

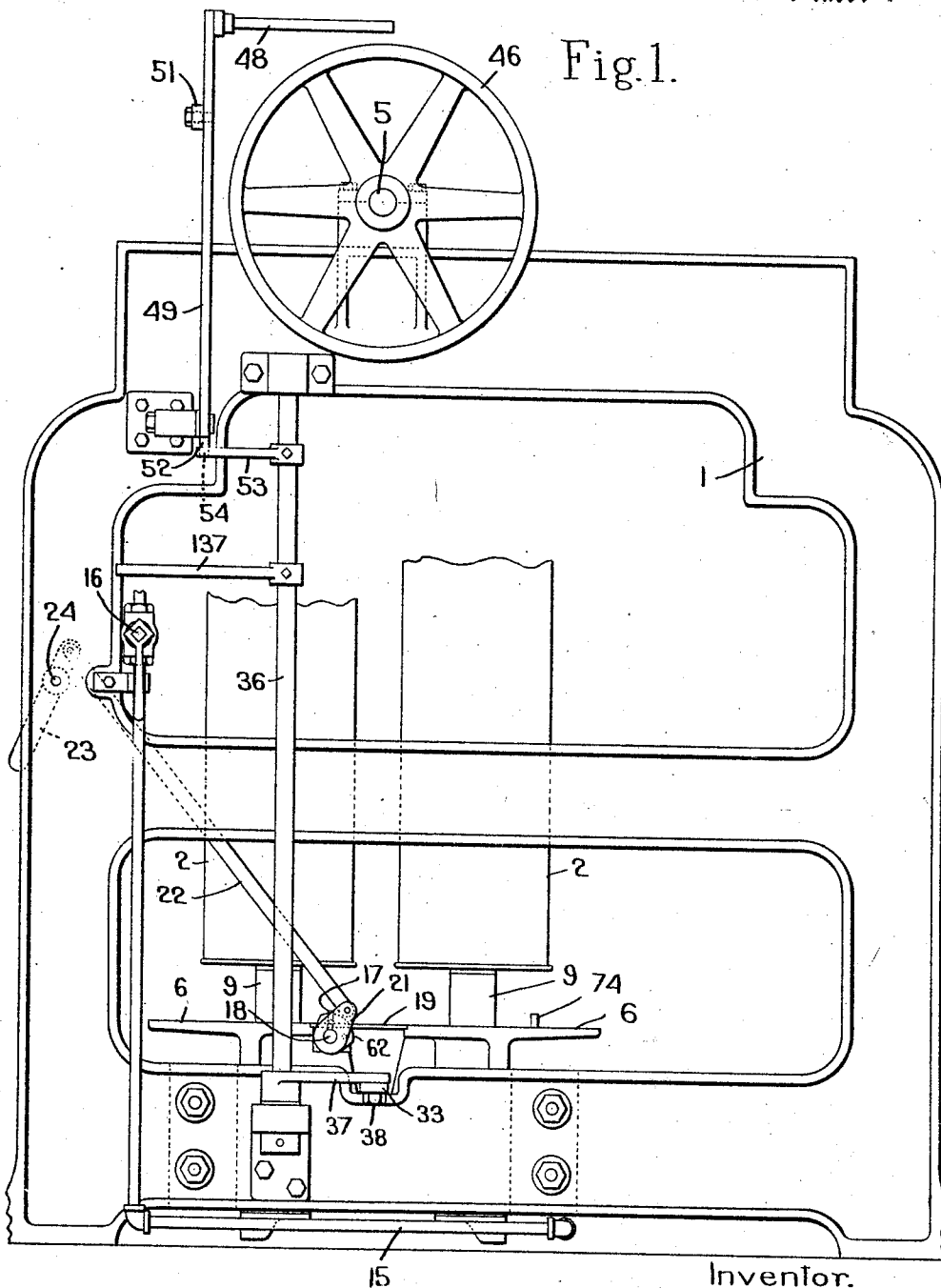
June 8, 1926.

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1,587,729

TWISTING AND WINDING APPARATUS

Original Filed May 19, 1923 6 Sheets-Sheet 1



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Original Filed May 19, 1923 6 Sheets-Sheet 2

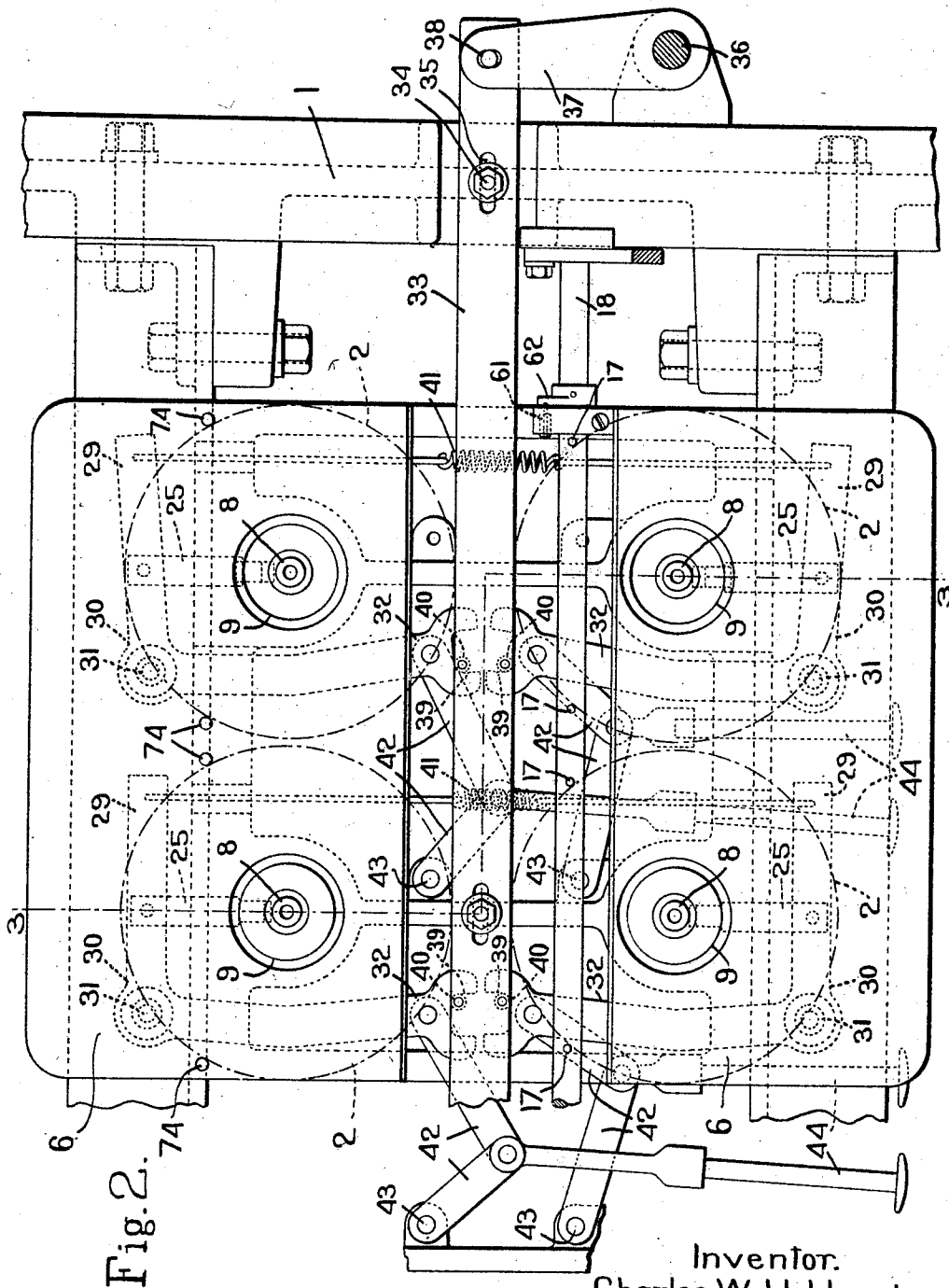


Fig. 2.

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Fig. 3.

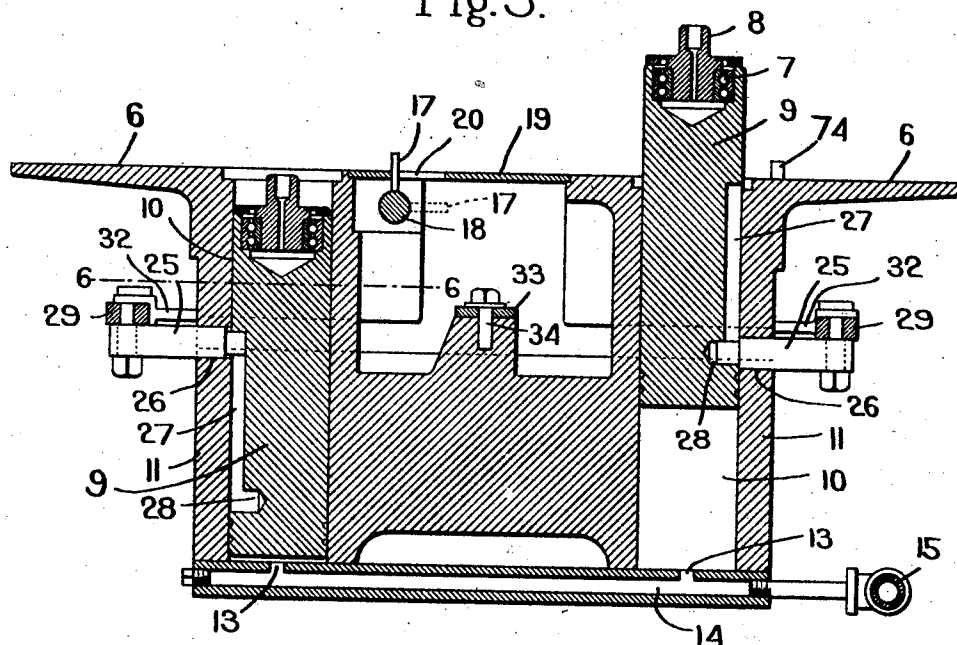
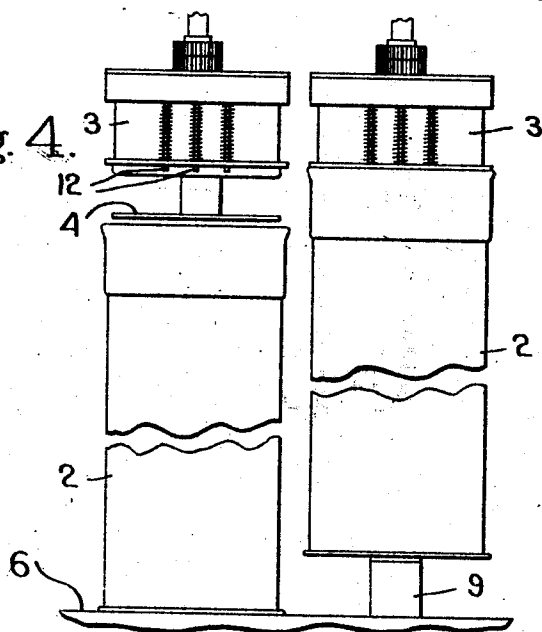


Fig. 4



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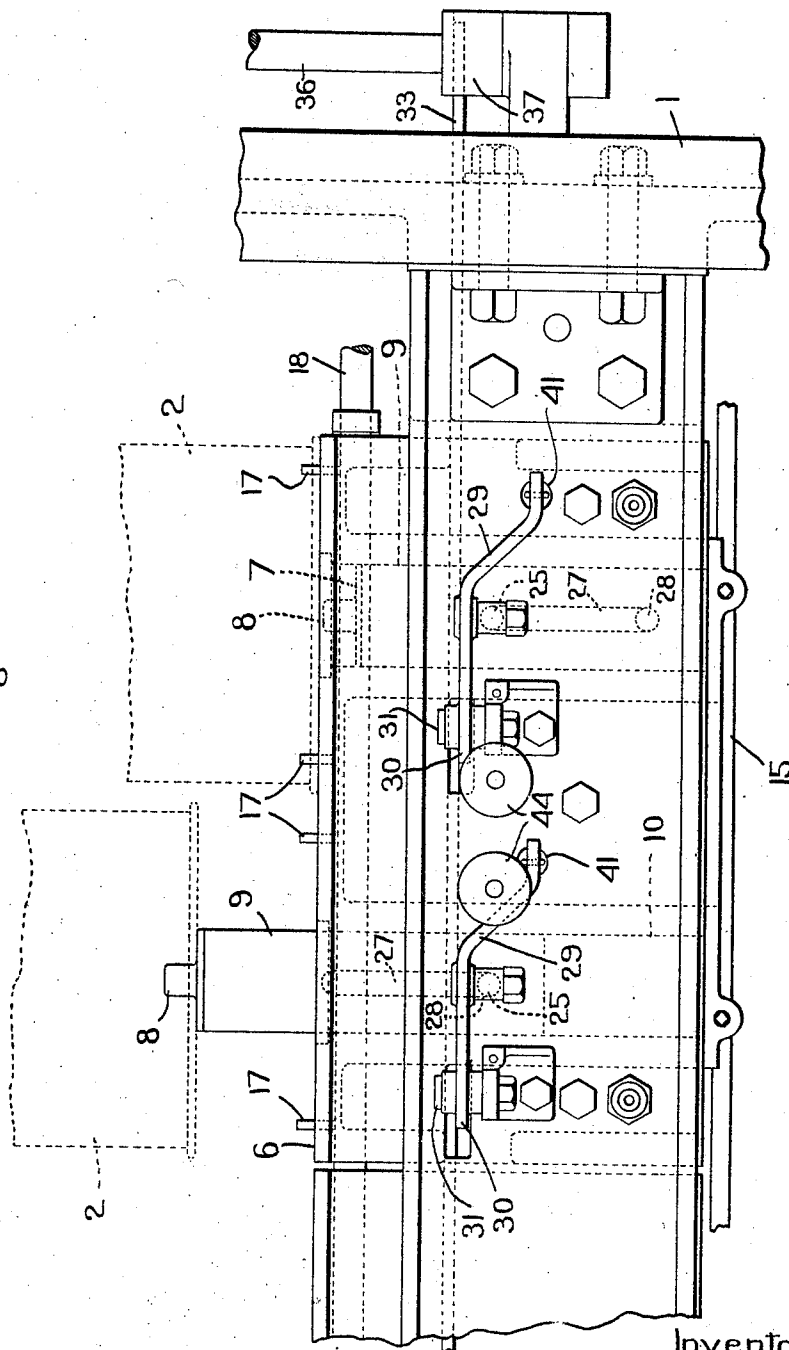
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Fig. 5.



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Fig. 6.

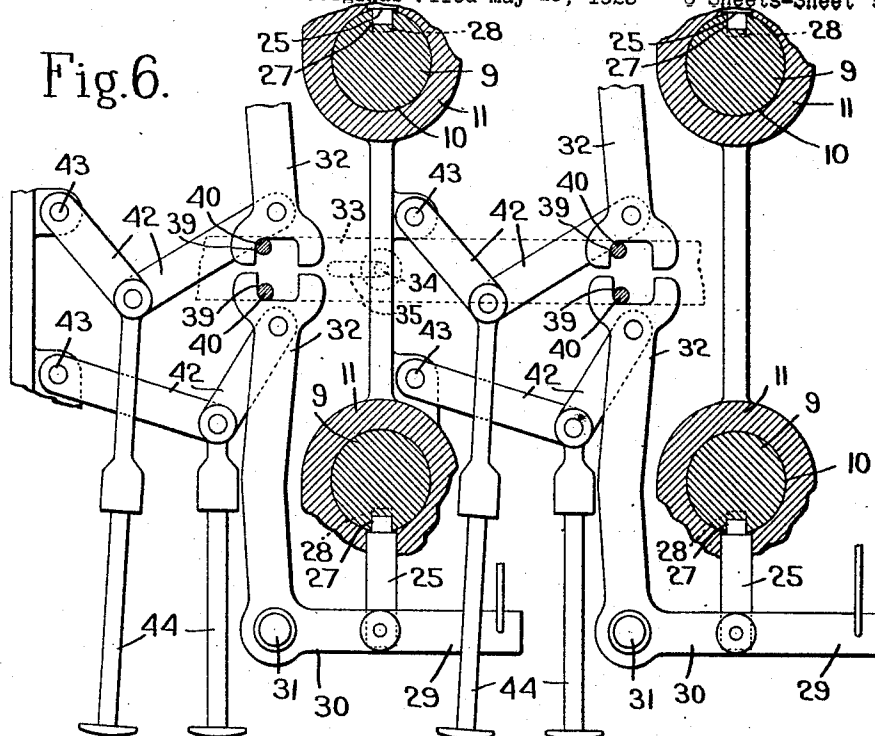
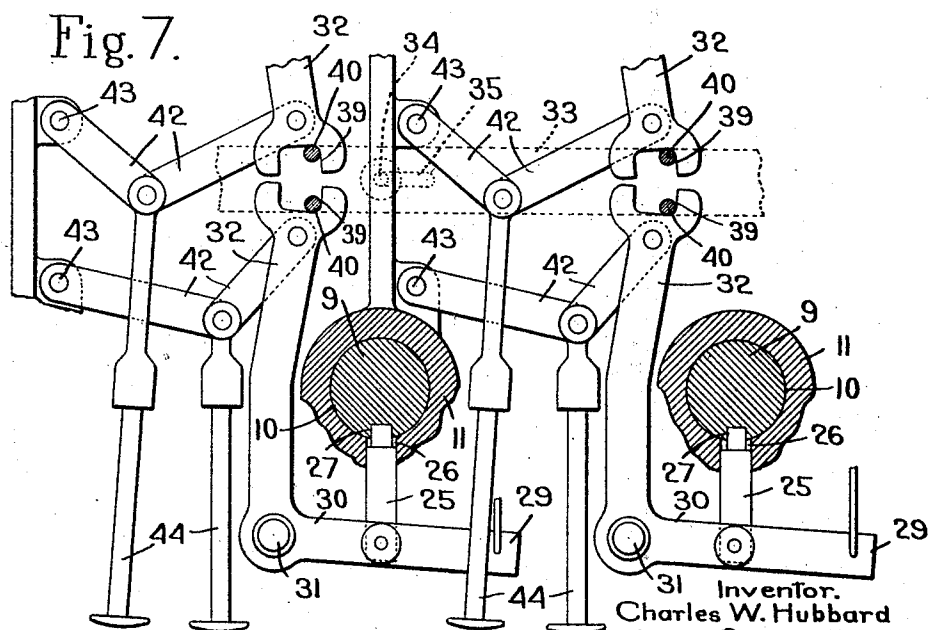


Fig. 7.



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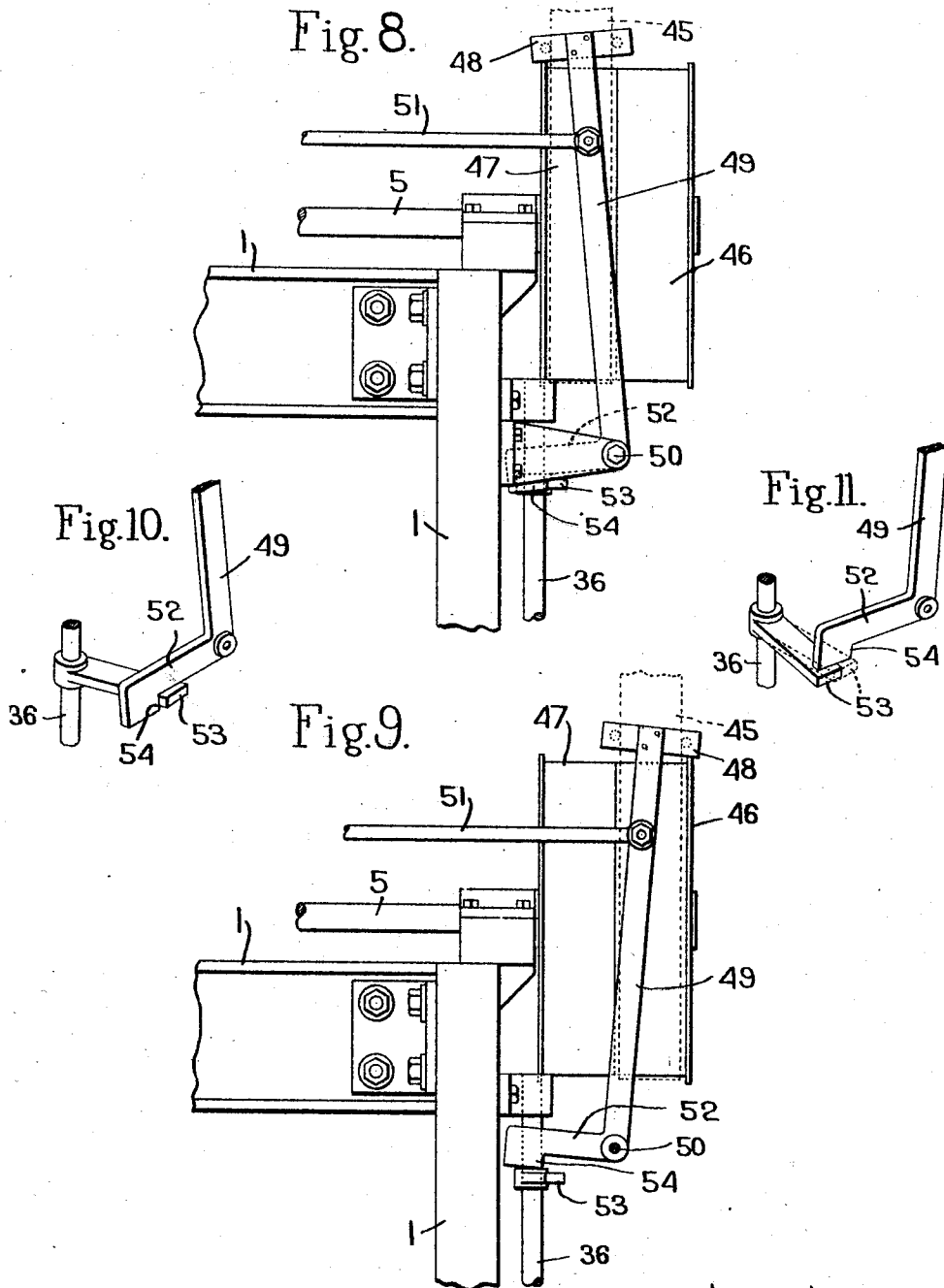
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UNITED STATES PATENT OFFICE.

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TWISTING AND WINDING APPARATUS.

Application filed May 19, 1923, Serial No. 640,110. Renewed November 6, 1925.

This invention relates to twisting and winding apparatus of that general type illustrated in my Patent No. 1,258,412, March 5, 1918, and which comprises a rotatable yarn container and a winding head for laying the yarn under pressure in said yarn container in loops forming layers extending at right angles to the axis of rotation, the apparatus being usually arranged so that it will twist the yarn before it is delivered to the winding head.

In machines of this type the yarn receiver is supported on a vertically-movable step bearing so that it can be raised into operative relation to the winding head for the twisting and winding operation and can be lowered to permit it to be removed from the winding head for the purpose of removing the yarn mass accumulated therein.

One of the objects of my present invention is to provide a novel means for thus raising or lowering the yarn containers.

Another object of the invention is to provide a novel means for locking and holding the yarn containers in their raised or operative position so that they will be retained in such position.

Still another object of the invention is to provide a novel interlocking connection between the means for raising the yarn containers and the devices for controlling the operation of the machine so that the machine cannot be started until the yarn containers are all raised and in their operative position, and the yarn containers cannot be unlocked and lowered while the machine is running and until after the belt shipper or other control mechanism for the machine has been operated to bring the machine to rest. The purpose of this is to prevent the possibility of the machine being operated when any of the yarn containers are in their inoperative position.

The invention has various other novel features all as will be more fully hereinafter set forth.

In order to give an understanding of the invention I have illustrated in the drawings a selected embodiment thereof which will now be described after which the novel features will be pointed out in the appended claims.

Fig. 1 is an end view of a roving frame

having my improvements applied thereto, parts being broken out and omitted in order not to complicate the showing;

Fig. 2 is a fragmentary plan view of the portion of the frame on which the yarn containers are supported;

Fig. 3 is a section on the line 3—3, Fig. 2;

Fig. 4 is a view showing two yarn containers and their winding heads;

Fig. 5 is a side elevation of the device shown in Fig. 2;

Fig. 6 is a section on the line 6—6, Fig. 3 showing the locking device in operative position for holding the yarn containers raised;

Fig. 7 is a similar view showing the locking device in inoperative position;

Figs. 8 and 9 illustrate the belt shipper and a portion of the interlocking connection between the latter and the device for controlling the vertical movement of the yarn containers.

Figs. 10 and 11 illustrate an interlocking connection between the belt shipper and the shaft 36.

As stated above the machine herein illustrated is of that type which comprises a plurality of yarn containers each rotatable about a vertical axis and winding heads for winding the yarn in the containers in loops extending transverse to the direction of rotation, each winding head including a winding plate which rests on the yarn mass and is provided with a slot through which the yarn passes and an oscillating yarn-laying arm for traversing the yarn in said slot.

In practise it is common to install a plurality of these winding and twisting units in a frame and to provide a common driving element for operating all of the units. The frame on which these winding and twisting units are supported is indicated generally at 1. The yarn containers are indicated at 2 and each is coupled to and driven by a housing 3 which contains the winding head, the winding plate of which is indicated at 4. The construction of the winding head and housing are or may be all as shown in my co-pending application Ser. No. 640,109, filed May 19, 1923, and form no part of my present invention.

The winding heads are all driven from a common driving shaft 5 which extends

the length of the frame 1 by any suitable gear connection, such for instance as shown in my co-pending application.

5 The housing 3 and the container containing the winding head are retained in fixed position on the frame but each yarn container is vertically movable so that it can be raised into operative relation to the winding head as shown at the right in Fig. 4 or may
10 be lowered into the position shown at the left in Fig. 4 to permit it to be disconnected and removed from its winding head.

The frame 1 is provided with a platform 6 adapted to receive the yarn containers
15 when they are in their lowered position and each yarn container is adapted to be rotatively supported on a step bearing 7. Each step bearing 7 is provided with a centering projection 8 adapted to enter a recess in the bottom of the yarn container and is rotat-
20 ably mounted on a plunger 9 which is movable vertically in a cylinder or well 10 formed in the base portion 11 of the frame. When the plungers are in their lowered position as shown at the left in Fig. 3 the corresponding step bearing 7 is below the platform 6 so that the yarn container is supported on the platform. When the plunger is raised as shown at the right in Fig. 3 the
30 yarn container supported thereon will be lifted up into operative engagement with its winding head and will be locked to its housing 3 by locking pins 12 all as illustrated and described in my co-pending application Ser. No. 572,441, filed July 3, 1922.

35 I have provided herein pneumatic means for raising the plungers 9. The lower end of each cylinder 10 has a port 13 leading to a duct 14 which communicates with a pipe 15
40 leading to a source of compressed air supply, said pipe having a three-way valve 16 therein by which the admission of the compressed air to the cylinder and its escape therefrom can be governed. The pipe 15
45 will preferably have communication with all of the ducts 14 so that when the three-way valve 16 is operated compressed air will be admitted simultaneously to all of the cylinders 10 and thus all of the yarn containers
50 will be simultaneously raised into operative engagement with their housings 3. This end is secured by arranging the pipe 15 so that it will communicate with each one of the ducts 14. Where the cylinders 10 are arranged in two rows as shown the corresponding cylinders in each row may be connected to the same duct 15 as shown in Fig. 3 and this will involve employing a plurality of
55 ducts 14 extending transversely of the frame, each of which will be connected to the pipe 15.

Means are provided for positioning the yarn containers on the platform in proper register with the step bearing 7 so that when
60 the compressed air is admitted to the cylin-

ders 10 the rising plungers 9 will function properly to lift the yarn containers into their proper position relative to the winding head. The frame herein shown is constructed to accommodate two rows of yarn containers. For positioning the yarn containers in one row I employ a plurality of positioning pins 74 secured to and rising from the platform 6, there being two pins for each yarn container. The pins are properly positioned so that when a yarn container is placed against them, as shown in dotted lines Fig. 2, said yarn container will be in proper register with the corresponding step bearing 7, whereby when the latter is raised
70 the projection 8 thereon will enter the recess of the yarn container. I also employ similar pins 17 for positioning the yarn containers of the other row, but I will preferably make the pins 17 movable so that they can
75 be depressed below the surface of the platform 6. The purpose of this is to enable the pins 17 to be carried out of the way when the yarn containers are being positioned against the pins 74 so that the yarn containers can be placed on the platform 6 and then pushed over the surface of the platform against the pins 74.
80

While this depressing movement of the pins 17 may be provided for in a variety of
85 ways I have herein illustrated said pins as mounted in a shaft 18 which can be turned thereby to swing the pins from their operative position shown in full lines Fig. 3 to their inoperative position below the level of the platform as shown in dotted lines.
90

The central portion of the platform 6 is formed by a plate 19 (which is omitted in Fig. 2) and this plate is provided with slots
95 20 through which the pins 17 may pass as the shaft 18 is turned.

When the yarn containers are to be placed on the frame the plungers 9 will all be lowered and the shaft 18 turned so as to carry the positioning pins 17 into the dotted line
100 position Fig. 3. The yarn containers for the back row may then be positioned against the pins 74 after which the shaft 18 may be turned to bring the pins 17 into their operative position and the yarn containers of the front row placed in position against the pins 17. When the yarn containers have thus been all properly positioned the valve 16 is opened to admit compressed air to the cylinders 10 thereby raising all the plungers 9 and lifting the yarn containers simultaneously into operative engagement with their housings 3.
105 110 115 120

The shaft 18 may be turned in any suitable way. I have herein shown said shaft as having an arm 21 fast thereon at one end which is connected by a link 22 to an actuating lever 23 pivoted to the front of the frame at 24. Turning of the handle 23 will, therefore, operate to turn the shaft 18 and move
125 130

the pins 17 from their operative to their inoperative positions and vice versa.

Means are provided herein for locking the plungers 9 in their elevated position. Each plunger is shown as being locked in its elevated position by means of a locking pin 25. These pins are slidably mounted in openings 26 formed in the frame 11 and each plunger 9 is provided with a vertical groove 27 to receive the inner end of the pin. At the bottom of each groove 27 is a radial recess 28 into which the pin may be projected to lock the plunger in its elevated position as shown at the right in Fig. 3. The provision of the slot 27 in which the inner ends of the locking pins operate serves to hold the plungers from turning movement and also serves to guide them in their vertical movement. When the plungers have been raised by the compressed air as above described as shown at the right in Fig. 3 these locking pins 25 will be forced inwardly. The movement of the locking pins 25 inwardly to bring the ends thereof into the recesses 28 will lock the plungers and before the plungers can be lowered it will be necessary to withdraw the locking pins as will be obvious.

A construction is herein provided by which all the locking pins may be simultaneously operated. Each locking pin is shown as being pivotally connected at its outer end to one arm 29 of an elbow lever 30 which is pivoted to the frame at 31. The other arm 32 of each elbow lever is connected to a common actuator 33 in the form of a bar extending longitudinally of the frame and slidably mounted thereon. This bar is held in position by guiding studs 34 rising from the frame and operating in slots 35 formed in the bar. The construction is such that movement of the bar 33 in one direction will move the locking pins into operative position and movement of the bar in the opposite direction will withdraw the locking pins. This actuating bar may be given its reciprocating movement in any suitable way. One convenient construction is that herein shown wherein a vertically-extending operating shaft 36 is provided at the end of the frame which has fast thereto an arm 37 having a pin and slot connection 38 with the actuating bar 33 so that turning movement of the shaft 36 will give the requisite movement to the bar 33. This shaft 36 is provided with a handle 137 by which it may be turned.

I have also provided means herein whereby each locking pin may be actuated separately if desired. The connection between the actuating bar 33 and the various elbow levers 30 is such that when the actuating bar is in one extreme position all the levers will be turned into a position to place the locking pins in their operative positions and when the actuating bar is at the extreme limit of its movement in the other direction the lock-

ing pins 25 will all be withdrawn. When, however, the actuating bar 33 is in an intermediate position then each of the locking pins can be independently actuated. This end is secured in the construction herein shown by making the end 39 of each arm 32 forked and by providing the actuating bar 33 with pins 40 which operate between the arms of the forks 39.

The actuating bar 33 is shown in Fig. 2 in an intermediate position and the locking pins 25 for the two right hand plungers are shown as withdrawn while those for the left hand plungers are in their operative position. If the bar 33 is moved to its extreme position to the left Fig. 2 or into the position shown in Fig. 6, the pins 40 will act on the forked ends 39 of the levers 30 which are connected to the locking pins that are withdrawn as shown at the right end of Fig. 2 and will turn said levers 30 thereby projecting the locking pins inwardly to lock the plungers in their raised position. When the plungers are all locked and the actuator 33 is at the extreme limit of its movement the parts will be in the position shown in Fig. 6 and the engagement of the pins 40 against one arm of the forked ends 39 will hold the locking pins 25 in their operative position. When the actuator bar 33 is moved to its extreme limit to the right it acts against the opposite arm of the forked ends 39 and turns the levers 30 thereby withdrawing the locking pins 25 as shown in Fig. 7. When the actuator bar 33 is in either extreme position it operates to hold the locking pins either in locking or unlocking position. When the actuator bar 33 is in an intermediate position, however, as shown in Fig. 2, each locking pin can be independently manipulated.

It will be observed that the arms of each fork 39 are separated so as to provide a lost motion between the pin 40 and the arms of the fork, and this lost motion is enough to allow sufficient movement of the levers 30 to carry the locking pins 25 from their operative to their inoperative position and vice versa.

The arms 29 of the levers 30 are acted upon by means of springs 41 which tend to hold the arms in a position with the locking pins 25 occupying the recesses 28 as shown at the left in Fig. 2 and at the right in Fig. 3.

The arm 32 of each elbow lever is pivotally connected to one end of a toggle device 42, the other end of which is pivoted to the frame at 43. The center joint of this toggle device is connected to a handle 44 by which it may be operated. By pulling each handle 44 out or pushing it in the corresponding lever 30 will be turned about its pivot thereby to project the corresponding locking pin into its operative position or withdraw it therefrom. When the actuator bar 33 is in its intermediate position

shown in Fig. 2 then each elbow lever 30 is free to be turned by its handle 44 and the lost motion between the pin 40 and the arms of the fork is sufficient to allow enough turning movement in the lever 30 to carry the locking pin 25 from its operative to its inoperative position and vice versa.

In the operation of the device assuming that the yarn containers are all in their operative elevated position and are locked therein, if it is desired to lower all the yarn containers then the actuator bar 33 will be given its complete movement to the right in the position shown into Fig. 7, this operating to turn all of the elbow levers 30 and withdraw all the locking pins 25. On the other hand if it is desired to unlock the plunger of some particular yarn container or yarn containers then the actuator 33 will be moved into its intermediate position shown in Fig. 2 after which the handle 44 corresponding to the yarn container which is to be unlocked will be pushed inwardly thereby swinging the corresponding elbow lever 30 into a position to withdraw its locking pin 25 from the notch 28 of the plunger.

The movement of the actuator bar 33 from its position Fig. 6 to the intermediate position shown in Fig. 2 does not of itself withdraw any of the locking pins 25 because this movement is simply equal to the lost motion between the pins 40 and the forks 39 and during this movement the pins 40 will merely be carried from one side to the other of the forks. The springs 41 serve to retain the locking pins 25 in their operative position at this time and until the levers 30 are positively moved either by a further movement of the actuator bar 33 or by one of the handles 44.

I have also provided an interlocking connection between the actuator bar 33 and the means for driving the shaft 5 by which the shaft cannot be started until the locking bar 33 is in the position shown in Fig. 7 and all of the plungers are locked in their elevated position, and by which the locking means cannot be withdrawn to unlock any plunger until after the controlling mechanism for operating the shaft 5 is rendered inoperative. The shaft 5 may be driven in any suitable way and any desirable control mechanism for starting or stopping it. I have herein illustrated the shaft as actuated from a driving belt 45 which is adapted to be shifted from a pulley 46 loosely mounted on the shaft 5 to a pulley 47 fast thereon. The belt 45 is shifted from one pulley to the other by a belt shipper 48 which is shown as carried on the end of a swinging arm 49 pivoted at 50. This belt shipper can be actuated by a shipper rod 51 that extends the length of the frame.

The interlocking connection above described comprises an arm 52 rigid with the

belt shipper arm 49 and extending laterally therefrom and a co-operating arm 53 fast on the shaft 36 and extending laterally therefrom. It will be noted that the movement of the arm 52 is in a vertical direction while that of the arm 53 is in a horizontal direction.

The arm 53 is arranged beneath the arm 52 and the parts are so designed that when the belt is on the loose pulley as shown in Fig. 9 the arm 52 will be raised above the arm 53 so that the shaft 36 may be turned freely. Furthermore when the belt shipper is in this position and the shaft 36 is turned to carry the actuator bar 33 either into the position shown in Fig. 7 thereby to unlock all of the plungers 9 or into the intermediate position shown in Fig. 2, said arm 53 will stand beneath the arm 52 and will thus prevent movement of the belt shipper. When, however, the shaft 36 is turned to carry the actuator bar 33 into the position shown in Fig. 6 thereby locking all of the plungers raised then the arm 53 is free from the arm 52 and the belt shipper can be moved into the position shown in Fig. 8. This arm 52 is formed with a shoulder 54 which engages the arm 53 when the parts are in the position shown in Figs. 8 and 10. When the parts are in this position the shoulder 54 locks the arm 53 from movement and therefore so long as the belt is on the fast pulley the shaft 36 is locked and cannot be turned to unlock the plungers 9. Hence before any plunger can be unlocked it is necessary to shift the belt onto the loose pulley thereby bringing the machine to rest.

I claim:

1. In a winding and twisting machine, the combination with a rotary yarn container and a winding head to wind a yarn mass therein, of a vertically-moving step bearing for said yarn container, said bearing when lowered permitting the yarn container to be removed from the winding head, and pneumatic means for raising the yarn container into operative position.

2. In a winding and twisting machine, the combination with a rotary yarn container and a winding head to wind a yarn mass therein, of a vertically-moving step bearing for said yarn container, said bearing when lowered permitting the yarn container to be removed from the winding head, pneumatic means for raising the yarn container into operative position, and means to lock the container raised.

3. In a winding and twisting machine, the combination with a rotary yarn container and a winding head to wind a yarn mass therein, of a vertically-movable step bearing for the yarn container, a plunger supporting said bearing, a cylinder in which the plunger operates, and means to admit

compressed air to the cylinder thereby to raise the plunger and lift the yarn container into operative position relative to the winding head.

4. In a winding and twisting machine, the combination with a rotary yarn container and a winding head to wind a yarn mass therein, of a vertically-movable step bearing for the yarn container, a plunger supporting said bearing, a cylinder in which the plunger operates, means to admit compressed air to the cylinder thereby to raise the plunger and lift the yarn container into operative position relative to the winding head, and means to lock the plunger in its raised position.

5. In a winding and twisting machine, the combination with a rotary yarn container and a winding head to wind a yarn mass therein, said yarn container being vertically movable to carry it into and out of operative position relative to the winding head, a lock to hold the yarn container in its operative position, a controlling device by which the machine is started and stopped, and an interlocking connection between said lock and said controlling device.

6. In a winding and twisting machine, the combination with a rotary yarn container and a winding head to wind a yarn mass therein, said yarn container being vertically movable to carry it into and out of operative position relative to the winding head, a lock to hold the yarn container in its operative position, a controlling device by which the machine is started and stopped, and an interlocking connection between said lock and said controlling device which prevents the locks from being released until after the controlling device is shifted into a position to stop the machine.

7. In a winding and twisting machine, the combination with a rotary yarn container and a winding head to wind a yarn mass therein, said yarn container being vertically movable to carry it into and out of operative position relative to the winding head, a lock to hold the yarn container in its operative position, a controlling device by which the machine is started and stopped, and an interlocking connection between said lock and said controlling device which prevents the controlling device from being shifted to start the machine until the lock is in its locking position.

8. In a winding and twisting machine, the combination with a rotary yarn container and a winding head to wind a yarn mass therein, of a vertically-moving step bearing on which the yarn container is supported, a lock to hold the step bearing in its raised position, a controlling device by which the machine is stopped and started, and an interlocking connection between said lock and the controlling device by which the

lock cannot be released until the controlling device is shifted into position to stop the machine.

9. In a winding and twisting machine, the combination with a rotary yarn container and a winding head to wind a yarn mass therein, of a vertically-moving step bearing on which the yarn container is supported, a lock to hold the step bearing in its raised position, a controlling device by which the machine is stopped and started, and an interlocking connection between said lock and the controlling device by which the controlling device cannot be shifted to start the machine until the lock is in locking position.

10. In a winding and twisting machine, the combination with a rotary yarn container and a winding head to wind a yarn mass therein, of a vertically-movable step bearing for supporting the yarn container, a plunger carrying said bearing, a cylinder in which the plunger operates, means to admit compressed air to the cylinder to raise the plunger, a lock to hold the plunger raised, a controlling device by which the machine is stopped and started, and an interlocking connection between said lock and controlling device.

11. In a twisting and winding machine, the combination with a platform adapted to receive a yarn container, of a vertically-movable step bearing for supporting said yarn container above the platform, said bearing when in its lowered position being below the platform, means to raise the bearing, and means for positioning the container on the platform in axial alignment with said bearing.

12. In a twisting and winding machine, the combination with a platform adapted to receive a yarn container, of a vertically-movable step bearing for supporting said yarn container above the platform, said bearing when in its lowered position being below the platform, means to raise the bearing, and positioning pins rising from the platform and by which the yarn container is positioned in axial alignment with the bearing.

13. In a twisting and winding machine, the combination with a frame having a platform, of positioning pins rising from the platform and by which the yarn container may be positioned, a vertically-movable step bearing situated in axial alignment with the yarn container when positioned by said positioning pins, and means to raise said bearing thereby to lift the yarn container from the platform and support it in operative position.

14. In a twisting and winding machine, the combination with a frame having a platform, of a pair of positioning stops rising therefrom and by which a yarn container

may be positioned, a vertically-moving step bearing situated axially in alignment with a yarn container positioned by said stops, means for raising said bearing thereby to
5 elevate a yarn container from the platform and bring it into operative position, and means for lowering the stops below the platform whereby the surface thereof is free to permit a yarn container to be placed on it or removed therefrom. 10

In testimony whereof, I have signed my name to this specification.

CHARLES W. HUBBARD.