991,659.

C. W. SPONSEL.

ROPE LAYING MACHINE.

APPLICATION FILED FEB. 27, 1908.

Patented May 9, 1911.

4 SHEETS—SHEET 1.

Fig. 1.

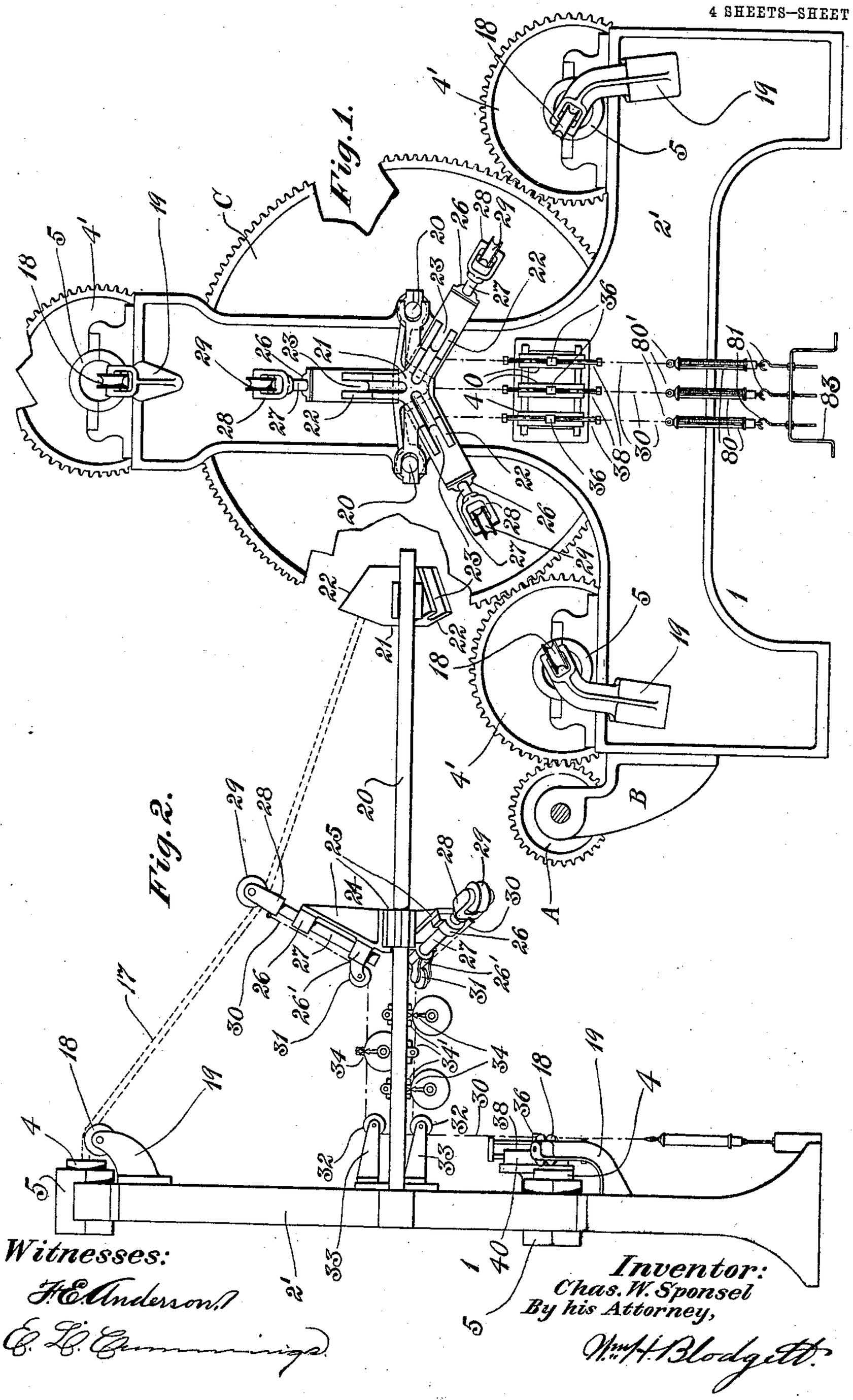

Fig. 2.

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4 SHEETS—SHEET 2.

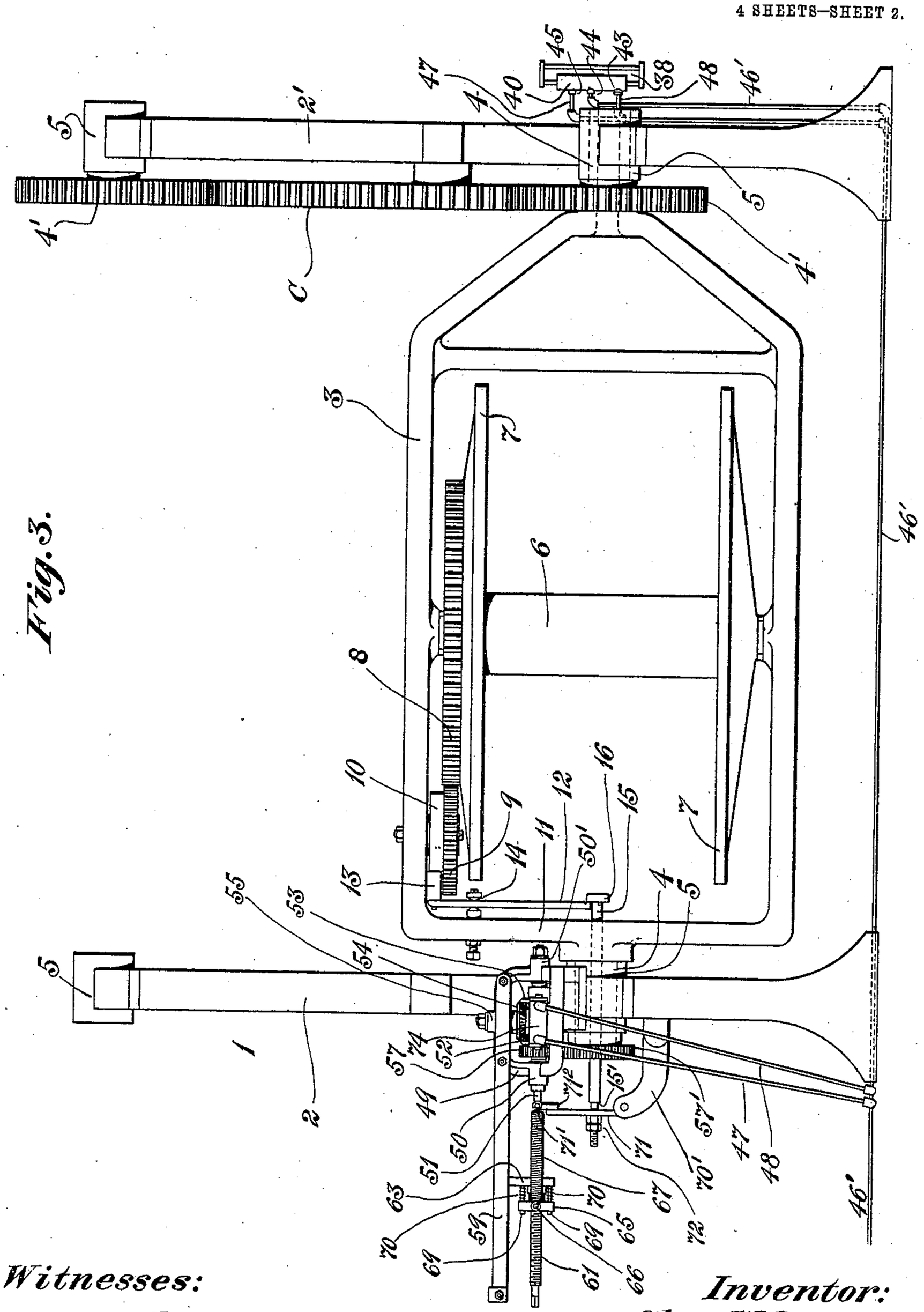

Fig. 3.

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By his Attorney,

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4 SHEETS—SHEET 3.

Fig. 4.

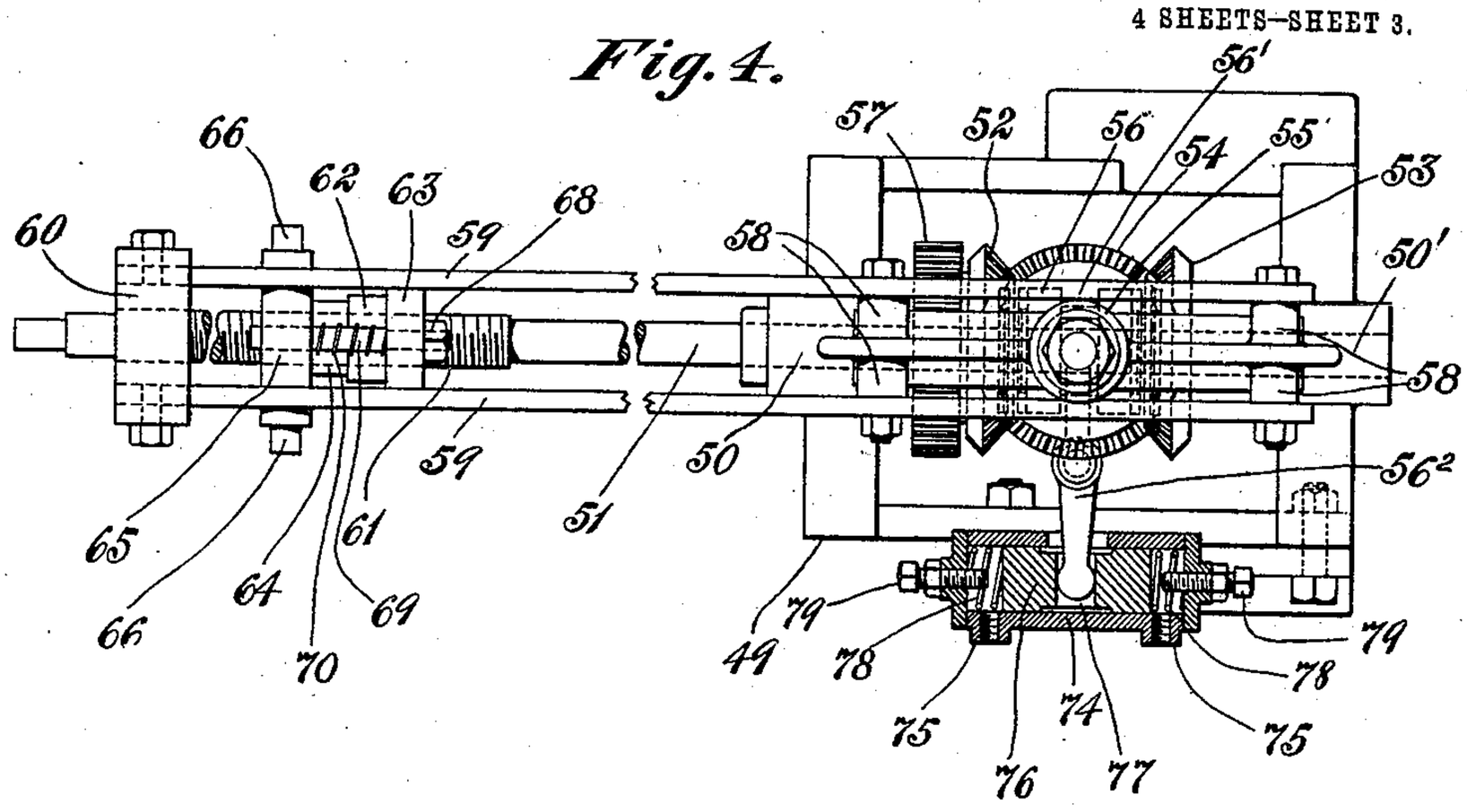


Fig. 5.

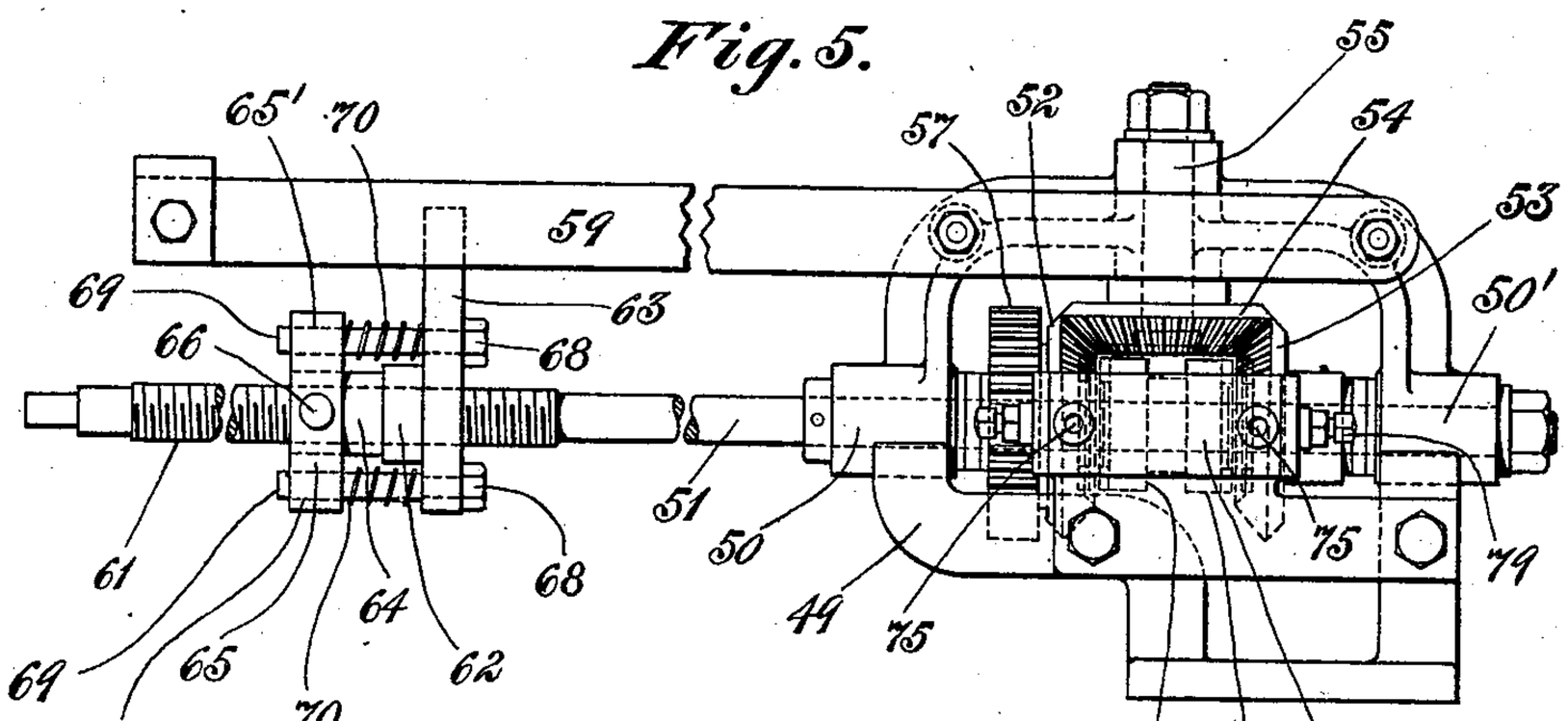
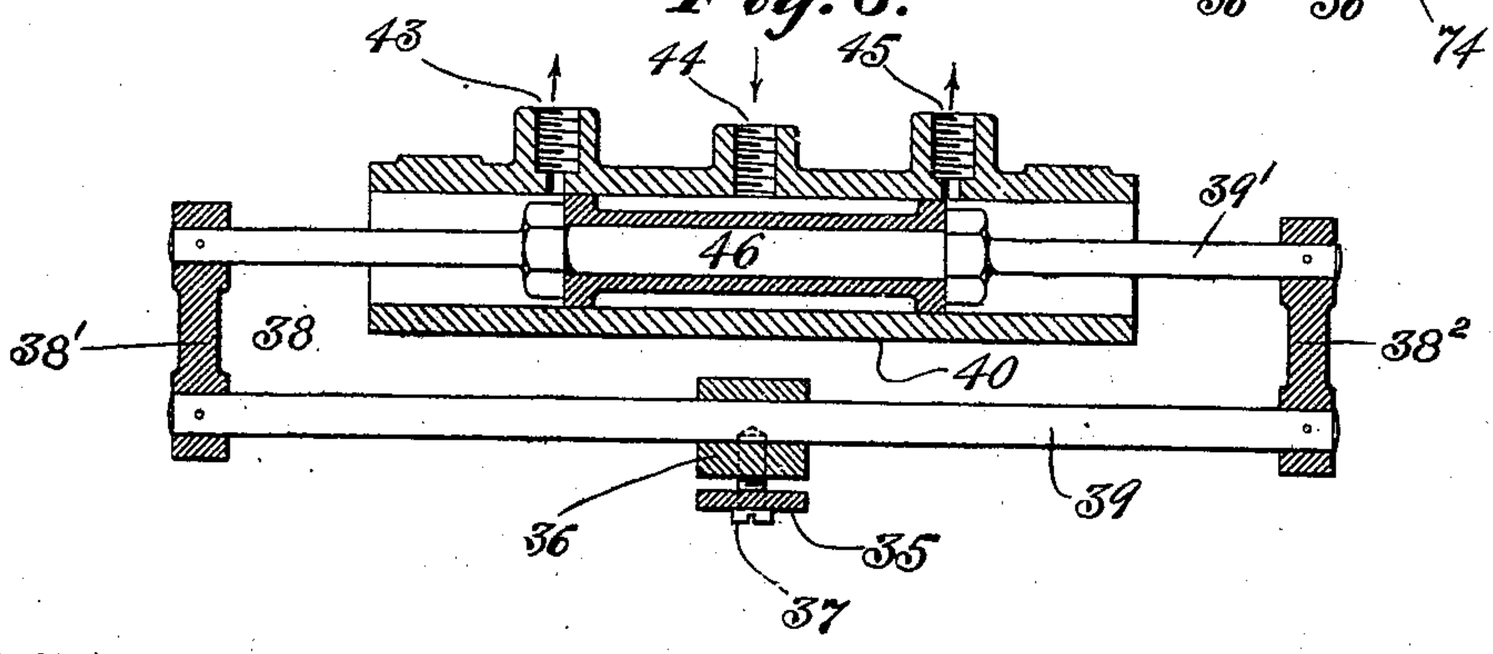


Fig. 6.



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4 SHEETS—SHEET 4.

Fig. 7.

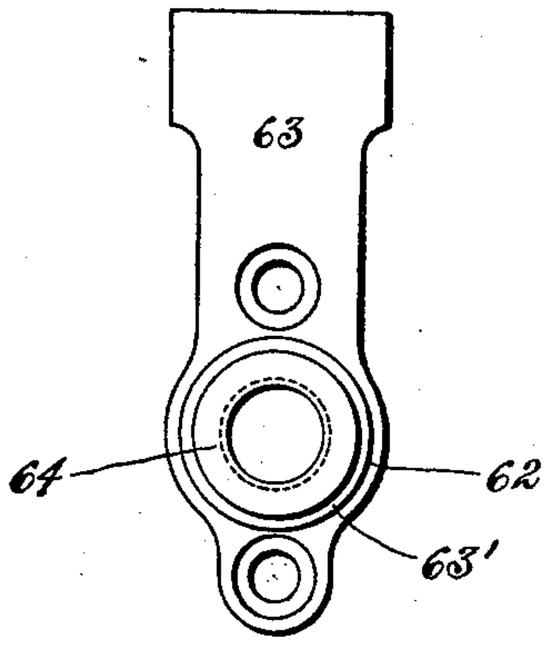


Fig. 8.

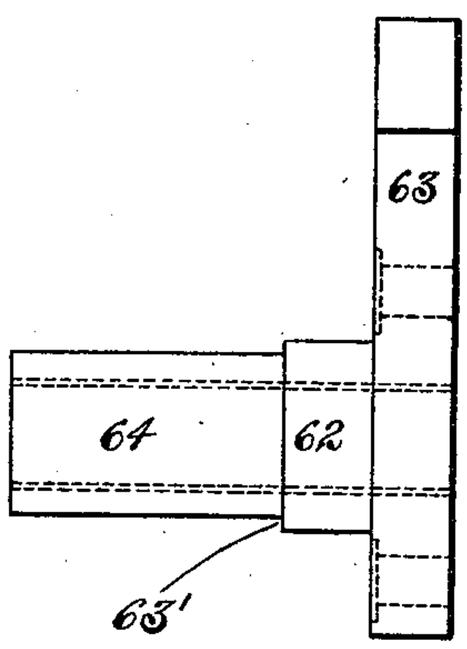


Fig. 9.

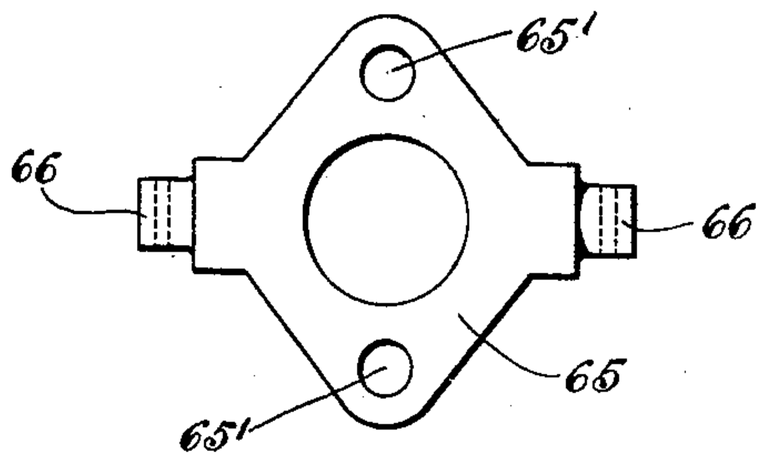


Fig. 10.

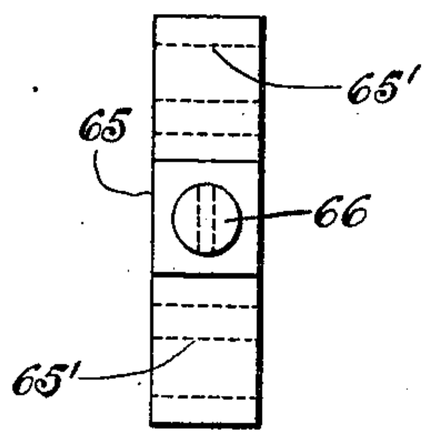
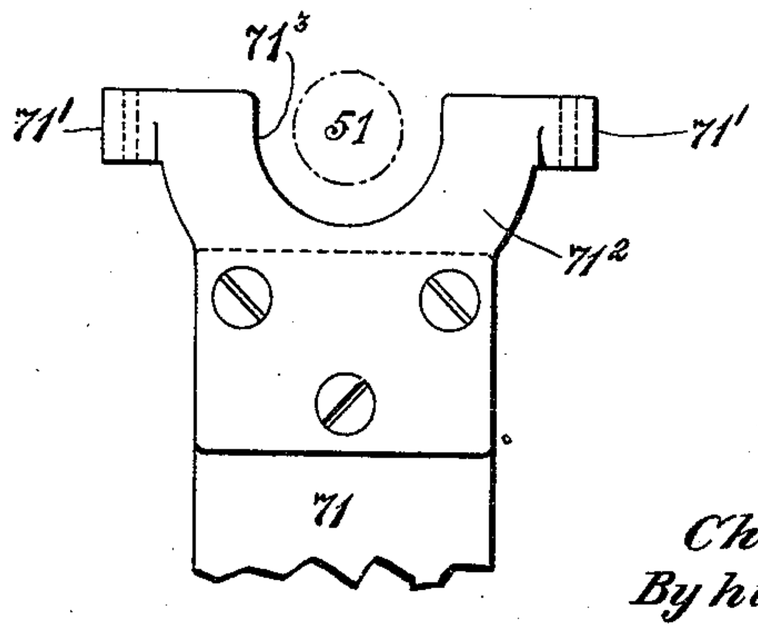


Fig. 11.



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UNITED STATES PATENT OFFICE.

CHARLES W. SPONSEL, OF HARTFORD, CONNECTICUT, ASSIGNOR TO COLUMBIAN ROPE COMPANY, OF AUBURN, NEW YORK, A CORPORATION OF NEW YORK.

ROPE-LAYING MACHINE.

991,659. Specification of Letters Patent. Patented May 9, 1911.

Application filed February 27, 1908. Serial No. 418,107.

To all whom it may concern:

Be it known that I, CHARLES W. SPONSEL, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Rope-Laying Machines, of which the following is a specification.

This invention relates to tension-regulating devices for the strands of rope-laying machines, the character of the rope being formed being immaterial—*i. e.*, rope composed of cordage, wire, etc.

In the embodiment of my invention a framework is provided in which fliers are journaled, each of said fliers containing a coil or bobbin of the material to be formed into rope.

Primarily the object of the invention is the provision of improved means for automatically regulating the tension of each strand issuing from the coil or bobbin.

Further objects of the invention relate to details of construction, some of generic application to other machines than that of the form illustrated and described in the present case.

In the accompanying drawings, Figure 1 is an end elevation of the machine. Fig. 2 is a side view thereof showing the manner in which the strands from the bobbins are led through guides to a twisting device (not shown), and also illustrating in elevation mechanism for indicating the tension of each strand. Fig. 3 is a side elevation, illustrating one of the fliers mounted on trunnions in the frame, and fluid-pressure actuated devices for controlling the tension of the strand from said flier. Fig. 4 is a sectional top plan view of gearing, a feed-screw and its nut, a piston and its cylinder and certain associated parts, Fig. 5 is an elevation of the parts represented in the preceding view. Fig. 6 is a sectional view of a valve, its casing and certain adjunctive elements, and, Figs. 7 to 11 inclusive are detail views hereinafter more particularly described.

Referring to the drawings, the numeral 1 designates in a general way, framework which may be of any desired construction, but is shown having vertical uprights 2, 2′ in which bearings for the trunnions of fliers 3 are mounted. Each flier 3 consists of an oblong frame having a tubular trunnion 4 at each end, said trunnions being mounted in bearings designated by 5.

In each skeleton flier-frame is journaled a reel or bobbin 6 having the usual end flanges 7. Carried by the shaft of each flier is a gear-wheel 4′. In the present instance the pinion 4′ on the left in Fig. 1 is positively operated by a gear-wheel or pinion as A which may be driven from any suitable source of power and meshes with a gear wheel as C of large diameter which in turn meshes with the other two pinions 4′ whereby the three flier frames may be simultaneously operated. Each reel or bobbin 6 is represented as having fastened thereto a gear-wheel as 8 in mesh with a pinion 9 having a cylindrical brake-surface 10. Mounted for movement on the inner end-bar 11 of each flier is a lever 12 carrying a brake-shoe 13, the adjustable pivot of said lever being designated by 14, and the end of the longer arm of said lever being adapted to engage an actuating-rod 15 having a flanged head 16, as will be hereinafter described.

The strand issuing from each coil of the bobbins is designated by 17, and it passes from the bobbin through one of the tubular trunnions 4 of the flier-frame, and over the roller 18 journaled in brackets 19 secured each to one of the standards 2 of the frame 1.

It is important in this class of machines that the strands to be laid should be held under constant, equal tension, and to accomplish this result there is provided mechanism for each strand, said mechanism being actuated by fluid-pressure and automatically operated by a valve, to produce the result desired. This mechanism, which may be of any desired form, will now be described.

Projecting from one of the standards of the main frame are rods 20, and held rigidly between these rods of which there are two is a guide-frame 21 composed of three arms 22 grooved at 23 to receive the strands, said guide frame 21 having in its opposite sides channels in which said rods tightly fit. Back of the grooved guide-frame and clamped to the rods is a frame 24 having three arms, each of which is designated by the numeral 25, and each of which is provided with bearings 26, 26′ for the reception of a rod 27 having a head 28, in the outer end of which is journaled a roller

29 beneath which the strand from the bobbin passes, as illustrated in Fig. 2. To each head 28 is secured a connector 30, and between separated arms of each lower bearing 26′ of the frame is journaled an antrifriction-roller 31, under the periphery of which the connector passes, and continuing on passes over rollers 32 journaled in brackets 33 projecting from the standards 2.

Indicators 34 are engaged by the connectors 30, and are mounted in brackets 34′ secured to the rods 20. Each indicator roller carries a hand coöperating in the usual way with a mark on the bracket to indicate the tension of the strand.

Each cord or connector 30 after it leaves the roller 32 is clamped by a washer 35 to a short sleeve 36 held in place on an element of a valve-actuator hereinafter described, by a screw 37, as illustrated in Fig. 6. These valve-actuators are each composed of a sliding frame 38, having heads 38′, 38² connected by rods 39, 39′ and on the rod 39′ is adjustably mounted the sleeve 36, held in place by screw 37, as aforesaid. Projecting from the end standard 2′ are fluid-pressure cylinders 40, having open ends and clamped on the rod 39′ of each frame 38 is a valve 46, shown as of spool-shape in Fig. 6. In each of the cylinders are ports 43, 44 and 45 and to the port 44 is connected a supply-pipe 46′, entering the cylinder at a point intermediate the ends of the valve. A pipe 47 enters the port 45 and a pipe 48 the port 43.

Normally or when the valve 46 is in its neutral or intermediate position as represented in Fig. 6 both ports 43 and 45 are open or in direct communication with the atmosphere through the opposite open ends of the cylinder or casing 40. It will be assumed that the valve through its actuator is caused to move to the left a distance sufficient to put the port 43 in uninterrupted communication with the port 44. When this takes place the operating fluid enters the pipe 48 by way of the port 43. Should the opposite movement of said valve be caused the port 45 will be put into communication with the port 44 and such fluid will then enter the pipe 47 by way of the port 45, the port 43 during the last mentioned stroke of the valve being put into communication with the atmosphere so that the pipe 48 can be exhausted. When the valve returns to its central position in which it is shown the pipe 47 can exhaust to atmosphere.

Secured to the standard 2 is a gear-box or frame 49, and in bearings 50, 50′ of said box is journaled a shaft 51. Separated from each other and loosely mounted on said shaft 51 are reversely-disposed bevel-gears 52 and 53, connected by an intermediate idler 54, the shaft of which is journaled in a bearing 55 of the gear-box. A sliding-clutch 56 is splined to the shaft between the gears 52 and 53, the hub of said clutch being grooved at 56′ to receive the usual yoke, the latter having an arm 56². On the hub of the loose bevel gear 52 is a gear 57 in mesh with a pinion 57′ by which the train of bevel-gears is driven, one of said pinions being carried by the trunnion of each flier-frame, and being perforated to receive the rod 15 so that the various gear-trains are driven by the pinions 57′ of the flier-frames. Bolted to each side of the gear-box or frame 49 and separated from each other by spacers 58 are bars 59, closed at their outer ends by a spacer 60, as illustrated in Fig. 4.

A part of the shaft 51 is threaded at 61, and in engagement with said threaded portion is a nut 62 attached to an arm 63 fitting between the bars 59, as illustrated in Figs. 4 and 5, and serving to hold the nut against rotation. To the left of the nut is a reduced hub 64 surrounding the shaft 51, and upon this hub is loosely mounted a collar 65 (Fig. 9) having studs 66 to which springs 67 are attached. Projecting from the arm 63 and held in place by nuts 68 are rods 69, the outer ends of which pass loosely through perforations 65′ in the collar 65, (Figs. 7 and 8). Coiled springs 70 surround the rods 69, and each bears at one end against the collar 65 and at its opposite end against arm 63.

Pivoted to a bracket 70′ projecting from one of the standards 2 is a lever 71, and to studs 71′ on an offset portion 71² of said lever are connected the inner ends of the springs 67. This offset portion is recessed or concaved at 71³ to receive the shaft 51, and the springs 67, which are of greater power than the springs 70, act with equal pressure against the lever 71.

On the inner threaded end of rod 15 are nuts 72, one being a jam-nut, said nuts serving to limit the outward motion of the levers 71, and a shoulder 15′ on rods 15, the inward movement thereof.

As above stated the screw-threaded shaft 51 is received in the recess at the top of the offset portion of the lever 71, the consequence being that when said lever 71 is actuated by the springs 67 by a sequence of operations hereinafter stated slack of the strand prevails, the rod 15 will be pulled inward and the flanged head 16 of said rod will actuate lever 12 to apply greater power to the brake 13, and when the strand is under too great tension, as shown by the indicators and the spring-scale, the springs 67 will be released in their bearing tension on lever 71, and the brake will be relieved,— all as shown by the indicators and the spring-scales described herein.

Designated by 74 is a cylinder adjacent to the ends of which are nipples 75 for receiving the threaded ends of pipes 47 and

48, and in said cylinder is a piston 76, slotted at 77 to receive the free end of the clutch-shifting lever 56^2. To cushion the stroke of said piston and normally hold the same in a neutral position springs 78 are employed, one in each end thereof, and stop-screws 79 are threaded into the caps of the cylinder to limit the motion of the piston in either direction.

Designated by 80 in Fig. 1 are spring-scales to which the cords or connectors 30 are each secured to an eye 80′ on the movable member of the scale.

Hooks 81 each adjustable in the top of the bracket 83 secured to the floor, serve to connect the tubular members of the spring-scales to said bracket.

When the tension of any one of the three strands 17 exceeds the normal the rod 27 under the roller of which said strand passes, is pulled outward by the strand and the connector which is united to said rod 27 is also pulled outward by reason of which the valve 46 is drawn to the right in Fig. 6 thereby permitting a blast of air to pass from the chamber or cylinder 40 into the pipe 47 and from the latter into the casing 74 so as to cause the piston 76 to move to the left in Fig. 4 and thereby as previously set forth clutching the gear 53 to the shaft 51 through the medium of the mechanism already described. When said shaft 51 is rotated by the gear 53 the nut 63 will be fed inward by the threaded portion 61 of said shaft by virtue of which the friction of the brake-shoe 13 against the periphery of the disk or wheel 10 will be relieved as also hereinbefore fully described. When the tension of the strand in question commences to decrease the coöperating spring of the spring-scale 80 becomes effective to restore the shifted connector 30 to its original relation during which motion the valve 46 is returned to its neutral position as shown in Fig. 6 thereby to cut off the further supply of operating fluid to the pipe 47 and permitting the piston 76 to be restored to its neutral position by the compressed end operating spring thereof which of course causes the brake shoe 13 to assume its normal position. When the slack of a strand goes below the normal the particular connector 30 coöperative with said strand is pulled downward by the spring of the coöperating spring balance 80 so that through the intermediate parts the valve 46 will be moved toward the left in Fig. 6 whereby a blast of air will be directed through the pipe 48 to cause the operation of the brake-shoe 13, through the intermediate parts, whereby said shoe will apply its force to the disk or wheel 10 to check the motion of the bobbin 6.

While three sets of gear-trains, clutch-shifting valves, and sliding valve-frames are illustrated and described (one set being for each flier-frame) it will be seen that the number of said sets may be varied, as desired according to the number of flier-frames and their bobbins employed.

For convenience like parts connected with all of the flier-frames are designated by the same numerals of reference, as each is a replica of the other.

As a matter of course it will be understood that the twisted strands will be wound upon the rotary reel in the usual manner which will pull each twisted strand from the coil on the bobbin of the flier. In this way irregular tension of any strand will be immediately corrected, and will be shown by the indicators and the spring-scales described. Furthermore, all the strands will, after leaving the guide-frames 23, be in proper condition for the usual twisting apparatus, not shown.

Various changes may be made in the construction of the machine, and the parts may be differently disposed from the manner in which they are shown in the illustrations given. Furthermore valve-mechanisms of different types may be employed as substitutes for the valve-mechanisms shown, without departure from the invention, and the quality of the framework may be varied to suit the conditions required.

Having thus described the invention, what I claim is:

1. The combination of cordage laying mechanism including means for presenting a strand, and mechanism including fluid-control means, set into action directly by the strand for regulating the tension of the latter.

2. The combination of a flier, a rotary reel supported by said flier, a brake coöperative with said reel, and means, including a fluid-control device, directly operable by the strand led off from said reel, for causing the operation of said brake.

3. The combination of a flier, a rotary reel supported by said flier, mechanism for governing the action of said reel, including a valve, and means directly operable by the strand led off from said reel, for operating said valve.

4. The combination, with a flier and its bobbin, of a gear carried by the bobbin; a pinion in mesh with the gear; a brake-wheel secured to the pinion; a pivoted lever; a brake carried by said lever; a rod having a projection in contact with the lever; fluid-actuated devices; and means controlled by said fluid-actuated devices for regulating the movement of the brake-mechanism.

5. The combination, with a series of fliers each having a bobbin mounted for rotary movement, of pinions, one for each flier; a driven gear with which all of the flier-pinions are in engagement; brake-mechanism for automatically controlling the rotary

movement of each bobbin; a lever for actuating each said brake-mechanism; and fluid-actuated devices for automatically controlling the action of said levers in applying and releasing the brake-mechanism when abnormal tension of the strands exists.

6. The combination, with a rotary flier having a tubular trunnion, of a bobbin journaled in the flier; brake-mechanism for controlling the action of the bobbin; a roller bearing against the strand issuing from the bobbin; a rod carrying said roller; a cord or connector attached to the rod; an indicating device actuated by the cord or connector and fluid-actuated mechanism having a valve controlled by said cord or connector.

7. The combination of a flier provided with a bobbin, a movable guide for the strand led from said bobbin, a fluid actuated device involving a valve, for controlling the flier, and means operable by said guide for actuating said valve.

8. The combination, with framework, of a flier frame journaled therein; a bobbin journaled in the flier-frame; a brake for controlling the movement of the bobbin; a rotary shaft; gearing for actuating said shaft in opposite directions; and means carried by the shaft for controlling the movement of the brake.

9. The combination of a rotary flier frame, a bobbin rotatively supported by said flier frame, a brake coöperative with the bobbin, a pair of gears for operating said brake in opposite directions, a clutch for alternately connecting said gears with a source of power, a cylinder, a piston in said cylinder for operating said clutch, a movable guide for the strand led off from said bobbin, and fluid means governed by said guide for operating said piston in opposite directions.

10. The combination of a flier frame, a pinion on said flier frame, a driven gear in mesh with said pinion, a bobbin journaled in said flier frame, brake mechanism for governing the action of said bobbin, a fluid controlled device, a rod for transferring the effect of said fluid controlled device to said brake mechanism, a movable guide for the strand led off said bobbin, and means for transferring the action of said guide to said fluid controlled device.

11. In mechanism of the class described, the combination, with a flier-frame having tubular trunnions, of a bobbin journaled in said flier-frame; a gear on said bobbin; a pinion in mesh with said gear, and having a brake-surface; a pivoted lever carrying a brake; a rod passing through one of the trunnions of the flier-frame, and having a projection on its inner end adapted to engage the lever; a shaft; reversing gearing for said shaft; a pivoted lever through which the rod passes; an extension on said lever having a recess to receive the shaft; and mechanism actuated by the shaft for actuating the second pivoted lever, and through the rod, the brake.

12. The combination of a rotary flier frame, a bobbin rotatively supported by said flier frame, a brake coöperative with the bobbin, a pair of gears for oppositely operating said brake, a clutch for alternately connecting said gears with a source of power, fluid controlled means governed by the strand led off from said bobbin for operating said clutch in opposite directions, and a spring scale for denoting the tension of said strand.

13. The combination, with framework, of reversing mechanism mounted therein; a shaft; a clutch slidable upon the shaft, and adapted to be connected with elements of the reversing mechanism; a threaded portion on the shaft; an arm carrying a nut for engaging said threaded portion; a flier-frame; a bobbin journaled in said flier-frame; a brake-element; and means controlled by the threaded portion of the shaft for applying and releasing the brake-element when abnormal tension of any strand exists.

14. In mechanism of the class described, the combination, with a framework, of a pair of separated rods extending from said framework; a frame mounted on said rods having bearings; a rod mounted for sliding movement in said bearings; a roller journaled in the end of said rod; a connector attached to the rod; indicators operated by the connector; valve-mechanism connected to the connector; a shaft; reversing-gearing loosely surrounding said shaft; a clutch for connecting said reversing-gearing to the shaft; and fluid-pressure devices for shifting the clutch.

15. In mechanism of the class described, the combination, with a framework, of a pair of separated rods extending from said framework; a frame mounted on said rods having bearings; a rod mounted for sliding movement in said bearings; a roller journaled in the end of said rod; a connector attached to the rod; indicators operated by the connector; valve-mechanism connected to the connector; a shaft; reversing gearing loosely surrounding said shaft; a clutch for connecting said reversing-gearing to the shaft; fluid-pressure devices for shifting the clutch; and means for bringing the clutch to a neutral position between two of the elements of the reversing gearing.

16. In mechanism of the class described, the combination, with a flier-frame, of a bobbin journaled therein; a gear carried by said bobbin; a pinion in mesh with said gear; a brake-surface connected with the pinion; a brake; a pivoted lever carrying said brake; a rod having a head in engagement with said pivoted lever, and passing

through one of the trunnions of the flier-frame; a second pivoted lever for actuating the rod; and means for operating said second pivoted lever.

17. The combination, with a flier-frame, and with a driving element therefor, of a shaft; reversing-mechanism adapted to be connected to said shaft; a clutch forming a part of said reversing-mechanism; a bobbin carried by the flier-frame; a brake; means for actuating the clutch between elements of the reversing-mechanism; and means controlled by the shaft for actuating said brake.

18. The combination, with framework, of a bobbin journaled therein; a shaft having a threaded section; reversing mechanism for the shaft; a clutch located between elements of said reversing-mechanism; a cylinder; a valve in said cylinder; fluid-pressure devices for actuating said valve, and thereby the clutch in either direction; and means carried by the valve cylinder for restoring the clutch to neutral position.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES W. SPONSEL.

Witnesses:
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FRANCES E. BLODGETT.