means for effecting such intermittent action thereof, and means for varying the size of the bunches.

Referring to Figs. 1 and 3, the main frame has mounted thereon at the right-hand end an upturned overhanging bracket A^2 , having a slot 1 to receive a stud 2, on which an intermediate gear 3 is rotatably mounted, the stud being adjustably held in place by a suitable nut 4. Said gear meshes with and is driven by a gear 5, fast on the adjacent end of the lower back-roll shaft b^x , and the intermediate gear 3 also meshes with a gear 6, loosely mounted on the lower front-roll shaft c^x , Figs. 3 and 4, the gear 6 serving as a support for one of the members of a clutch. In Fig. 6 an inner face view of the gear 6 is shown, it having pivotally mounted thereon at 7 a pawl 8, having an elongated tail 9, a suitable spring 10 acting upon the pawl to effect its engagement with a ratchet 11, keyed to the shaft c^x to rotate therewith, (see Fig. 4,) the pawl and ratchet constituting two coöperating clutch members loose and fast, respectively, with relation to the lower front-roll shaft c^x . The gears 5 and 3 are rotated continuously, and through the intermediate gear 3 the gear or pawl-carrier 6 is continuously rotated, and so long as the pawl and ratchet are in coöperation the shaft c^x will be rotated and the operation of the front set of delivery-rolls c c' thereby effected. When, however, the members of the clutch—viz., the pawl and ratchet—are disengaged, the front rolls will be stopped and the delivery of the main or core yarns m will be arrested. A fast collar 12 on the shaft c^x prevents inward movement of the pawl-carrier 6 thereon, the fast member or ratchet 11 of the clutch positioning the pawl-carrier on the opposite side, and between said ratchet and a washer 13 on the end of the shaft is loosely mounted a gear 14, having an elongated hub 15. (Clearly shown in Fig. 4.) The gear 14 meshes with a smaller intermediate gear 16, adjustably mounted on a slotted stand 17, Fig. 3, and meshing with a pinion 18, (see dotted lines, Fig. 3,) fast on the roll-shaft b^x , the intermediate gear 16 being a change-gear, the introduction of gears of different sizes between the pinion 18 and loose gear 14 changing the speed of the latter gear in well-known manner. The stud 19, on which the change-gear 16 is rotatably mounted, is held fixedly in the segmental slot 20 of the stand 17 by a suitable nut 21. (See Fig. 1.)

I will now describe the clutch-controller and the means whereby the duration of the rest periods in the delivery of the main yarns is made adjustable.

5 The inner end of the hub 15 of the gear 14 has mounted upon it the hub 22 of the clutch-controller, (shown as a disk 23,) rigidly secured to the said gear by screws 24, Fig. 4, said disk having an inturned peripheral flange 10 25, provided with an internal annular shoulder 26. (Best shown in Figs. 4, 5, and 9.) The flange 25 is herein shown as radially thickened at two diametrically opposite portions and shaped to present cam-surfaces or risers 15 27, projecting inward into the path of the tail 9 of the pawl 8, as best shown in Fig. 5. At the leading side of each riser 27 the shoulder 26 is widened and raised to form segmental seats 28, each seat having an elongated 20 slot 29 to receive a screw-stud 30, threaded into a segmental cam or shoe 31, the width of each shoe being equal to that of the seat, the latter being thick enough (see Fig. 9) for its inner edge to lie in the path of the tail 9 of 25 the pawl. As shown in Fig. 4, the thickness of the pawl-tail is substantially equal to the distance between the shoulder 26 and the edge of the flange 25. The heads 32 of the studs 30 (see dotted lines, Fig. 9) are accessible at 30 the outer face of the disk, the studs 30 maintaining the segmental cams 31 in adjusted position on the seats.

By reference to Fig. 3 it will be seen that the gear or pawl-carrier 6 is driven at substantially the speed of the roll-shaft b^x ; but 35 by virtue of the pinion 18 and change-gear 16 the gear 14 will be rotated at a slower speed than the pawl-carrier, and consequently the pawl 8 will in its bodily revolution around 40 the shaft b^x pass by one after another of the risers and segmental cams on the clutch-controller. When the tail of the pawl engages a riser 27, it is thereby moved inward, withdrawing the pawl from engagement with the 45 other member of the clutch—viz., the ratchet 11—and thereby the front delivery-rolls are disconnected from the actuating means and delivery of the main yarns is arrested. As the pawl-carrier 6 continues its rotation the 50 tail of the pawl wipes over the inner longitudinal edges of the adjacent shoe 31 and its seat, and thereby the pawl is held inoperative until the tail drops off the end of the shoe, whereupon the spring 10 immediately 55 effects reengagement of the clutch members and rotation of the main-yarn-delivery rolls begins. While the pawl is held inoperative, the auxiliary yarns are forming a corresponding number of bunches on the main yarns, as 60 has been described, and the position of the leading end of the cam-shoe 31 determines the size of the bunch, due regard being also had to the differential speed of the pawl-carrier and clutch-controller. The thickening of the 65 seat is to maintain the pawl inoperative while

the tail 9 passes over the space between the riser and the adjacent end of the shoe, supposing the latter to be set in order to increase the duration of the rest period. By setting 70 the shoes 31 in toward the risers 27 the duration of the rest or bunch-forming period will be shortened, and by moving the shoes away from the risers the rest periods will be increased, with corresponding decrease or increase in the size of the bunches. During the 75 travel of the pawl from one cam-shoe to the next riser the main yarns are delivered to the twisting instrumentalities, the feed being sufficient to present proper portions of the main yarns for the next series of bunches. 80 Referring to Fig. 8, the main yarn is shown as ready for the formation of another series of bunches, the clutch having just been rendered inoperative. By changing the clutch-controller shown for one having a different 85 number of cams and properly changing the gearing and the distances separating the auxiliary-yarn guides (d' d' , &c.) the distances between successive bunches will be varied.

It will be obvious that a single cam could 90 be used on the clutch-controller, if desired; but in the particular mechanism and arrangement herein shown it is more convenient to employ two cams.

The risers 27 serve to gradually throw the 95 clutch out of operation as the tail of the pawl rides along the convex edge of each riser from its low point to the high point on the arc of the inner edges of the adjacent shoe and its 100 seat.

In Fig. 7 the formation of a single bunch at a time is shown, requiring but one guide, 105 d^x , for the auxiliary yarn n , and the twisting together of the main and auxiliary yarns between bunches is very clearly shown.

The mechanism shown for governing the rotation of the main-yarn-delivery rolls will, if 110 but a single auxiliary yarn be used, cause a bunch to be formed by or through each cam on the clutch-controller, the cams governing the size of the bunches.

My invention is not restricted to the precise construction and arrangement shown and described, as the same may be varied or modified in different particulars by those skilled in 115 the art without departing from the spirit and scope of my invention.

Having fully described my invention, what I claim as new, and desire to secure by Letters 120 Patent, is—

1. In apparatus of the class described, a twisting instrumentality, means to intermittingly deliver a main yarn thereto, means to continuously deliver a plurality of bunch-forming yarns at separated points to and to be 125 twisted with the main yarn, a plurality of bunches being formed at each arrest of the delivery of the main yarn, and means to vary the rest periods of the main yarn and thereby govern the size of the bunches to be formed. 130

2. In apparatus of the class described, a twisting instrumentality, means to deliver continuously thereto a plurality of bunch-forming yarns, means to deliver intermit-
- 5 tingly to said instrumentality a main yarn, and a plurality of relatively fixed guide-eyes arranged in alinement and through all of which the main yarn is led, each bunch-forming yarn being led under a guide-eye to the main yarn.
- 10 3. In apparatus of the class described, a set of continuously-driven delivery-rolls, a set of intermittingly-driven delivery-rolls for the main yarn, adjustable means to vary the length of the rest periods of said latter rolls, means
- 15 to deliver an auxiliary yarn from the continuously-driven rolls to the main yarn, and a twisting instrumentality to twist together said yarns.
4. In apparatus of the class described, two
- 20 sets of delivery-rolls, means, including an adjustable cam, to drive one set of rolls intermittingly and to vary the length of the rest periods thereof, and a twisting instrumentality to receive yarn from both sets of rolls to be
- 25 twisted together, the arrest of one set of rolls causing the yarn from the other set of rolls to form bunches on the intermittingly-delivered yarn, the adjustment of the cam governing the size of the bunch.
- 30 5. In apparatus of the class described, delivery-rolls, continuously-running actuating means therefor, a clutch intermediate said rolls and the actuating means, and comprising two coöperating members respectively fast
- 35 and loose with relation to one of the delivery-rolls, the loose member being driven by said actuating means, and a clutch-controller operated by said means and having a differential speed with relation to said loose clutch mem-
- 40 ber, to intermittingly effect disengagement of the clutch members and thereby arrest the operation of the delivery-rolls.
6. In apparatus of the class described, delivery-rolls, continuously-running actuating

means therefor, a clutch intermediate said 45 rolls and the actuating means, and comprising two coöperating members respectively fast and loose with relation to one of the delivery-rolls, the loose member being driven by said actuating means, and a clutch-controller oper- 50 ated by said means and having a differential speed with relation to the loose clutch member, said controller including a cam to effect disengagement of the clutch members, and means to vary the effective length of the cam, 55 to thereby change the duration of the periods of rest of the delivery-rolls.

7. In apparatus of the class described, delivery-rolls, a ratchet rotatable with one of said rolls, a coöperating pawl, a rotatable 60 pawl-carrier loose with relation to said roll and continuously driven, a controller concentric with the pawl-carrier, and having an adjustable cam thereon to intermittingly engage 65 the pawl and withdraw it from coöperation with the ratchet, to thereby stop rotation of the delivery-rolls, and means to rotate the controller at a slower speed than the pawl-carrier.

8. In apparatus of the class described, de- 70 liverly-rolls, a ratchet rotatable with one of said rolls, a coöperating pawl, a rotatable pawl-carrier loose with relation to said roll and continuously driven, a controller concentric with the pawl-carrier and having a plu- 75 rality of adjustable cam-segments adapted to successively engage and withdraw the pawl from coöperation with the ratchet, and means to continuously rotate the controller at a slower speed than the pawl-carrier. 80

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

ALONZO E. RHOADES.

Witnesses:

GEORGE OTIS DRAPER,
ERNEST W. WOOD.