March 9, 1954 T. H. PEARCE 2,671,303

WIRE LAYING MACHINE

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Fig. 1.

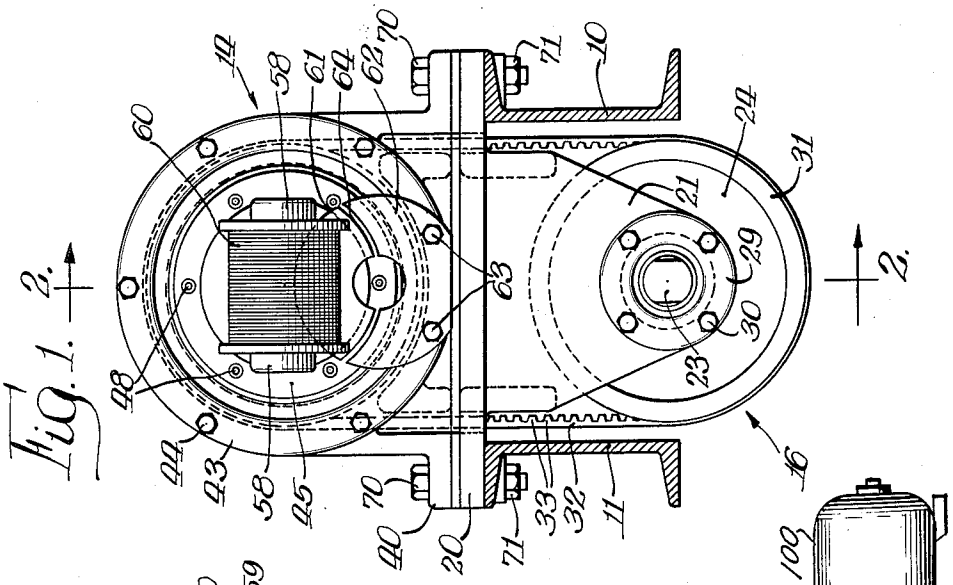
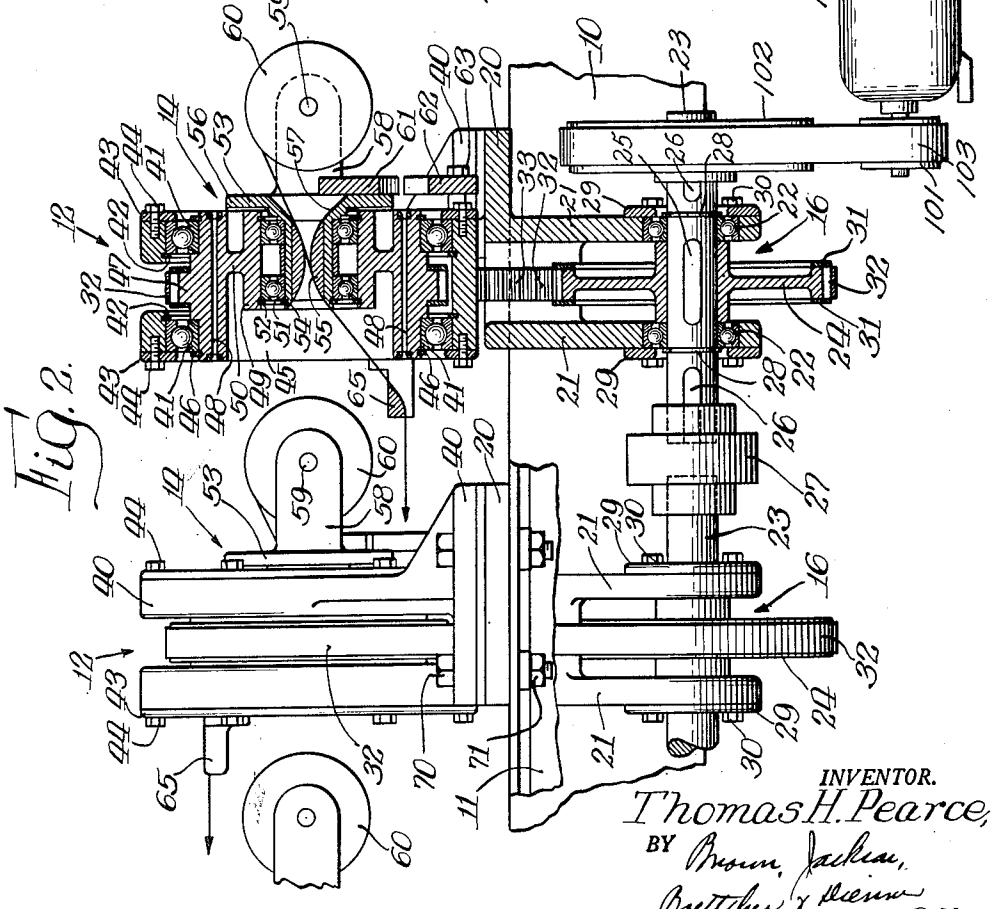


Fig. 2.



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WIRE LAYING MACHINE

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15 Claims. (Cl. 57—1)

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The present invention relates to an improvement in wire laying machines, and more particularly to machines of the type in which a plurality of wires are laid together without twisting thereof to form a strand.

Wire laying machines are well known in the art, earlier developments comprising a rotor having cradle means journaled therein, which cradle means provide for the support of supply spools of wire to be stranded. The conventional arrangement has been to suitably support the rotor for rotation, with the cradle means being arranged to be restrained against rotation with the rotor, so that the wires drawn off the supply spools are laid over each other by rotation of the rotor by means of a stranding head rotatable with the rotor. In these earlier machines, the spools have been supported in a long rotor which holds a plurality of spools. These rotors have imposed severe limitations on the speed at which the machines may be safely operated. Slowing down of the machines to safe operating limits sacrifices the production of linear feet of strand and, furthermore, in the event wire from one of the supply spools breaks, it is difficult to bring the rotor to a stop without entangling of the broken wire about the machine.

Recent developments in wire laying machines have sought to avoid the difficulties encountered with tubular rotors in order to increase the rate of production of strand. A departure from the conventional form of wire laying machine is disclosed in the patent to Albert G. Harmon, No. 2,499,246, which patent is assigned to the assignee of the instant application. In the patent referred to, the disadvantages of the described tubular rotor are avoided by dispensing with the tubular rotor and substituting therefor a pair of relatively small individual rotors driven in synchronism with one another in a suitable manner. The individual rotors are disposed at opposite ends of a stationary cradle carrying one or more spools of wire, preferably two spools of wire, one for each of the rotors. While providing substantial advantage over machines utilizing a tubular rotor, the patented device does not attain the ultimate in compactness and economy of construction of wire laying apparatus and does not present the ultimate in increased speed of production of strand.

It is an object of the present invention to provide an improved wire laying machine of more compact and economical construction and capable of greater speeds of operation than prior wire laying machines.

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Another object of the invention is the provision of an improved wire laying machine wherein the wire laying heads or rotors are in the form of individual units, which units may be individually associated with one another on a supporting frame and with a common drive means whereby a wire laying machine may be built up to form strand consisting of any desired number of individual wires.

A further object of the invention is the provision of an improved wire laying machine adapted for use in either a horizontal or vertical position, which machine consists of a plurality of individual rotor units having drive means associated therewith for individually driving the rotors of the units in synchronism.

Among the advantages of the present invention are the provision of an improved wire laying machine capable of forming strand consisting of any desired number of individual wires, closing strand in a rope to provide wire rope formed of a plurality of strands, each strand being formed of a plurality of individual wires, and operation of the rotors at increased speed to provide a high rate of production of strand or rope. Another advantage is the provision of a machine capable of convenient and ready assembly, disassembly and repair.

Other objects and advantages of the present invention will become apparent in the following detailed description of a preferred embodiment of the invention, wherein reference is made to the accompanying drawing, in which:

Figure 1 is an end elevation of one rotor unit of the wire laying machine of the present invention; and

Figure 2 is a side view of a portion of the wire laying machine of the present invention, the view showing one rotor unit in elevation and another rotor unit in section.

Referring now to the drawings, the wire laying machine of the present invention is shown as comprising a frame consisting of a pair of channel irons 10 and 11, which may be suitably mounted on other framework in either a horizontal or vertical position as desired, and a plurality of heads or rotor units 12 detachably secured to the frame members 10 and 11 in a manner to be described more fully hereinafter. Each of the rotor units 12 comprises a rotor portion 14 and a drive portion 16.

The drive portion 16 of each rotor unit 12 includes a frame 20 adapted to be suitably secured to the frame members 10 and 11 and having a pair of integral depending bearing plates 21.

The bearing plates 21 are each provided with an aperture for the reception of a bearing 22. The bearings 22 may be of any desired construction or form, but it is preferred that ball bearings be utilized as shown. A shaft 23 is rotatably supported by the bearings 22 and carries a pulley 24 positioned between the bearing plates 21. The shaft 23 is provided with flats 25 intermediate its ends by means of which the hub of the pulley 24 may be suitably secured to the shaft 23, as by having a set screw extend through the hub of the pulley into engagement with one of the flats 25 on the shaft 23. The shaft 23 is provided at each end with flats 26 adapted for the reception of a suitable coupling device 27 adapted to couple the drive shaft 23 of one rotor unit to the drive shaft 23 of a second rotor unit. The shaft 23 is suitably centered with respect to the bearings 22 by means of the hub of the pulley 24 engaging one side of the inner race of each of the bearings 22 and by means of C clamps 28 secured in peripheral grooves in the shaft and engaging the outer surface of the inner race of the bearings 22. The bearings 22 are retained in the bearing plates 21 by means of annular end plates 29 suitably secured to the bearing plates 21, as by means of bolts 30, and engaging the outer race of the bearings 22.

The pulley 24 is provided with spaced peripheral flanges 31 between which gear teeth are formed on the peripheral surface of the pulley 24. An endless belt 32 is mounted on the peripheral portion of the pulley 24 between the flanges 31 and is provided with gear teeth 33 adapted for engagement with the gear teeth formed on the pulley 24 to provide a positive driving connection between the belt and the pulley. The drive shaft 23 of any one of the rotor units 12 is adapted to be driven in a suitable manner by a power unit, such as an electric motor, or an electric motor and a power transmission, such as the motor 100, the pulleys 101 and 102 and the belt 103 shown by way of example in Figure 2 of the drawing. As shown, the pulley 102 is secured to the shaft 23 of one of the rotor units, the pulley 101 is secured to the shaft of the motor 100 and the belt 103 is reeved over the two pulleys. The mounting of the pulley 102 on the particular drive shaft shown is to be considered as being merely exemplary of the mounting of suitable drive means for the shafts, it being understood that the pulley may be suitably mounted on the drive shaft of any one of the units forming the complete wire laying machine assembly. As will be appreciated, other power drive means will suggest themselves to those skilled in the art. As shown, however, a common power unit or drive is employed and the individual drive shafts 23 are adapted to be coupled to or uncoupled from the drive shaft driven by the power unit so that each of the rotor units may be individually rendered operative or inoperative depending upon the type or form of strand to be laid by the machine.

The rotor portion 14 of each rotor unit 12 includes a frame 40 comprising a base portion and a pair of spaced circular portions formed integrally with the base and defining a bore for reception of a generally tubular rotor 45 as will presently appear. Each of the circular portions presents an aperture adapted for the reception of a bearing 41. The bearings 41 may be of any desired construction, but it is preferred that ball bearings be provided, as is shown in the drawings. The bearings 41 are retained in the circular apertures in the frame 40 at their inner

sides by means of a C ring 42 fitting within a peripheral groove in the inner wall of the circular portions of the frame 40. The bearings are retained from disassociation with the frame 40 by means of end plates 43, suitably secured to the frame as by means of bolts 44, and engaging the outer race of the bearings. The bearings 41 rotatably support a tubular rotor 45 co-axially of the axis of the bore of the frame 40. The rotor 45 at each end has a reduced cylindrical outer surface portion engaging the inner race of the ball bearings 41. The rotor 45 is maintained in aligned position with respect to the frame 40 and the bearings 41 by means of shoulders formed integrally with the rotor and engaging one side of the inner race of the ball bearings and by means of C rings 46 suitably positioned within peripheral grooves in the rotor 45 and engaging the outer surface of the inner race of the ball bearings 41. The rotor 45 is provided intermediate its ends with an external peripheral pulley portion 47 disposed between the spaced circular portions of the frame 40. The pulley portion 47 is provided with gear teeth in the same manner as the pulley 24, adapted for positive engagement with the teeth 33 on the pulley belt 32. The utilization of the drive means described and shown is preferred, but other drive means may be utilized if desired. Spaced inwardly from the peripheral extent of the rotor 45, a plurality of wire threading holes 48 are formed in the rotor and disposed in a circular path about the axis of the rotor. Any number of wire threading holes 48 may be provided as desired, six wire threading holes being shown in the drawings as equally spaced in a circular path in the rotor 45. The rotor 45 includes an inner cylindrical portion 49 integrally connected with the outer cylindrical portion thereof by means of a radial connecting flange 50. The inner cylindrical portion 49 is adapted for the reception of pair of bearings 51, which again are preferably ball bearings, secured within the cylindrical portion 49 by means of C rings 52 and a spacer between the bearings. The bearings 51 rotatably support a cradle means or wire guide and spool support 53.

The cradle means 53 comprises a generally cylindrical body 54 within which a wire guide member 55 is positioned. The wire guide 55 is in the form of a hardened cylindrical plug having a cross sectional internal configuration corresponding substantially to that of a venturi for the free and substantially frictionless guiding of a wire therethrough. A radial flange 56 is formed integrally with the cylindrical body portion 54 of the support member 53 at one end thereof and is adapted to rotatably engage the end wall of the inner cylindrical portion 49 of the rotor 45. The radial flange 56 of the support member 53 is provided with a conical aperture or bore 57 leading to the Venturi-like bore through the wire guide member 55. A pair of spaced spool supporting arms 58 extend outwardly from the flange 56 for the reception of an axle 59 upon which a spool of wire 60 may be mounted for free rotation.

In operation, as the rotor 45 is rotated, it is necessary to maintain the cradle 53 in a stationary position. While numerous methods of accomplishing this end are known, I prefer to utilize cooperating magnetic means secured to the spool support and to the rotor frame. Preferably, a permanent magnet 61 is suitably secured to the wire guide and spool support 53 in juxtaposed relation to a second permanent magnet 62 suitably secured to the frame 40, as by

means of bolts 63. The permanent magnets 61 and 62 define therebetween an arcuate gap or slot 64 aligned with the circular path of the wire threading holes 48 in the rotor 45, which slot or gap constitutes the flux path of the two magnets. Due to the attraction between the magnets, the cradle means or wire guide and spool support 53 will be maintained stationary while the rotor is rotated within the frame 40 and about the support member 53.

In use of the wire laying machine, a spool of wire 60 is rotatably mounted by means of the axle 59 on the spool supporting arms 58 and the wire thereof is threaded through the central bore of the wire guiding member 55. The wire is then led through a hardened wire guide head or pulley 65 secured to the rotor 55 in alignment with one of the holes 48 extending through the rotor. The wire guide head 65 comprises a generally U-shaped member adapted to be secured by the ends of the legs thereof to the face of the rotor 45 with the legs bridging one of the holes 48 in the rotor. The bight portion of the U-shaped guide head is provided at the side thereof facing radially outward with an arcuate surface upon which the wire is guided, as is clearly shown in the right hand rotor unit in Figure 2. The wire from each spool on each rotor unit of the wire laying assembly is threaded in a similar manner with the wire guide head 65 of each unit displaced with respect to the wire guide head 65 of all of the other units of the assembly and with the wire threading holes of the various units in alignment. As is shown in Figure 2, the wire from the unit shown in cross section is aligned with the lowermost of the wire threading holes 48 and is adapted to be threaded through the lowermost wiring threading hole in the rotor of the unit shown in side elevation and from thence through the same aperture in the next succeeding unit and so on to the end of the machine. The wire guide head 65 of the unit shown in side elevation in Figure 2 is aligned with the uppermost of the wire threading holes 48 and the wire guided thereby is adapted to be threaded through the uppermost wire threading hole in the next succeeding rotor unit and so on. Accordingly, in a complete wire laying machine assembly, six rotor units of the type shown may be provided, with a wire from each of the units extending through a separate wire threading hole 48 in each of the succeeding units with the six wires being brought together at the stranding head at the end of the machine where they are laid upon one another in a customary manner.

In operation, the drive shaft 23 of each of the units is driven from a common source of power so that the pulleys 24 on each of the shafts 23 are rotated in synchronism. Prior to setting the shafts 23 in rotation, the rotors of each of the units are positioned with respect to one another so that the wire guide head 65 of each of the units is displaced or angularly off-set with respect to the wire guide heads of the other units and so that the wire threading holes 48 of all of the units are in alignment with one another. As the pulleys 24 are rotated, the positive drive connection between the pulleys and the belt 32 effects a rotation of the belts and the rotors 45. Due to the frictionless journalling of the shaft 23 in the frame 20, the rotor 45 in the frame 40 and the support 53 in the rotor 45, the rotor is driven with minimum effort. As the rotors 45 revolve, in synchronism, the individual wires from each of the units travel in a circular path about the

rotor units forwardly thereof, due to their passage through the appropriate wire threading holes 48, about the wire spools 60 of each of the units and extend forwardly to the stranding head at which points the individual wires are brought together and laid upon one another.

In each of the units, the rotor 45 revolves within the frame 40, and about the wire guide and spool support 53, the spool support 53 being maintained stationary by means of the permanent magnets 61 and 62. Therefore, as the individual rotors revolve, the wire carried by that unit is moved in a somewhat circular path within the Venturi passage in the wire guide 55, but the frictional resistance to movement of the wire with respect to the guide 55 is not such as to effect movement of the spool support 53 or twisting of the wire. The surfaces of the wire guides 55 and 65 engaged by the wire are hardened to substantially reduce or eliminate wear thereof. As the wire from one unit is threaded through the appropriate hole 48 in the rotor of the next succeeding unit, it is revolved in a circular path by that unit so that the wire must pass through the arcuate gap 64 between the permanent magnets 61 and 62 of that unit. The arcuate gap 64 accommodates the free passage of the wire and the wire does not so cut or change the flux path between the magnets as to accommodate movement of the wire guide and spool support 53 with respect to the frame 40. In the case of the rotor unit immediately preceding the stranding head of the machine, several wires are revolved through the arcuate slot between the magnets in rapid succession, but the flux cutting effect of the wires is not sufficient to overcome the magnetic attraction of the magnets. However, should one of the wires become displaced with respect to the arcuate slot 64 between the magnets, the wire guide and spool support 53 is free to rotate under the compulsion of the revolving wire to permit the wire to free itself and to permit the support 53 to return to normal position without breaking that wire. Any slight rotation or oscillation imparted to the spool support will not be detrimental, so long as the spool be not rotated to such extent as to result in twisting of the wire fed from the spool 60 of the unit under consideration. The wires are drawn from the individual spools and threaded and revolved in the manner stated for passage to a stranding head by means of which the wires are stranded in a customary manner, the apparatus completing the machine being well known and not shown.

In use of the wire laying machine of the present invention, the rotor units 12 may be utilized in any desired number. That is, if a three strand wire is being formed, only three units need be utilized. Later, if the same machine is to be utilized for the formation of six wire strand, the same basic machinery may be utilized with the addition of three additional rotor units. The number of wire threading holes 48 in the rotor units may be varied as desired to render the assembly capable of production of strand having any number of wires. The rotor units 12 may be permanently associated with the frame in spaced aligned relation and may be individually coupled to, or uncoupled from, other rotor units, as desired, by means of the coupling devices, 27, or the rotor units may be removably mounted on the frame members 10 and 11 for addition to or removal from the complete machine, as desired. The detachable mounting of the power units 12 on the frame members 10 and 11 may be con-

veniently accomplished by providing flanges on the frames 20 and 40 and suitably securing the flanges together. The complete units may then be individually associated with the frame members 10 and 11 by extending bolts 70 through suitable apertures or bores in the flanges of each of the frames 20 and 40 in the flange presented by the channel frame members 10 and 11 and securing the frame members 20 and 40 to the frame channels 10 and 11 by means of nuts 71 threaded to the bolts 70.

From the foregoing, it will be apparent that the present invention provides a wire stranding machine formed of a plurality of individual wire laying and spool supporting units, each provided with its own drive assembly adapted to be selectively coupled to a power unit common to all of the rotor units. The rotor units of the present invention provide individual small rotors which may be operated at high speed due to their relatively slight mass and compact structure so that the rate of production of strand may be appreciably increased over that previously accomplished. Due further to the compact structure of the rotor units, the units may be mounted close to one another to provide a complete machine assembly of relatively small size. In addition, the present invention provides a compact and economical wire laying machine adapted to form strand of any number of individual wires or to form rope from a plurality of strands, the number of strands and the number of wires in each strand being variable within wide limits.

While I have described what I regard to be a preferred embodiment of my invention, it will be appreciated that various changes, rearrangements and modifications may be made therein without departing from the scope of the invention, as defined by the appended claims.

I claim:

1. In a wire laying machine, the combination of frame means and a plurality of individual rotor units detachably secured to said frame means in aligned spaced relation, each unit comprising a frame adapted to be secured to said frame means, a rotor journaled in said frame, a drive shaft journaled in said frame in spaced parallel relation to the axis of rotation of said rotor, cradle means journaled in said rotor, means for restraining movement of said cradle means with respect to said frame and drive means between said drive shaft and said rotor, the drive shaft of each of said units being adapted to be selectively coupled to the drive shaft of an adjacent unit, and means for rotating the drive shafts of said units in synchronism.

2. In a wire laying machine, the combination of frame means and a plurality of individual rotor units detachably secured to said frame means in aligned spaced relation, each unit comprising a frame adapted to be secured to said frame means, a rotor journaled in said frame, a drive shaft journaled in said frame in spaced parallel relation to the axis of rotation of said rotor, cradle means journaled in said rotor, means for restraining movement of said cradle means with respect to said frame and drive means between said drive shaft and said rotor, detachable coupling means for connecting the drive shafts of adjacent rotor units, and means for rotating the drive shaft of one of said units.

3. In a wire laying machine, a rotor unit comprising a drive section and a rotor section, a frame for each of said sections, a drive shaft rotatably supported by the frame for said drive section, a single pulley secured to said drive shaft, a single rotor rotatably supported by the frame for said rotor section and presenting a pulley surface, an endless belt trained over said pulley and the pulley surface of said rotor, a wire guide and spool support rotatably mounted and having its sole support on said rotor, and means restraining said support against rotation with respect to said frames, whereby said pulley and rotor are free to rotate with respect to said support and said frames.

4. In a wire laying machine, a plurality of rotor units disposed in aligned spaced relation, each unit comprising a drive section and a rotor section, a frame for each of said sections, a drive shaft rotatably supported by the frame for said drive section, a pulley secured to said drive shaft, a rotor rotatably supported by the frame for said rotor section and presenting a pulley surface, an endless belt trained over said pulley and the pulley surface of said rotor, a wire guide and spool support rotatably mounted on said rotor, a first permanent magnet secured to said frames and a second permanent magnet secured to said rotor and aligned with said first magnet for restraining said support against rotation with respect to said frames, means for selectively coupling and uncoupling the drive shafts of the plurality of units, and means for driving the shaft of one of said units.

5. In a wire laying machine, a plurality of rotor units disposed in aligned spaced relation, each unit comprising a drive section and a rotor section, frame means for said sections, a rotor rotatably supported by said frame means, a drive shaft rotatably supported by said frame means in spaced parallel relation to the axis of rotation of said rotor, a pulley secured to said drive shaft, said rotor presenting a pulley surface aligned with said pulley, an endless belt trained over said pulley and the pulley surface of said rotor, a wire guide and spool support rotatably mounted on said rotor, magnetic means secured to said frame means, magnetic means secured to said support in alignment with the magnetic means on said frame means for restraining said support against rotation with respect to said frame means, said rotor having a plurality of wire threading holes therein disposed in a circular path about the rotor axis, said magnetic means having an arcuate gap therebetween aligned with the circular path of said holes, means for selectively coupling and uncoupling the drive shafts of the plurality of units, and means for driving the shaft of one of said units.

6. In a wire laying machine, a plurality of synchronously driven rotor units disposed in aligned spaced relation, each unit comprising frame means, a rotor journaled on said frame means, cradle means journaled in said rotor with its axis aligned with the axis of rotation of said rotor, a spool adapted to carry a coil of wire mounted on said cradle means with its axis extending transversely of the axis of rotation of said rotor, a wire guide head on said rotor between the axis of rotation and the periphery thereof, a wire guide carried by said cradle for guiding wire from said spool to said head, said rotor having a plurality of holes therein disposed in a circular path about the axis of rotation of said rotor outwardly of said cradle means, said head being aligned with one of said holes, the other of said holes being adapted for the reception of wires from other rotor units, first magnetic means fixed to said cradle means, and second magnetic means

fixed to said frame means in alignment with said first magnetic means for preventing rotation of said cradle means with respect to said frame means, said magnetic means being spaced apart to provide a gap therebetween aligned with the circular path of disposition of said holes for passage of wires received in said other holes from other rotor units.

7. In a wire laying machine, a plurality of synchronously driven rotor units disposed in aligned spaced relation, each unit comprising frame members, a rotor journaled on said frame means, cradle means journaled in said rotor with its axis aligned with the axis of rotation of said rotor, a spool adapted to carry a coil of wire mounted on said cradle means, a wire guide head on said rotor between the axis of rotation and the periphery thereof, a wire guide carried by said cradle for guiding wire from said spool to said head, said rotor having a plurality of holes therein disposed in a circular path about the axis of rotation of said rotor outwardly of said cradle means, said head being aligned with one of said holes, the other of said holes being adapted for the reception of wires from other rotor units, a first permanent magnet fixed to said cradle means, and a second permanent magnet fixed to said frame means in alignment with said first magnetic means for preventing rotation of said cradle means, said permanent magnets being spaced apart to provide an arcuate gap therebetween aligned with the circular path of disposition of said holes for passage of wires received in said other holes from other rotor units.

8. In a wire laying machine, a plurality of synchronously driven rotor units disposed in aligned spaced relation, each unit comprising frame means, a rotor journaled on said frame means, cradle means journaled in said rotor with its axis aligned with the axis of rotation of said rotor, a spool adapted to carry a coil of wire mounted on said cradle means, a wire guide head on said rotor between the axis of rotation and the periphery thereof, a wire guide carried by said cradle for guiding wire from said spool to said head, said rotor having a plurality of holes therein disposed in a circular path about the axis of rotation of said rotor outwardly of said cradle means, said head being aligned with one of said holes, the other of said holes being adapted for the reception of wires from other rotor units, first magnetic means fixed to said cradle means, and second magnetic means fixed to said frame means in alignment with said first magnetic means for preventing rotation of said cradle means, said magnetic means being spaced apart to provide a gap therebetween aligned with the circular path of disposition of said holes for passage of wires received in said holes from other rotor units, the wire threading holes in each of the rotor units being aligned and the wire guide head of each unit being angularly off-set with respect to the wire guide heads of the other units of the machine.

9. In a wire laying machine, a plurality of synchronously driven rotor units disposed in aligned spaced relation, each unit comprising frame means, a rotor journaled on said frame means, cradle means journaled in said rotor with its axis aligned with the axis of rotation of said rotor, a spool adapted to carry a coil of wire mounted on said cradle means, a wire guide head on said rotor between the axis of rotation and the periphery thereof, a wire guide carried by said cradle means for guiding wire from said spool to said head, said rotor having a plurality of holes therein disposed in a circular path about the aixs of rotation of said rotor outwardly of said cradle means, said head being aligned with one of said holes, the other of said holes being adapted for the reception of wires from other rotor units, first magnetic means fixed to said cradle means, and second magnetic means fixed to said frame means in alignment with said first magnetic means for preventing rotation of said cradle means, said magnetic means being spaced apart to provide a gap therebetween aligned with the circular path of disposition of said holes for passage of wire received in said other holes from other rotor units, the wire threading holes in each of the rotor units being aligned and the wire guide head of each unit being angularly off-set with respect to the wire guide head of the other units of the machine, and means for driving said rotors in synchronism.

10. In a wire laying machine, the combination of frame means, a plurality of individual rotor units detachably secured to said frame means in aligned spaced relation, each unit comprising a frame adapted to be secured to said frame means, a rotor journaled in said frame, cradle means journaled in said rotor with its axis aligned with the axis of rotation of said rotor, a spool adapted to carry a coil of wire mounted on said cradle means, a wire guide head secured to said rotor between the axis of rotation and the periphery thereof, a wire guide carried by said cradle means for guiding wire from said spool to said head, said rotor having a plurality of holes therein disposed in a circular path about the axis of rotation of said rotor outwardly of said cradle means, said head being aligned with one of said holes, the other of said holes being adapted for the reception of wires from other rotor units, first magnetic means fixed to said cradle means, and second magnetic means fixed to said frame means in alignment with said first said magnetic means for preventing rotation of said cradle means, said magnetic means being spaced apart to provide a gap therebetween aligned with the circular path of disposition of said holes for passage of wire received in said other holes from other rotor units, the wire threading holes in each of the rotor units being aligned and the wire guide head of each unit being angularly off-set with respect to the wire guide head of each of the other units in the machine, a drive shaft journaled in said frame in spaced parallel relation to the axis of rotation of said rotor, means for selectively coupling the drive shaft of one rotor unit with the drive shaft of adjacent rotor units, and means for rotating the drive shaft of one of said units.

11. In a wire laying machine, the combination of frame means and a plurality of individual rotor units detachably secured to said frame means in aligned spaced relation, each unit comprising a frame adapted to be secured to said frame means, a rotor journaled in said frame, cradle means journaled in said rotor with its axis aligned with the axis of rotation of said rotor, a spool adapted to carry a coil of wire mounted on said cradle means, a wire guide head secured to said rotor between the axis of rotation and the periphery thereof, a wire guide carried by said cradle means for guiding wire from said spool to said head, said rotor having a plurality of holes therein disposed in a circular path about the axis of rotation of said rotor outwardly of said cradle means, said head being

aligned with one of said holes, the other of said holes being adapted for the reception of wires from other rotor units, first magnetic means fixed to said cradle means, and second magnetic means fixed to said frame means in alignment with said first magnetic means for preventing rotation of said cradle means, said magnetic means being spaced apart to provide a gap therebetween aligned with the circular path of disposition of said holes for passage of wires received in said other holes from other rotor units, the wire threading holes in each of the units being aligned and the wire guide head of each unit being angularly off-set with respect to the wire guide head of the other units of the machine, a drive shaft journaled in said frame in spaced parallel relation to the axis of rotation of said rotor, a pulley fixed to said drive shaft, said rotor having a pulley portion on its periphery aligned with said pulley, an endless belt trained over said pulley and over the pulley surface of said rotor, means for selectively coupling the drive shaft of one unit to the drive shaft of an adjacent unit, and means for rotating the drive shaft of one of said units, the pulley surface of the rotor and the endless belt of each unit being identical whereby the rotors of said units are driven synchronously.

12. In a wire laying machine, a rotor unit comprising a frame having a bore therein, a generally tubular rotor rotatably supported in said bore on said frame, a cradle having a portion thereof rotatably mounted within and on said rotor and having a portion projecting outwardly beyond said rotor and said frame, a spool adapted to carry a coil of wire mounted on said projecting portion of said cradle, a wire guide head on said rotor, and a wire guide mounted on said cradle for guiding wire from said spool to said head.

13. In a wire laying machine, a rotor unit comprising a frame having a bore therein, a generally tubular rotor rotatably supported coaxially of and in said bore on said frame, a generally tubular cradle having a portion thereof rotatably supported within and on said rotor and having a portion projecting outwardly beyond said rotor and said frame, a spool adapted to carry a coil of wire mounted on said projecting portion of said cradle, a wire guide head secured to said rotor between the axis of rotation and the periphery thereof, said wire guide head being mounted to the exterior of said rotor at the side thereof opposite said spool, a hollow wire guide mounted in the interior of said cradle for guiding wire from said spool through said cradle and said rotor to said head, said rotor having a plurality of holes therein disposed in a circular path about the axis of rotation of said rotor outwardly of said cradle, said head being aligned with one of said holes, and means associated with said cradle and said frame for restraining rotation of said cradle with respect to said frame.

14. In a wire laying machine, the combination of first frame means and a plurality of individual rotor units detachably secured to said first frame means in aligned spaced relation, each unit comprising second frame means adapted to be secured to said first frame means, a rotor journalled in said second frame means, cradle means journalled in said rotor and means for restraining movement of said cradle means with respect to said second frame means, drive shaft means rotatably supported in spaced parallel relation to the axis of rotation of the rotors of said units, identical drive means between said drive shaft means and each of said rotors, and means for rotating said drive shaft means, whereby said rotors are rotated in synchronism.

15. In a wire laying machine, a plurality of rotor units disposed in aligned spaced relation each unit comprising frame means, a rotor rotatably supported by said frame means, a wire guide and spool support rotatably mounted on said rotor, magnetic means secured to said frame means and magnetic means secured to said support in alignment with the magnetic means on said frame means for retaining said support against rotation with respect to said frame means, said rotor having a plurality of wire threading holes therein disposed in a circular path about the rotor axis, said magnetic means having an arcuate gap therebetween alignment with the circular path of said holes, drive shaft means supported for rotation in spaced parallel relation to the axis of rotation of said rotor, a pulley secured to said drive shaft means adjacent the rotor of each unit, each rotor presenting a pulley surface aligned with the pulley adjacent thereto, an endless belt trained over each of said pulleys and the pulley surface of the adjacent rotor, and means for driving said drive shaft means whereby the rotors of said units are rotated in synchronism.

THOMAS H. PEARCE.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
2,416,126	Somerville	Feb. 18, 1947
2,485,348	Arnason	Oct. 18, 1949
2,499,246	Harmon	Feb. 28, 1950