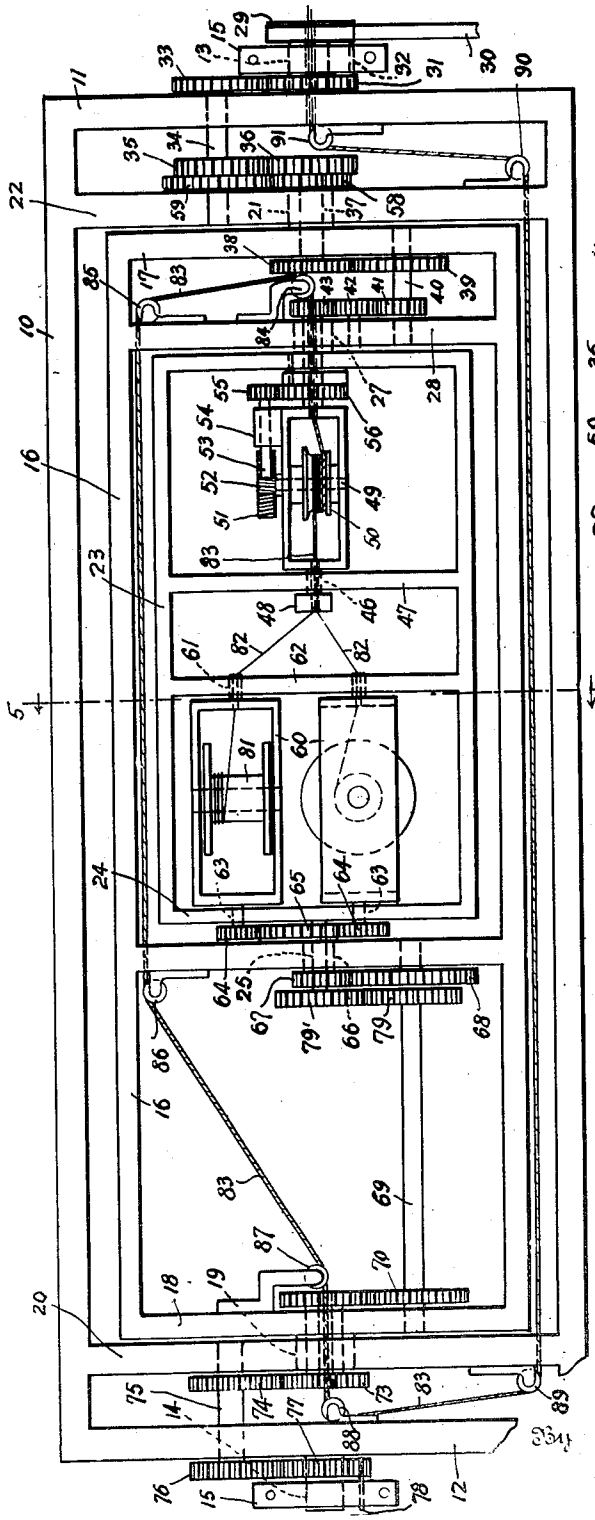
Oct. 17, 1950 W. T. MacCREADIE 2,526,147

WIRE ROPE MAKING MACHINE

Filed March 18, 1949 2 Sheets-Sheet 1



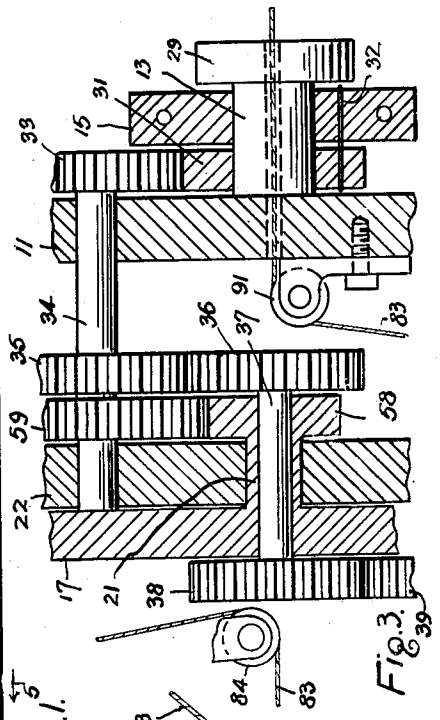


Fig. 1.

Fig. 3.

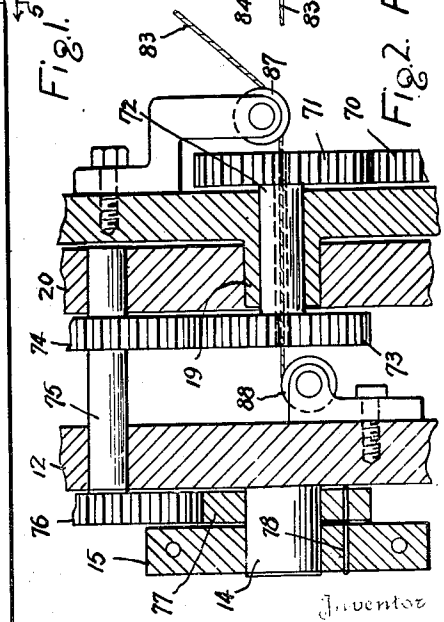


Fig. 2.

Inventor

William T. MacCreadie

Dwight B. Stone

Attorney

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WIRE ROPE MAKING MACHINE

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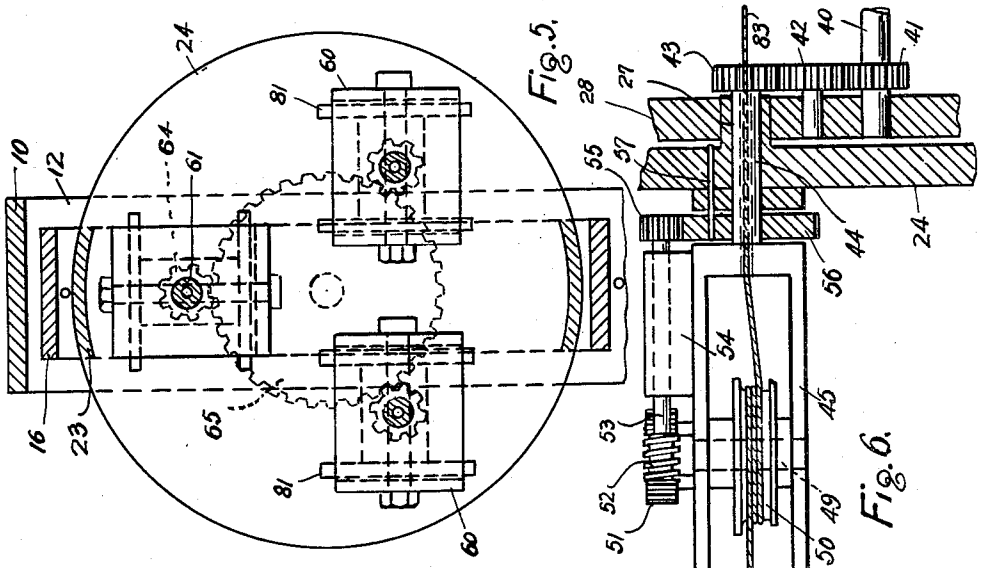


Fig. 5.

Fig. 6.

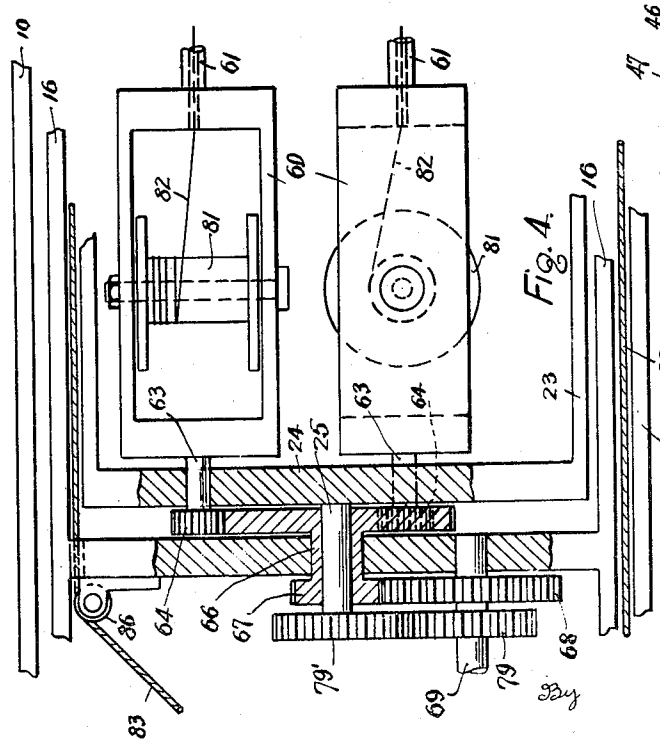


Fig. 4.

Inventor
William T. MacCreadie

By Douglas P. Ware

Attorney

Patented Oct. 17, 1950 2,526,147

UNITED STATES PATENT OFFICE

2,526,147

WIRE ROPE MAKING MACHINE

William T. MacCreadie, Lewisburg, Pa.

Application March 18, 1949, Serial No. 82,203

5 Claims. (Cl. 57—58)

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This invention is a wire rope making machine, designed particularly, but not necessarily limited to, the manufacture of small wire ropes.

The primary object of the invention is to provide a machine which may be of comparatively small size and constructed in such manner as to rapidly produce wire rope of any desired lay and which operates in such manner as to entirely remove the twist from the strand or cable as it passes from the machine to a wind-up bobbin.

A further object of the invention is to provide a wire rope making machine capable of producing strand wire at exceedingly high speed, and which operates in such manner that as the strand is formed it is treated in such manner as to issue from the machine without twist, whereby the cable or strand may be completed with a minimum of speed of the turning frames.

With the foregoing objects in view, together with others which will appear as the description proceeds, the invention consists in the novel construction, combination and arrangement of parts, all as will be described more fully hereinafter, illustrated in the drawing, and particularly pointed out in the claims.

In the drawings:

Fig. 1 is an elevation of a wire rope making machine constructed in accordance with the invention,

Fig. 2 is an enlarged detailed sectional view showing the construction of the left end of the machine shown in Fig. 1,

Fig. 3 is a similar view of the construction of the machine at the right hand end,

Fig. 4 is an enlarged elevation, parts in section, showing the power drive for the supply bobbins,

Fig. 5 is a transverse sectional view, on an enlarged scale, taken substantially upon line 5—5 of Fig. 1, and

Fig. 6 is an enlarged elevation, parts in section, of the haul-off, twister die and the drive means therefor.

The machine consists essentially in a main frame, a second frame and a third frame, all arranged in a common axis. The inner or third frame carries the supply bobbins, the twister die and the haul-off. This frame remains stationary, while the main and second frames rotate around it. The main frame turns in a direction opposite to the direction of rotation of the second frame, and these frames rotate at different speeds. The cable or strand formed in the innermost frame is led outwardly therefrom and laterally over guides arranged in longitudinal alignment in the second frame and parallel with the axis

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of the frames, after which the strand passes back into the longitudinal center of the frames and outwardly therefrom to suitable guides on the main frame. These guides are disposed near the periphery or outer edge of the main frame and in longitudinal alignment thereon so that the strand passes in a direction parallel with the axis of the frames, after which it is led back into the longitudinal center of the frames and outwardly therefrom to a wind-up bobbin. In this manner all twist or turning of the cable ceases so that the completed strand may be drawn off and wound upon a suitable wind-up bobbin.

More particularly, the outer or main frame is indicated at 10. This frame is of elongated rectangular shape having end members 11 and 12 each provided with outwardly extending longitudinally disposed hollow trunnions 13 and 14 mounted for free rotation in fixed bearings 15. The second or intermediate frame or carriage is indicated at 16 and is likewise of elongated rectangular shape and of a size to freely rotate within the main frame 10. The end bars of the intermediate frame are indicated at 17 and 18. The end bar 18 has affixed thereto a centrally located outwardly projecting hollow trunnion 19 which has rotative bearing in an adjacent bar 20 of the main frame and in the longitudinal axis of the latter. The opposite end bar 17 of the second or intermediate frame has likewise affixed thereto an outwardly projecting centrally disposed hollow trunnion 21 having rotative bearing in an adjacent bar 22 of the main frame. From this construction it will be seen that the main or outer frame is free to rotate upon a horizontal axis in the bearings 15, while the second or intermediate frame 16 is free to rotate upon and within the main frame and in the same longitudinal axis thereof.

The third or innermost frame 23 is also of elongated rectangular shape and is rotatably supported within the intermediate frame 16. This innermost frame is provided with end bars 24, from one of which projects a stub shaft 25 disposed in the longitudinal axis of the frame to pivotally support one end thereof. The opposite end bar 24 of the said innermost frame has rigidly affixed thereto an outwardly extending centrally disposed hollow trunnion 27 pivotally supporting the said end in the adjacent cross bar 28 of the intermediate frame 16.

The outer end of hollow trunnion 13 which supports the main frame 10 has affixed thereto a pulley 29 over which passes a drive belt 30 leading from any suitable source of power. Rotata-

bly supported upon the trunnion 13 is a gear 31 affixed against rotation by a pin 32 which anchors the gear to the bearing member 15. The gear 31 is in mesh with a gear 33 mounted upon shaft 34 having bearing in the end member 11 of the main frame. This shaft 34 has bearing also in the bar 22, and affixed to this shaft 34 is a gear 35 in mesh with a gear 36 affixed to shaft 37 having bearing in the hollow shaft 21. The inner end of shaft 37 has affixed thereto a gear 38 in mesh with gear 39 carried by stub shaft 40 having bearing in adjacent bars of the intermediate frame 16. The shaft 40 has secured thereto a gear 41 which is in mesh with an intermediate gear 42 rotably carried by the second or intermediate frame 16 in the bar 28 thereof, and the intermediate gear is in mesh with a spur gear 43 affixed to the outer end of a hollow trunnion 44 projecting from one end of a haul-off drum frame 45 disposed longitudinally within the innermost frame and near one end thereof. This haul-off frame is disposed in the longitudinal center of and is therefore coaxial with the other frames. The opposite end of the haul-off frame has projecting therefrom a hollow trunnion 46 mounted for rotation in a cross bar 47 in the innermost frame. This hollow trunnion has affixed thereto a conventional twister die indicated at 48.

The haul-off frame carries a laterally disposed shaft 49 to which is affixed the haul-off drum 50. One end of the shaft 49 has affixed thereto a worm wheel 51 in mesh with a worm 52 carried by shaft 53 mounted in a suitable bearing 54 on the haul-off frame. The shaft 53 has affixed thereto a spur gear 55 in mesh with a gear 56 mounted loosely upon the hollow trunnion 44 and secured against rotation by a pin-57 which anchors the said gear to the cross bar 24 of the innermost frame.

The hollow trunnion 21 which rotatably supports the intermediate frame 16 has affixed thereto a spur gear 58 which meshes with a gear 59 affixed to shaft 34.

The innermost frame 23 carries a desired number of rotatable supply bobbin frames 60, three being shown in the present instance. These frames are of elongated rectangular construction and are mounted within the innermost frame to rotate upon axes parallel to the axis of the said innermost frame. Each of the supply bobbin frames has a hollow trunnion 61 at one end rotatably mounted in a cross bar 62 of the innermost frame, while the opposite end of each of the supply bobbin frames has affixed thereto an outwardly extending trunnion 63, each having affixed thereto a spur gear 64 in mesh with a master gear 65 rotatably mounted in the intermediate frame and axially thereof. This master gear 65 is provided with a hollow central shaft 66 to be rotatably received upon the trunnion 25 affixed to the innermost frame end 24. The hollow trunnion 66 is provided with a spur gear 67 in mesh with a gear 68 affixed to shaft 69 mounted for rotation in cross members constituting a part of the intermediate frame 16. The shaft 69 has another gear 70 affixed thereto which is in mesh with a gear 71 secured to a hollow shaft 72 rotatably mounted in the hollow trunnion 19 of the frame 16 and in the longitudinal axis thereof. The outer end of this shaft 72 has affixed thereto a gear 73 which is in mesh with a gear 74 affixed to a jack shaft 75 carried by the main frame and rotatable upon an axis parallel with the axis of the frames. The shaft 75 projects beyond the end of the main frame 10 and has secured thereto

a gear 76 in mesh with a gear 77 loosely mounted upon supporting trunnion 14 of the main frame. The gear 77 is secured against rotation by a pin 78 which passes through the gear as well as through the bearing post 15.

The shaft 69 has also affixed thereto a gear 79 which meshes with a spur gear 79' secured to trunnion 25 of the innermost frame 23.

Each of the supply bobbin frames 60 is provided with a freely rotatable bobbin 81, from each of which a wire 82 is led through the hollow trunnions 61 in convergence in the twister die 48, at which time the several wires are twisted together as a strand or cable. This strand, indicated at 83, passes over the haul-off drum 50 and out through the hollow shaft 44. A guide roller 84 mounted in the axis of the intermediate frame 16 receives the strand, from whence the latter passes laterally to a guide 85 disposed near the outer lateral edge of the intermediate frame 16. The strand then passes rearwardly of said frame and parallel to the axis thereof to a guide 86 also carried by the intermediate frame, from whence it passes back into the axis of the frames to the guide roller 87 carried by the intermediate frame. The cable or strand then passes through the hollow trunnion 72 to a guide wheel 88 secured to the end member 12 of the main frame 10 and in the longitudinal center thereof. From the guide roller 88 the cable passes laterally of the main frame to a guide 89 carried by the said frame near an outer lateral edge thereof, from whence the cable passes forwardly of the said frame to a guide 90 also carried by the main frame and in longitudinal alignment with the guide 89. The cable then passes radially inward of the main frame to the guide roller 91 carried by the main frame and disposed in the longitudinal center thereof, from whence the cable passes through the hollow trunnion 13 to a suitable or orthodox wind-up bobbin, not shown.

From the foregoing, it is apparent that rotation of the pulley 29 by means of the belt 30 will cause the main frame 10 to rotate in one direction while the second or intermediate frame 16 will rotate in the opposite direction. Due to the gearing arrangement, the speeds of rotation of these frames will not be the same, and it will be understood that the gear ratios may be changed as desired to obtain the desired relative speeds of these frames. Rotation of the pulley 29, which is affixed to the outer frame 10, will cause the latter to rotate. The gear 33 travels in planetary action around fixed pinion 31, causing shaft 34 to rotate and through gears 59 and 58 causes the intermediate frame 16 to rotate in a direction opposite to the direction of rotation of the outer frame. A the same time, the gear 35 drives gear 36 which in turn rotates gear 38 which is in mesh with gear 39 carried by shaft 40. The gear 41 upon shaft 40 drives intermediate gear 42 which is in mesh with gear 43, the latter being affixed to the hollow shaft 44 which connects with the haul-off frame (viewed from the right end in Fig. 1) 45. Rotary movement in the latter, as well as the twister die 48 connected thereto, is thus obtained, while at the same time the planetary movement of pinion 55 upon fixed gear 56 brings about driving action of the haul-off drum through the instrumentality of the worm 52 and worm gear 51.

Due to the manner in which it is mounted, it is obvious that the innermost frame 23 will remain stationary while the intermediate frame 16 rotates about it. The spur gears 64 secured to

the stub shafts **63** of the supply bobbin frames travel around gear **65**, thus bringing about rotative movement of the supply bobbin frames.

As the wires **82** converge in the twister die **43** it is turned, for instance, in clockwise direction, while the intermediate frame **16** is turning in the same direction but at a ratio, say, one to four. As the twisted cable passes centrally or axially to the frame **16** it continues to rotate in a clockwise direction. The cable or strand passes laterally of the frame to the outer edges thereof, where it is now turning anti-clockwise, whereupon it takes a rearward course to the opposite end of the frame, being led to the axial center thereof at said end. At this point the ratio is now one to two. As the strand then passes from the longitudinal center of the frame outwardly to the guides at the lateral edges of the main frame, the latter turning counter-clockwise, (viewed from the right in **Fig. 1**) it is making but a single turn. As the cable passes forwardly of the main frame and out through the center of the pulley **29** it is not turning at all, and may be wound up on a suitable wind-up drum. It will be understood that changes in the sizes of the various gears may be resorted to to bring about desired results without departing from the spirit of the invention. It is obvious, however, that by removing all twist or turn in the cable issuing from the machine, the wind-up operation is greatly simplified.

The machine here shown, and for example only, is provided with three supply bobbins, but it will be understood that more may be added as required. The bobbins here shown are disposed in radial arrangement within the bobbin supporting frame, but it will be understood that this arrangement may be departed from should it be desired.

I claim:

1. In a wire rope making machine, a rotatably mounted main frame, a second frame mounted coaxially within said main frame, a third frame mounted coaxially within said second frame, means for rotating said main and second frames in opposite directions and for maintaining said third frame stationary, supply bobbin frames and a twister die and haul-off frame all mounted for rotation in said third frame, bobbins rotatably supported in said bobbin frames, means for rotating said bobbin frames, and means for rotating said twister die and said haul-off frame in the same direction as said second frame.

2. In a wire rope making machine, a rotatably mounted main frame, a second frame within said main frame mounted for rotation coaxially therewith, a third frame mounted coaxially within said second frame, means for rotating said main and second frames in opposite directions, means for maintaining said third frame stationary, supply bobbin frames and a twister die and a haul-off frame all mounted for rotation in said third frame, bobbins rotatably supported in said supply bobbin frames, means for rotating said supply bobbin frames, and means for rotating said twister die and said haul-off frame in the same direction as said second frame.

3. In a wire rope making machine, a rotatably mounted main frame, a second frame mounted for rotation axially within said main frame, a third frame axially disposed within said second frame, means for rotating said main and second frames in opposite directions and at different speeds, means for maintaining said third frame stationary, a twister die and a haul-off rotatably mounted axially within said third frame, means for rotating said twister die and haul-off, supply bobbin frames rotatably mounted in said third frame, means for rotating said bobbin frames, bobbins loosely mounted in said bobbin frames, means for leading a strand laterally from the axis of said haul-off, guides on said second frame eccentrically thereof and in longitudinal alignment to receive said strand, means to lead said strand back into the longitudinal axis of said main frame, guides in longitudinal alignment with one another on said main frame and disposed eccentrically of the latter to receive said strand, and means to lead said strand back into the longitudinal axis of said main frame.

4. In a wire rope making machine, a rotatably mounted main frame, a second frame rotatably mounted coaxially within said main frame, a third frame coaxially disposed and stationary within said second frame, means for rotating said main and second frames in directions opposite to one another, a twister die and a haul-off mounted for rotation coaxially within said third frame, supply bobbin frames in said third frame, means for rotating said twister die and said haul-off, means for rotating said supply bobbin frames, guides to lead a strand from the axis of said haul-off in a direction laterally of said frames, guides arranged in longitudinal alignment near the outer edges of said second frame to lead the strand in a direction parallel to the axis of said frames, a guide on said second frame to lead the strand back into the longitudinal axis of said frames, guides near the outer edges of said main frame in longitudinal alignment thereof to lead the strand in a direction parallel to the axis of said frames, a guide in the axis of said frames to lead the strand back into said axis, and means for rotating said main and secondary frames.

5. In a wire rope making machine, an elongated main frame mounted for rotation on a horizontal axis, a second frame coaxially disposed within said main frame, means for rotating said main and second frames in opposite directions and at different speeds, a third frame coaxially supported against rotation within said second frame, a twister die and a haul-off arranged coaxially within said third frame, means for rotating said die and haul-off, supply bobbin frames rotatably mounted in said third frame, means for rotating said bobbin frames, bobbins in said bobbin frames whose wires pass through said twister die and onto said haul-off, a guide on said second frame to lead the strand axially from said third frame, guides on said second frame disposed near the outer edge thereof and in longitudinal alignment parallel to the axis of said frames, a guide on said second frame to lead the strand back into the axis thereof, guides on said main frame near the outer edges thereof and in longitudinal alignment parallel with the axes of the frames to lead said strand, and a guide in the longitudinal center of said main frame to lead the strand from said machine.

WILLIAM T. MacCREADIE.

No references cited.