

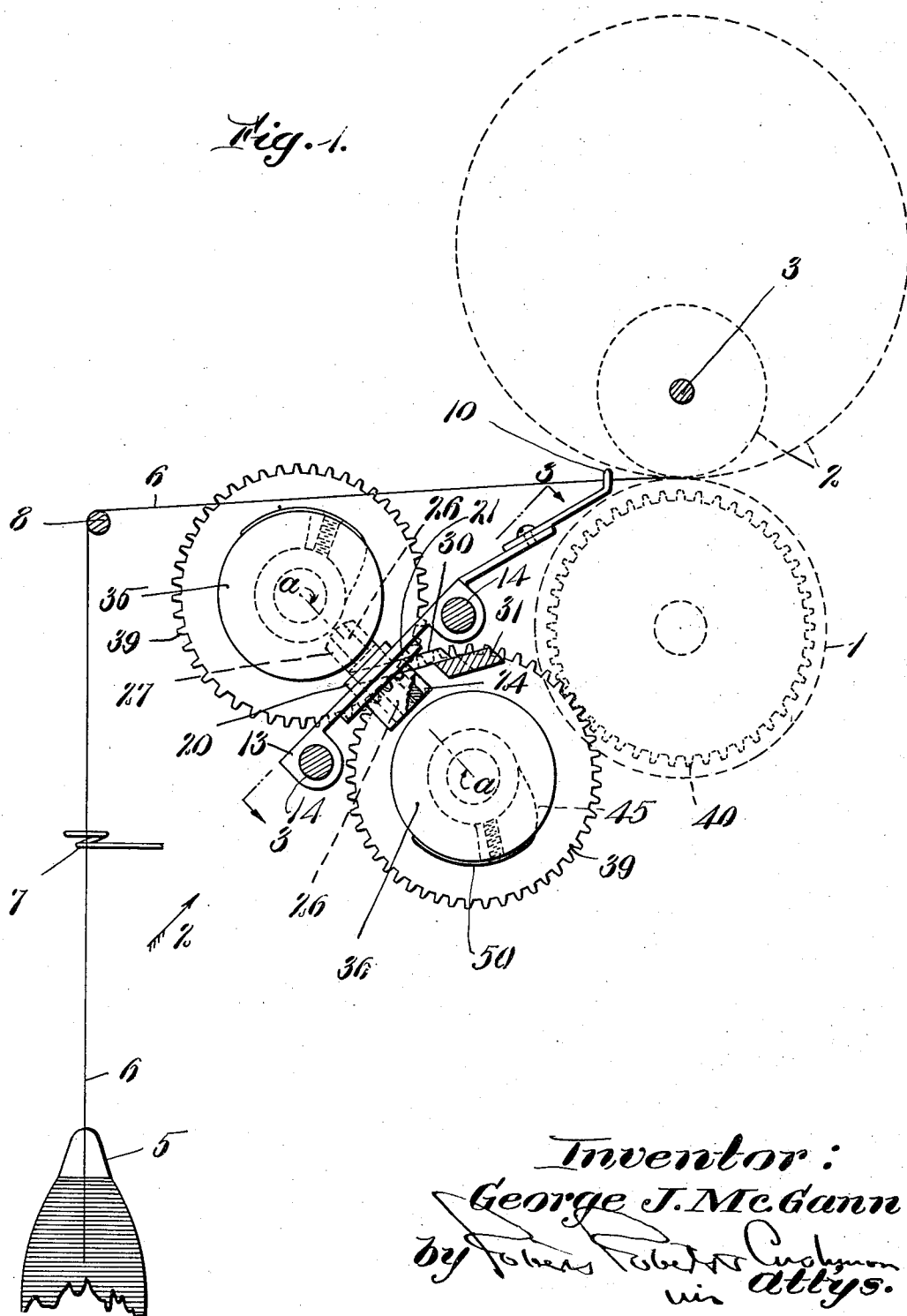
Nov. 6, 1923.

G. J. McGANN

1,472,847

HIGH SPEED TRAVERSE MECHANISM FOR WINDING MACHINES

Original Filed Jan. 12, 1920 3 Sheets-Sheet 1



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Fig. 2.

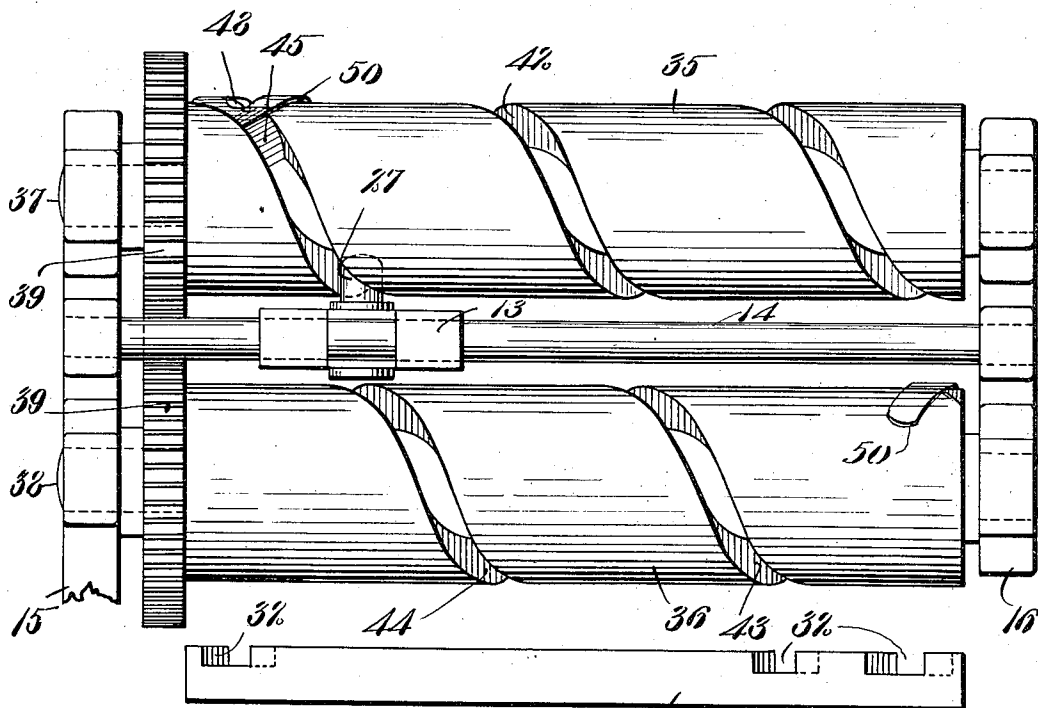


Fig. 4.

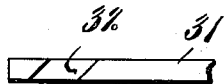


Fig. 5.

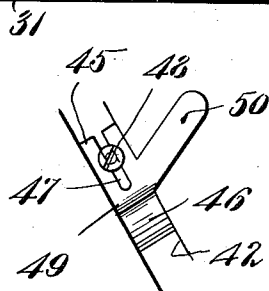
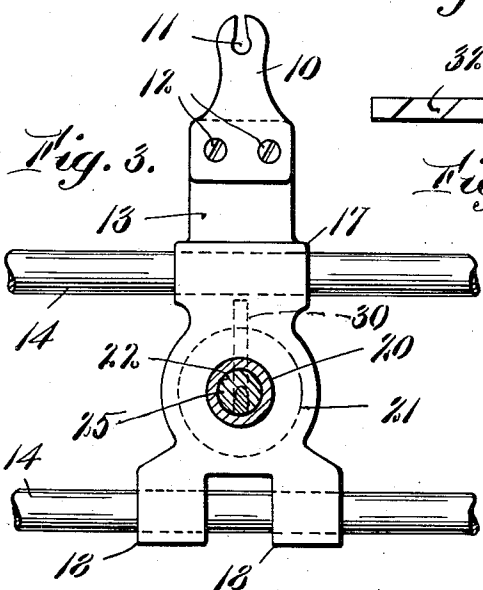
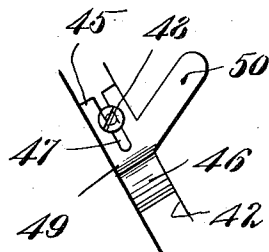


Fig. 6.



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Nov. 6, 1923.

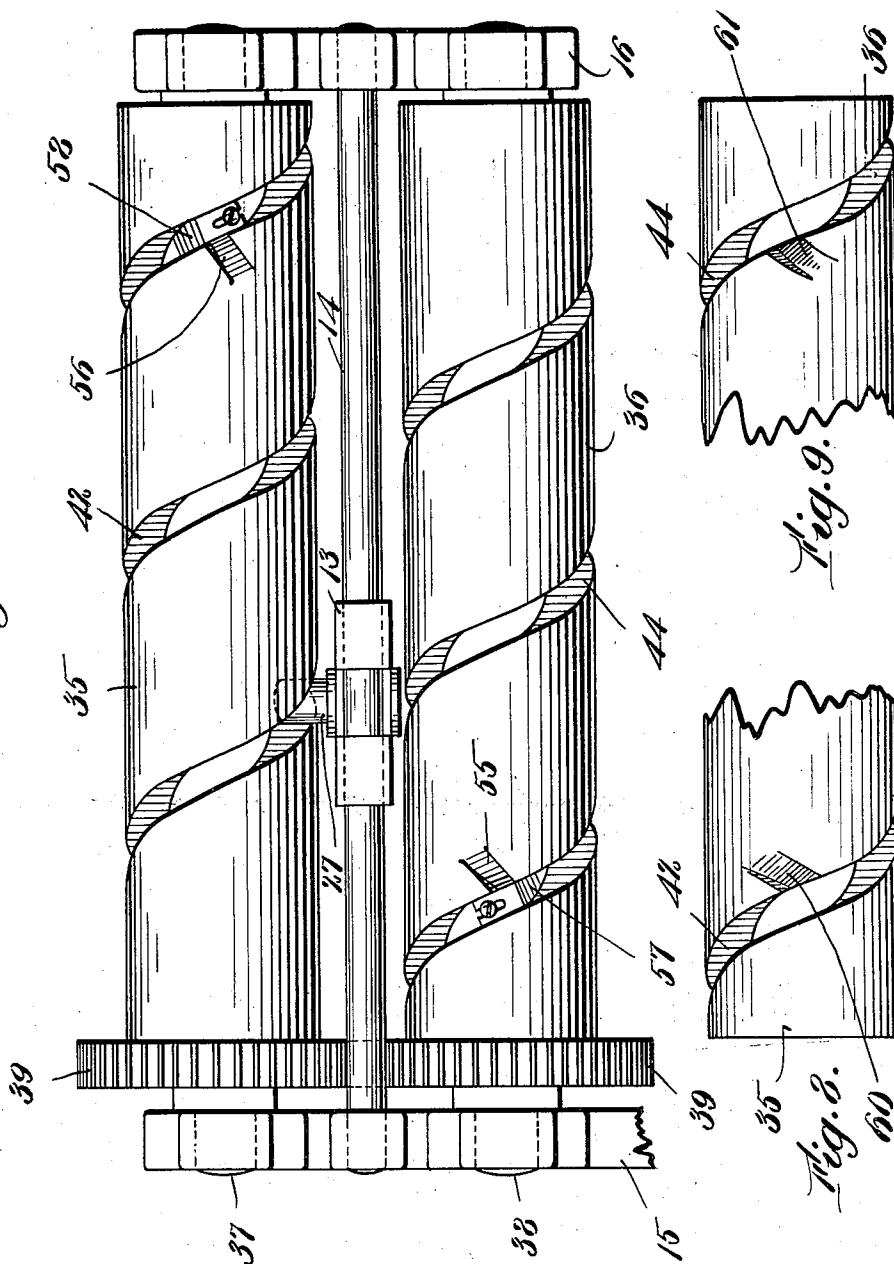
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Fig. 7.



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UNITED STATES PATENT OFFICE.

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HIGH-SPEED TRAVERSE MECHANISM FOR WINDING MACHINES.

Application filed January 12, 1920, Serial No. 350,895. Renewed June 10, 1921. Serial No. 476,606.

To all whom it may concern:

Be it known that I, GEORGE J. MCGANN, a citizen of the United States, and resident of Providence, in the county of Providence and State of Rhode Island, have invented new and useful Improvements in High-Speed Traverse Mechanism for Winding Machines, of which the following is a specification.

This invention relates to high-speed traverse mechanism suitable for winding and other textile machines and other uses.

It has heretofore been proposed for use in textile machines in which a yarn or thread is wound on a carrier (which may be cylindrical or conical, and a mere tube, a free ended bobbin, a skewer, or a spool having heads) accurately to relate the traverses of a winding guide distributing the thread or yarn spirally on the winding mass to the rotary speed of the surface of the winding thread-mass. In order to do this, it is necessary to reciprocate the traverse-guide accurately with respect to the rate of rotation of the surface upon which the thread or yarn is being wound. When the mechanism is intended to operate at high speeds, the usual reliance upon cam-and-lever mechanism and other like devices of the prior art is frequently not successful. For one reason, all such mechanisms, so far as I am aware, introduce a variable rate of traverse as between the middle and the ends of the stroke of the traverse-guide, preventing a sharp reversal at the end of the stroke. The mechanism in common use, for another reason, is not only space-consuming and dispersed, rather than compact, but often and usually is such as to rotate eccentrically disposed masses or reciprocate for the traverse a considerable mass of metal, the inertia of which at high speeds prevents sudden reversal at the end of the traverse, and so either occasions waste of power or prevents operation at speeds otherwise attainable, or results in broken parts or in uncertain motions, or in both.

Objects of the present invention are to provide simple and durable mechanism for positively reciprocating a guide for such uses which shall be characterized by accuracy of motion, by compactness keeping the mechanism nearly within the dimensions of the reciprocal stroke, by simplicity of mechanism, and by relatively small mass of the

operating parts called upon to participate in the reciprocation, and by absence of eccentric rotating weights and particularly by reversals at the end of the traverses substantially without delay or dwell, so that at high speeds quiet running is secured and very little power is absorbed in overcoming the inertia of the apparatus at the ends of the traverses, and the ends of the turns are sharp, regular and evenly spaced in planes perpendicular to the axis of winding.

In exemplification of the genus of devices I have herein illustrated and will now describe particular preferred species. In the accompanying drawings,—

Figure 1 is a side elevation of so much as is necessary to explain the invention of a winding machine embodying the improved traverse motion;

Figure 2 is a view taken in the direction of the arrow 2, Fig. 1;

Figure 3 is a section on the line 3—3 of Fig. 1;

Figure 4 is a view in plan of a guide stop;

Figure 5 is an elevation of the guide stop;

Figure 6 is a detail of the driving stud shifting means;

Figure 7 is a view corresponding to Fig. 2, illustrating a modification; and

Figures 8 and 9 are respectively detail elevations illustrating further modification of the devices shown in Fig. 7.

Referring now to the drawings, the machine may comprise any kind of driving means; as shown, a tractor roll 1 is employed to drive the winding thread mass 2 held for rotation by a carrier of any form on a winding spindle 3 adapted to rise with respect to the surface of the tractor roll 1 as the wound mass grows in size. The supply bobbin 5, representative of any kind of thread supply, is suitably held to unwind, and the thread 6 is suitably guided at 7 and 8. The guide 8 may be a polished horizontal rod from which the yarn or thread 6 passes to the traverse guide 10. Any usual form of traverse guide 10 having any suitable kind of notch 11 for the thread may be employed; preferably the structure 10 is a light piece of sheet metal attached by screws 12 to a traverse carriage 13 reciprocated on parallel guides 14. Carriage 13 and the guides 14 may be of any suitable form; preferably the guides 14 are parallel round

steel rods firmly seated in end frames 15, 16, respectively attached to or forming a part of the winding machine; and preferably the carriage 13 is an aluminum casting or steel or bronze punching or machined part having a tubular guide 17 for one of the rods 14, and preferably separated guides 18, 18, for the other rod 14; but any other design of the carriage 13 enabling strength and easy motion on the guides 14 without involving considerable mass may be employed.

The carriage is provided with driving means constituting a connection by which it is reciprocated. Integral with, soldered to, or brazed in the carriage 13 midway between the guides 14, a tubular boss 20, for instance, is provided; a preferred construction being that best shown in Figs. 1 and 3, in which the tube 20 having a flange 21 is shrunk or welded in a central opening of the carriage so as to form virtually an integral part thereof. The tubular boss 20 is provided with an accurate bore 22 and is made with an axial slot 24.

The bore 22 carries an axially movable driving stud 25 preferably having a central portion fitting the bore 22 and reduced end portions 26 riveted over anti-friction rolls 27, which are free to turn with respect to the stud 25 and reduced portions 26. The rolls 27 do not exceed the stud 25 in diameter, so that rolls 27 may alternately be housed within the bore 22 when the stud 25 is moved endwise in bore 22.

Entering the slot 24 and a transverse bore made at an inclination in the pin 25, a preferably hardened guide pin 30 is arranged to project beyond the tubular boss 20 and beneath the carriage 13 to engage on either side of a flat guide-stop 31, Figs. 1, 4 and 5, which guide-stop preferably is of the rhomboidal form in cross-section shown, and is provided near each end of its left-hand edge as viewed in Fig. 1, with an inclined gateway 32. When the pin 30 is on one side of the guide-stop 31, the driving stud 25, 27, is projected on that side from its tubular boss. The tubular boss 20 is sufficiently long to pass freely between the nearest parts of two constantly actuated driving members adapted to drive the stud 25 and hence the carriage 13 alternately in opposite directions at preferably constant rates, as determined by the position of the stud 25, 27, in respect to the carriage 13.

Preferred driving members comprise like quick-pitched screws or spiral cams 35, 36, on parallel shafts 37, 38, respectively having bearings in the end frames 15, 16, and central on the plane swept by the center line of the driving stud 25. The shafts 37, 38, are connected together and driven in opposite directions by like gears 39, 39, and one of these gears is arranged to be driven by

any suitable driving train from the tractor roll 1. Preferably as shown a pinion 40 on the tractor roll directly engages one of the gears 39.

In the preferred form shown, the respective cams or screws 35, 36, are alike, having grooves 42, 44, respectively of rectangular cross section adapted to present everywhere an accurate radial driving surface engaging the roll 27 throughout its length, and of such width as to direct the roll 27 positively, the groove being wide enough only to prevent binding of the roll running in it.

The stud 25 when the guide pin 30 is on the upper side of the guide-stop 31, projects upwardly from the carriage 13 into engagement with the spiral groove 42 of the rotating screw 35, and is thus driven toward the left of Fig. 2. As the carriage 13 approaches the desired maximum stroke to the left, the anti-friction roll 27 encounters a cam block 45, shown in elevation in Fig. 6, clamped in the groove 42 at the desired point. Preferably the block 45 comprises an inclined face 46 and is split at 47, bored and threaded for a cone expander screw 48 by which the block 45 is adjustably fastened by expanding its split portion at the desired point in the groove 42. The block 45 carries a sheet metal plate 49, preferably slightly resilient, having a tail 50 projecting over the outer surface of the cylindrical screw 35 at an inclination the same as but opposite to the pitch of the spiral groove 42.

As the anti-friction roll 27 reaches the face 45 of the block 48 the stud 25 is driven through the tubular boss 20 of the carriage 13, until the other roll 27 is in engagement with the groove 44 of the other traverse screw 36. The tail 50 of the sheet metal attachment 49 is useful at this time to prevent rebound at high speeds.

Movement of the pin 25 can not take place, however, unless permitted by the guide stop 31, which is recessed at 32 to provide a gateway for this purpose, and it will be understood without further explanation that the tail 50 maintains the pin 25 and the guide pin 30 in its new position until after the return traverse has begun and therefore until after the pin 30 is locked on the under side of the guide 31 by passage to the right under the unrecessed part of the guide 31. Engagement of the driving connection 25, 27, with one or the other of its driving means is always positive in both directions, so that overthrow of the carriage 13 at the end of its stroke is impossible. The effect of this arrangement is to lay the cusp or turn at the end of one layer of the winding sharply and accurately at the place intended, both in the direction of the length of the package and in an angular or rotary sense.

When the carriage has been driven to the extreme of the desired right-hand stroke,

another cam block 48, in all respects similar to that above described and fastened in the spiral groove 43 of the screw 36, returns the stud 25, 27, to position for the appropriate roll 27 again to engage the spiral groove 42 of screw 35, the pin 30 passing through the gateway 32 to the upper side of the guide 31, and being held in place against rebound by the spring 50 until the pin 30 passes beyond the gateway 32. The guide stop 31 may be provided with gateways for as many different lengths of traverse as desired, the pin 30 being unable to pass through any gateway unless positively moved.

The detail of the devices for transferring the driving stud 25, 27, from engagement with one screw to the other may be varied. For instance, as shown in Fig. 7, the respective traverse cams or screws may be provided at the proper places for the ends of a fixed traverse with short sloped sections of oppositely-turning spiral grooves as at 55 and 56, the deepest parts of these auxiliary grooves at their juncture with the main grooves being about half as deep as the main grooves, these auxiliary grooves lying in the opposite direction but at the same angle, with respect to the axis, as the main groove. Cooperating with the auxiliary grooves, cams 57, 58, may be fastened in the grooves, as described in connection with the cams 45 and serving to partially throw the stud 25, 27, out of the groove driving it and into engagement with the other rotating screw. The effect of the cams 57, 58, as before, will be to engage the driving stud on the carriage with the oppositely rotating traverse screw, but in this case the initiation of the driving of the carriage is effected by holding the stud 25 in a middle position, the fully projected position of the stud being caused by the cam action of the bottoms of the auxiliary grooves 55 and 56. As shown in Figs. 8 and 9, similar reversely inclined grooves 60 and 61 may be provided at the ends of the rolls 35, 36, toward which the stud 25 is moved at the end of the traverse. These short grooves 60 and 61 are respectively opposite the cams 57, 58, and serve to receive the end of the stud 25 when in mid-position and immediately prior to reversal of the stroke of carriage 13 by cooperation with respective ends of the stud 25 of groove 55 and groove 42, as will immediately occur. The gateways 32 in guide stop 31 are wide enough to permit a relatively slow shift of stud 25, and considerable adjustment of the length of traverse, but it is recommended to provide replaceable stops 31 for widely different lengths of traverse.

It will be observed that the mass of the reciprocating parts is kept at a minimum by my device; that the length of the traverse is easily and delicately adjustable, and that the ratio between the traverse and

the winding-speed may readily be set at any desired figure without having to change the traverse screws or cams by providing suitable gearing for driving the gears 39.

In any of the forms of the device the means provided for initiating a return of the carriage, results in winding each reversed spiral layer of the wound mass everywhere except at the ends, in an accurately controlled spiral path represented by the spiral grooves in the respective rolls 35, 36. Between their ends these spirals or layers are laid by a guide moving at uniform speed. At the ends of the spirals the reversals are sharp and accurately placed, both in the sense of occurring in the same plane perpendicular to the axis of the winding mass and at the desired angle in the rotation of the winding mass. The result of these functions is a wound mass having regular and even ends, the runs of the yarn coming up to the end planes and reversing into the body of the wound mass sharply, and therefore exposing no such irregular and loose loop of yarn as has heretofore characterized the product of the usual winding machine of this type. Since the reversals of the yarn are taken care of in this manner, successive spirals on the surface together making up a layer are laid in a superior propinquity to each other, the successive spires forming a layer being in contact, or at a desired separation if the package is intended to be open, with a maximum of regularity and a minimum of deviation from regularity.

I claim:

1. A high-speed traverse motion comprising a pair of like screws geared together for rotation in unison in opposite directions, means for rotating the screws, a reciprocating carriage adapted to travel in a path parallel with the axes of the screws, a driving connection adapted for engagement with the threads of either screw carried by the carriage, positive means for shifting the driving connection at the end of each stroke of the traverse of the carriage, and means for retaining the driving connection in engagement with the screw driving it adapted to release the connection at the end of a stroke of the carriage.

2. High-speed traverse mechanism having therein a carriage to be reciprocated, guides therefor, rotary driving members running in opposite directions on each side of the path of reciprocation of the carriage, a driving connection on the carriage adapted to be engaged with one or the other of said driving members, a guide stop mounted near the path of the carriage, means on said driving connection adapted to be restrained by said guide stop from motion permitting the driving connection to be shifted from one operating member to the other, except when the carriage is at the end of its path of

travel, and positive cam means for shifting such drive connection.

3. A traverse mechanism having a traverse guide and a reciprocating carriage therefor, in combination with screws mounted for rotation on axes parallel with the path of said carriage, and a driving stud mounted on the carriage for motion into engagement with the thread of one or another of said screws, cam means associated with each of said screws for shifting said stud, and means with respect to which the carriage is movable for locking the stud in engagement severally with the respective screws.

4. A traverse mechanism having a traverse guide and a reciprocating carriage therefor, in combination with screws mounted for rotation on axes parallel with the path of said carriage, and a driving stud mounted on the carriage for motion into engagement with the thread of one or another of said screws, and means comprising a cam adapted to be fastened to each of said screws for engaging and shifting said driving stud into engagement with another of said screws, and a relatively fixed guide stop for holding the stud in position during ensuing motion of the carriage, said stop having transverse guiding grooves for permitting the passage of said stud from one side of the stop to the other.

5. In a traverse mechanism having therein a reciprocated member and a carriage therefor, a driving connection for the carriage, carriage-actuating spiral cams rotating near the path of the carriage and having thereon segmental paths of opposite spirals, whereby the driving connection when in an intermediate position may engage with and be actuated in the same direction by each of said rotating cams, and subsequently engage one only of said cams without change of the direction of motion of the carriage.

6. A traverse mechanism having a traverse guide and a reciprocating carriage therefor in combination with screws mounted for rotation on axes parallel with the path of said carriage, a driving stud mounted on the carriage for motion into engagement with the thread of one or another of said screws, said stud being in engagement with one of said screws during the traverse of the carriage in one direction, means for shifting said stud into engagement with the other of said screws for traversing the carriage in the opposite direction and means to initiate reverse movement of said carriage prior to the operative engagement of said stud with said other screw.

7. A traverse mechanism having a traverse guide and a reciprocating carriage therefor in combination with screws mounted for rotation on axes parallel with the path of said carriage, a driving stud mount-

ed on the carriage for movement into engagement with the thread of one or another of said screws, means carried by one of said screws for contacting with and shifting said driving stud into engagement with another of said screws and means associated with said shifting means for initiating movement of said carriage in the opposite direction.

8. In a device of the class described a rotatable shaft having a helical cam groove therein, a follower engageable with said cam groove to be traversed thereby, and a cam element adjacent the end of said groove and of a pitch opposite thereto, said element being constructed and arranged to initiate movement of said follower in a reverse direction when brought into engagement therewith.

9. In a device of the class described a pair of substantially parallel rotatable shafts having helical cam grooves extending therealong, and a relatively short cam member adjacent each end of each of said helical grooves, said cam members being inclined in directions substantially opposite to the inclination of the grooves in their respective shafts.

10. A traverse mechanism having a reciprocable carriage in combination with screws mounted for rotation on axes parallel with the path of said carriage, a driving stud mounted on the carriage and selectively movable into engagement with the threads of the respective screws, and means for so moving such stud at predetermined times, said means comprising cams having radially active elements, means associated with each of said screws for initiating movement of the carriage in the direction imparted thereto by the other screw and a device for holding the stud in engagement with said other screw during the major portion of the motion of the carriage induced thereby.

11. In a device of the class described, a shaft having a helical groove therein, a secondary groove relatively short as compared with said first groove and of opposite pitch thereto, said secondary groove intersecting said helical groove and being of a depth substantially less than that of the helical groove at the point of intersection, a follower engageable with said grooves, and means for lifting said follower from the bottom of said helical groove to permit its engagement with said secondary groove.

12. A device of the class described comprising a cylinder having a longitudinal cam groove of substantially uniform depth in its peripheral surface, a secondary groove having a pitch opposite to that of said first groove said secondary groove intersecting said first groove, the bottom of said secondary groove being substantially above that of the first groove at the point of intersection

and merging gradually into the surface of said cylinder, and a cam follower engageable in said grooves.

13. In combination a pair of substantially
5 parallel cylinders having helical cam grooves therein, a cam follower selectively engageable with either of said grooves, means associated with one of said grooves for impelling said follower in a direction to engage said
10 other groove, and a secondary groove, associated with said last named groove for receiving said follower prior to its operative engagement with said last named groove.

14. In combination, a pair of substantially
15 parallel rotatable cylinders having helical cam grooves therein, a reciprocable carriage, a cam follower comprising a stud selectively movable into engagement with either of said grooves and operatively connected to said
20 carriage whereby alternately to move said carriage in opposite directions, a cam device adjacent the terminal end of each of said grooves for impelling said stud in a

direction to engage the grooves in the other cylinder, and a secondary groove of relatively short extent intersecting each of said
25 cam grooves adjacent the beginning end thereof and of a pitch opposite thereto, said secondary grooves being constructed and arranged to receive said stud prior to the
30 operative engagement thereof with the corresponding helical groove.

15. A traverse guide mechanism comprising a reciprocable traverse guide, a driving member movable therewith, and a pair of
35 oppositely rotating cylinders provided respectively with cam elements which engage with the driving member, the parts being so constructed and arranged as to permit
40 simultaneous engagement of the driving member with cam elements of both of said cylinders as the traverse guide nears the end of its stroke.

Signed by me at Providence, Rhode Island, this thirtieth day of December, 1919.
GEORGE J. MCGANN.