June 19, 1923. 1,458,997

F. H. SLEEPER

WINDING AND CABLING MACHINE

Filed July 8, 1921 2 Sheets-Sheet 1

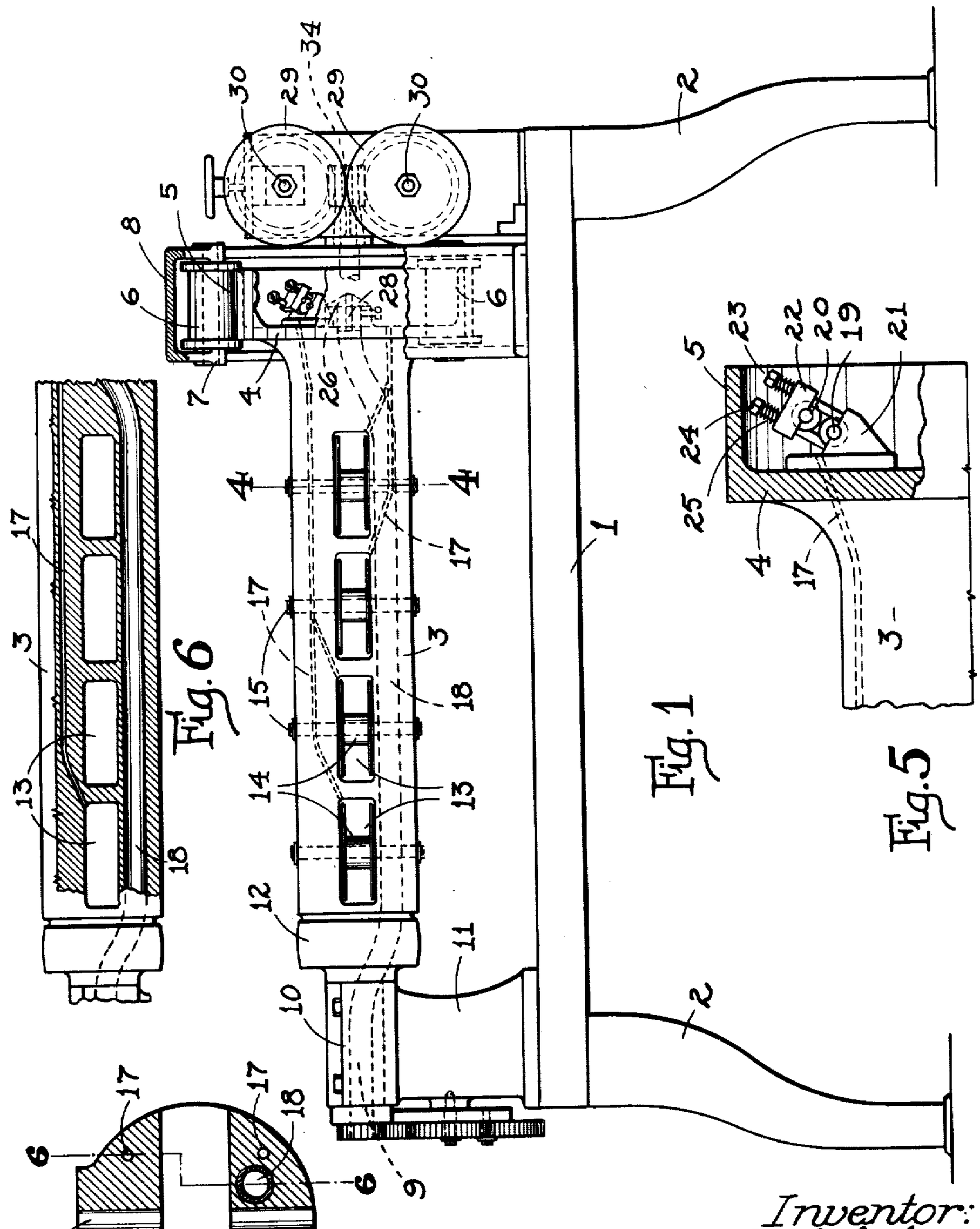

Fig. 1

Fig. 5

Fig. 6

Fig. 4

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2 Sheets-Sheet 2

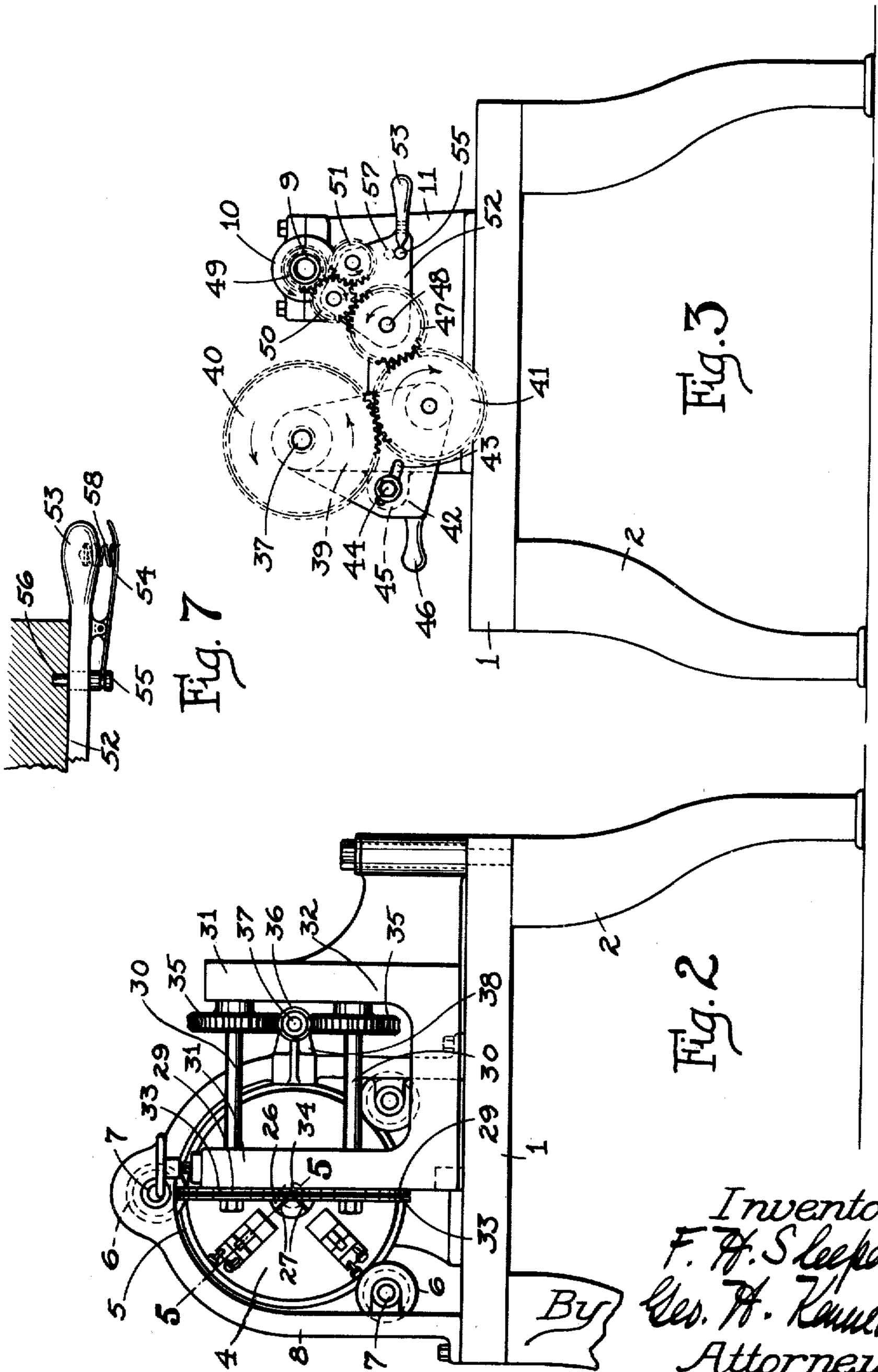

Fig. 7

Fig. 3

Fig. 2

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UNITED STATES PATENT OFFICE.

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WINDING AND CABLING MACHINE.

Application filed July 8, 1921. Serial No. 483,265.

To all whom it may concern:

Be it known that I, FRANK H. SLEEPER, a citizen of the Dominion of Canada, residing at Worcester, in the county of Worcester and Commonwealth of Massachusetts, United States of America, have invented a new and useful Improvement in a Winding and Cabling Machine, of which the following, together with the accompanying drawings, is a specification.

My invention relates to machines for the production of flexible shafting and other cabled and wound forms, and has for its object to provide certain improvements in machines of this class whereby their general effectiveness and reliability in operation, as compared with prior machines, is greatly increased.

Such machines, as generally heretofore constructed, have comprised a rotatable flyer or head upon which is mounted a plurality of spools carrying the wire or other flexible material which it is desired to form or wind. In such prior machines, the spools have usually been arranged about the axis of rotation of the flyer, the separate wires from the several spools being led to a suitable winding point located at substantially the center of the spools. With the above described arrangement, it has been found that when the flyer is rotated at high speeds, the weight of the spools and the material thereon subjects the frame of the machine to severe and unbalanced strains, owing to the fact that the spools differ in weight and are located at a considerable radial distance from the axis of rotation of the flyer. The forces set up by the rotation of the flyer tend both to displace the spools and to impose severe and unequal stresses on the bearings supporting the flyer. Furthermore, it is obvious that should one spool have a greater amount of material thereon than the other spools, the forces developed by rotation will be so unbalanced as to tend to set up undesirable vibrations in the flyer, thereby very materially limiting the operating speed of the machine, besides having detrimental effects upon the product of the machine.

According to the present invention, I propose to provide a machine in which the above described operating difficulties are completely eliminated, owing to the fact that the flyer is always in balance and can therefore be operated at very high speeds without being subjected to stresses set up by centrifugal force, due to its rotation. These and other advantageous features of my invention will hereinafter more fully appear, reference being had to the accompanying drawings, in which

Fig. 1 is a view in side elevation of a machine embodying my invention.

Fig. 2 is a view in end elevation of the machine shown in Fig. 1, looking in the direction of the flyer.

Fig. 3 is a view in end elevation, looking at the driving end of the machine.

Fig. 4 is an enlarged sectional view along the line 4—4, Fig. 1.

Fig. 5 is a partial sectional view along the line 5—5 of Fig. 2.

Fig. 6 is a partial sectional view along the line 6—6 of Fig. 4.

Fig. 7 is a fragmentary view showing a detail of my invention.

Like reference characters refer to like parts in the different figures.

Referring to the drawings, the machine generally comprises a table 1 supported on suitable legs 2, and above which is rotatably mounted an elongated flyer body 3. The flyer body 3 is generally cylindrical in form and is provided at one end with an enlarged head 4, which, as best shown in Fig. 5, is hollow and provides a circumferential rim or flange 5 of considerably greater diameter than the body portion 3. The flyer body 3 is rotatably supported at one end by a plurality of rolls 6 which are angularly spaced around the rim 5 and are in rolling contact therewith. Each roll 6 is provided with a shaft 7 which is rotatably supported in a yoke 8 which extends upwardly from the table 1 and surrounds the head 4.

The other end of the flyer body 3 is reduced in diameter to provide a shaft portion 9 which is rotatably supported in a bearing 10 provided at the top of a pedestal 11 extending upwardly from the table 1. The body 3 is provided with an annular seat 12, adjacent the shaft portion 10, for receiving a belt, not shown, by means of which the flyer body may be rotated from any suitable source of power.

The flyer body 3 is formed with a plurality of openings 13 spaced along the horizontal axis thereof, each opening extending through the body as indicated in Fig. 4. A spool 14 is rotatably mounted in each of the openings 13 by means of a pin 15 located in a radial hole 16 extending through the body 1 substantially at right angles to the opening 13. Longitudinal passages 17 are provided in the body 3, each passage 17 leading from one of the openings 13 to the head 4, where the passages terminate at diametrically opposite points. The flyer body 3 is further provided with a longitudinal passage 18 extending therethrough below the opening 13 as near as possible to the longitudinal axis of the body 3, the passage 18 extending centrally through the shaft portion 9 at one end of the body 3 and terminating substantially at the center of the head 4 at the other end of the body, for a purpose to be hereafter described. The flyer body 3 is preferably formed in one casting with the head 4 and shaft portion 9 integral therewith, and the various openings 13 and passages 17 and 18 formed therein in any suitable manner.

As best shown in Fig. 5, a pair of tension rolls 19 and 20 are mounted on the head 4 adjacent to the end of each passage 17, the lower roll 19 being rotatably supported in a lug 21 projecting outwardly from the head 4. The upper roll 20 is yieldingly held in the direction of the roll 19 by means of a bearing block 22 slidably supported upon pins 23 projecting from the lug 21. A nut 24, in threaded engagement with the end of each pin 23, serves to maintain a spring 25 thereon, so that the pressure of the springs is exerted against the block 22 and serves to hold the roll 20 in yielding engagement with the roll 19. The several pairs of rolls 19 and 20 are arranged around the head, so that each passage 17 terminates adjacent to a pair of rolls, as best shown in Fig. 2. Located substantially at the center of the head 4 is a cone shaped portion 26 provided with a plurality of radial grooves 27, each of which extends in the direction of a pair of rolls 19 and 20, the portion 26 being further provided with a central opening 28 which registers with the end of the passage 18.

Referring again to Fig. 1, a pair of feed rolls 29, 29 are mounted on shafts 30 to rotate in a substantially vertical plane, the shafts 30 being supported at their ends by the upwardly extending arms 31 of a yoke 32 secured to the table 1. Each roll 29 is provided with a peripheral groove 33, the grooves 33 being adapted to register with each other at the point of tangency of the rolls, and the opening 34 thus provided between the rolls being substantially in alinement with the opening 28 in the portion 26. A line passing through the openings 34 and 28 would also substantially coincide with the axis of rotation of the flyer body 3. Each roll shaft 30 is provided with a worm wheel 35 which is in mesh with a worm 36 mounted on a shaft 37. One end of the shaft 37 is rotatably mounted in a bearing bracket 38 projecting from the yoke 8, and the other end of the shaft 37 is rotatably supported in a bearing 39 provided by the pedestal 11. The shaft 37 is adapted to be connected to the shaft portion 9 of the flyer body 3 by means of a train of gearing, which is best shown in Fig. 3.

A spur gear 40 is mounted on the shaft 37 beyond the bearing 39 and is in mesh with a gear 41, which is rotatably mounted on an arm 42 adapted to swing about the axis of rotation of the shaft 37. The arm 42 is provided with a slot 43, which receives a bolt 44 in threaded engagement with a lug 45 projecting from the bearing 39. The arm 42 is further provided with a handle 46, by means of which it may be swung about the shaft 37 when the bolt 44 is loosened. In this way the gear 41 may be moved about the gear 40 to bring the gear 41 into mesh with a gear 47 rotatably mounted on the pedestal 11 on a fixed stud 48. A pinion 49 is mounted on the shaft portion 9 beyond the bearing 10 and is adapted to be connected with the gear 47 by either one of two gears 50 and 51. The gears 50 and 51 are rotatably mounted on a plate 52 which is adapted to swing about the axis of the stud 48. The gear 50 is adapted to be constantly in mesh with the gear 47, while the gear 51 is adapted to be constantly in mesh with the gear 49.

As best shown in Fig. 7, the plate 52 is provided with a handle 53 upon which is pivotally mounted a lever 54. A pin 55 is secured to one end of the lever 54 and is adapted to engage holes 56 and 57 provided in the plate 52. A spring 58 is confined between the handle 53 and the other end of the lever 54 and serves to maintain the pin 55 in engagement with one of the holes 56 or 57. In the position of the parts shown in Fig. 3, the pin 55 is located in the hole 56, so that the position of the plate 52 is such as to maintain the gear 50 in mesh with both the pinion 49 and the gear 47. The gear 51 is then only an idler and does not transmit any power. With the gears in mesh as shown, it is obvious that rotation of the shaft portion 9 will be transmitted to the shaft 37 and that the shaft 37 will rotate in the same direction as the shaft portion 9.

Having described the various parts entering into my invention, the operation thereof is as follows:—The several spools 14 loaded with wire (or any other suitable flexible material) are inserted in the openings 13 and secured therein by means of the pins 15. The wires from the spools 14 are then fed

through the several passages 17 to the head 4, and between the several pairs of tension rolls 19 and 20. The ends of the wires are then brought inwardly to the cone portion 26, each wire being placed in one of the grooves 27. The wires may then be given several twists by hand to form a short length of cable, which is then projected through the opening 34 provided by the grooves 33 of the feed rolls 29.

The flyer body 3 may then be rotated by connection to its source of power, which will cause the feed rolls 29 to be simultaneously driven and thereby draw the completed cable through the opening 34. It is obvious that rotation of the head 4 will cause the several wires to be continuously formed into a stranded cable, the wires passing easily from the spools 14 through the passages 17 and between the tension rolls 19 and 20, whch tend to keep the wires taut between the winding point and the ends of the passages 17. The completed cable is passed between the rolls 29, as it is formed, and may be wound upon a suitable reeling device, not shown.

After the desired length of cable has been formed as described above, the takeup reel with the cable thereon may be removed and placed at the opposite end of the machine, an empty reel being substituted in its place. The end of the cable may then be run through the passage 18 in the flyer body 3 and also through the opening 28 in the portion 26, from which the cable is projected between the feed rolls 29, as before. The machine is then ready for forming a second layer of cable, and where it is desired to twist this second layer in a reverse direction as compared with the first layer, it is only necessary to reverse the direction of rotation of the flyer body 3. In order that the feed rolls 29 may continue to be driven in the same direction of rotation as before, it is only necessary to depress the lever 54 on the handle 53 and move the plate 52 until the gear 51 meshes with the pinion 49. The plate 52 may be locked in this position by releasing the lever 54 and allowing the pin 55 to seat in the hole 57. It is obvious that the gear 50 still remains in mesh with both the gear 47 and the gear 51, so that the direction of rotation of the shaft 37 will then be opposite to that of the shaft portion 9. Rotation of the flyer body 3 will then cause the second layer of strands to be wound reversely to the first layer, while the feed rolls 29 continue to draw the finished cable from the twister, as before. It is obvious that this alternation of the layers may be continued until a cable of the desired thickness is obtained. It is also obvious that a flexible core of any suitable material may be first inserted through the passage 18 in the body 3 before the machine is operated, so that one or more strands of wire or other flexible material used for armoring or covering will be wound directly upon this core. Other variations in the operation may obviously be carried out to vary the product of the machine as desired.

From a consideration of the structure of my improved machine, it is obvious that the flyer body 3 may be operated at high speeds heretofore unobtainable without being subject to injurious vibrations set up by centrifugal force, for the reason that the flyer is always completely in balance. The disposition of the several reels along the longitudinal axis of the flyer, with their axes of rotation intersecting the axis of rotation of the flyer substantially at right angles, is believed to represent a distinct advance in the art as represented by prior winding or cabling machines. This arrangement also allows the wires to be brought to the winding point from passages closely adjacent, so that there is no possibility of the wires becoming snarled, inasmuch as they are confined in their passages and between the tension rollers for almost the entire distance from the spools to the winding point. Furthermore, my improved construction allows the flyer head to be made comparatively small in diameter, so that it may be firmly supported by rolls directly engaging the outer periphery of the head. This construction serves to steady the head, thereby eliminating all possibility of vibration during the twisting. The distribution of the weight of the spools and wire along the axis of the flyer body insures that none of the bearings will be subjected to overloading, and it is obvious that as many bearings may be provided for supporting the flyer body as may be desirable.

While I have shown my invention as being embodied in a particular arrangement of parts, it is not so limited and it is obvious that the principles involved therein may be applied to other types of cabling, winding, armoring, stranding and twisting machines without departing from the spirit and scope of my invention. I desire therefore that only such limitations be imposed thereon as come within the scope of the appended claims.

I claim,

1. A machine of the class described, comprising a rotatable flyer having a solid body portion provided with apertures within which are mounted spools.

2. A machine of the class described, comprising a rotatable flyer having a solid body portion provided with apertures spaced along its longitudinal axis, and means for supporting a spool in each of said apertures, with its axis intersecting the axis of said body portion.

3. A machine of the class described, com-

prising a rotatable flyer having a solid body portion provided with apertures, and means for removably supporting a spool in each of said apertures.

4. A machine of the class described, comprising a rotatable flyer having a solid body portion provided with apertures, and passages extending through the said body portion from said apertures.

5. A machine of the class described, comprising a rotatable flyer having a solid body portion provided with apertures and passages extending through said body portion from said apertures and from one end thereof to one end of said body portion to the other.

6. In a machine of the class described, a rotatably mounted flyer comprising an elongated solid body portion and an enlarged flanged head portion, the said body portion being provided with apertures connected to said head portion by longitudinal passages.

7. In a machine of the class described, a rotatable flyer comprising an elongated body portion and an enlarged head portion, the said body portion carrying a plurality of spools and the said head portion being provided with rolls and passages extending through said body portion between said rolls and said spools.

8. In a machine of the class described, a rotatable flyer comprising an elongated body portion carrying a plurality of spools, an enlarged head portion provided with rolls arranged about the axis of rotation of said flyer, and passages extending through said body portion from said spools to said rolls.

9. In a machine of the class described, a rotatable flyer comprising an elongated body portion carrying a plurality of spools, an enlarged head portion provided with a plurality of pairs of rolls arranged about the axis of rotation of said flyer, passages extending through said body portion between said spools and said rolls, and a single passage extending the length of said body portion and terminating at substantially the center of said head portion.

10. In a machine of the class described, the combination with a rotatable flyer adapted by its rotation to wind a continuous cable, a pair of rolls for receiving the wound cable therebetween, and gearing connecting said rolls to said flyer, of means for controlling the operation of said gearing whereby said rolls are adapted to always convey the cable away from said flyer, irrespective of the direction of rotation of said flyer.

11. In a machine of the class described, the combination with a rotatable flyer adapted by its rotation to wind a continuous cable, a pair of rolls for receiving the wound cable therebetween, and gearing connecting said rolls to said flyer, of means for reversing the direction of rotation of said flyer, and other means controlling the operation of said gearing whereby said rolls are always driven in the same direction of rotation.

Dated this sixth day of July 1921.

FRANK H. SLEEPER.

Certificate of Correction.

It is hereby certified that in Letters Patent No. 1,458,997, granted June 19, 1923, upon the application of Frank H. Sleeper, of Worcester, Massachusetts, for an improvement in "Winding and Cabling Machines," an error appears in the printed specification requiring correction as follows: Page 4, lines 14 and 15, claim 5, strike out the words "one end thereof to" and insert the same to follow the word "from", first occurrence, in line 14; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 17th day of July, A. D., 1923.

[SEAL.]

WM. A. KINNAN,
Acting Commissioner of Patents.