Jan. 2, 1968 H. BURR 3,360,919

STRANDING APPARATUS

Filed Oct. 8, 1965 2 Sheets-Sheet 1

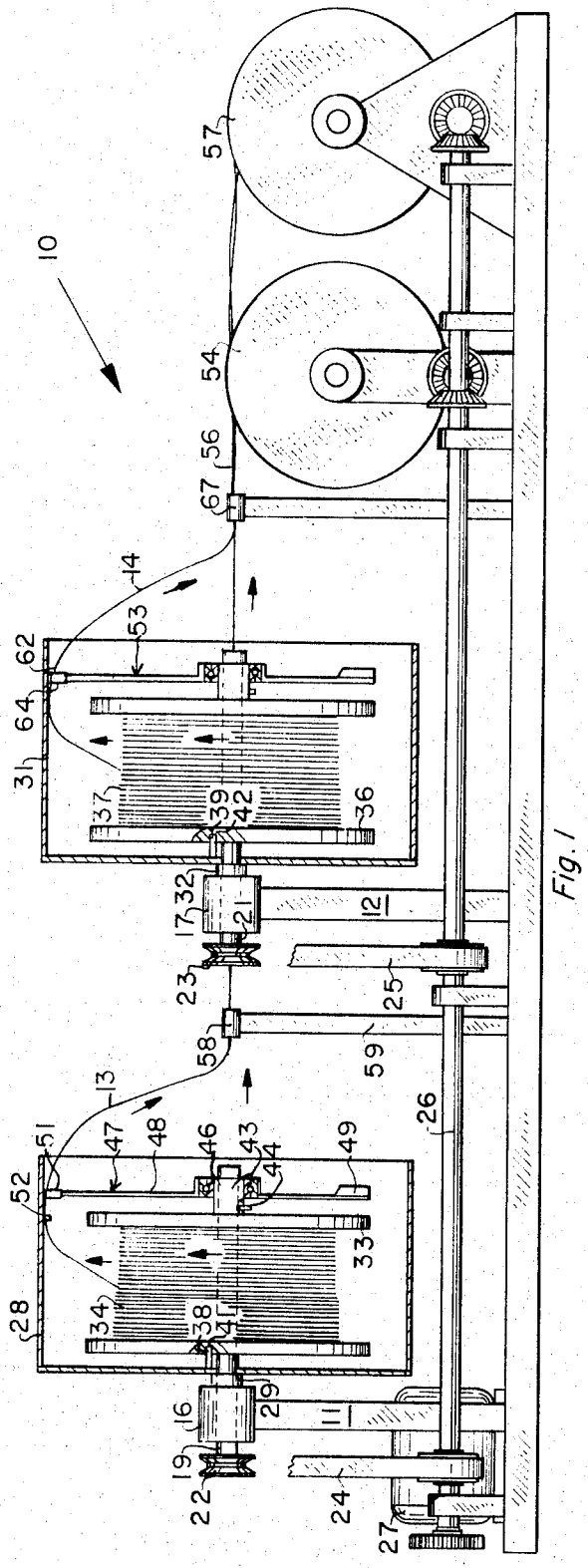


Fig. 1

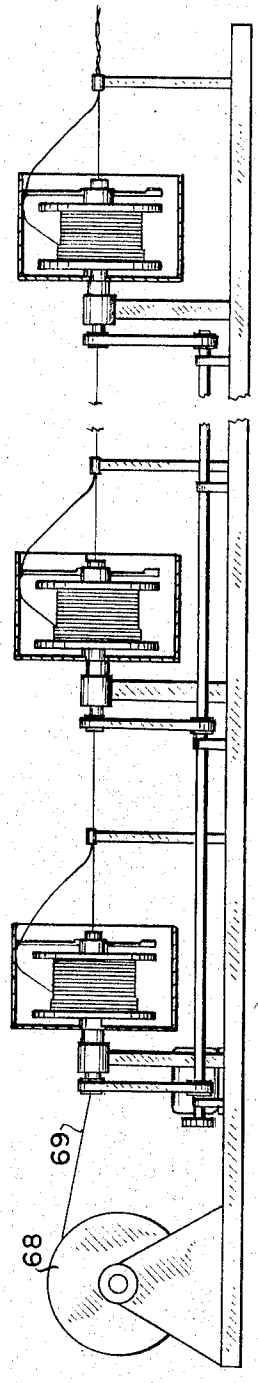


Fig. 2

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STRANDING APPARATUS

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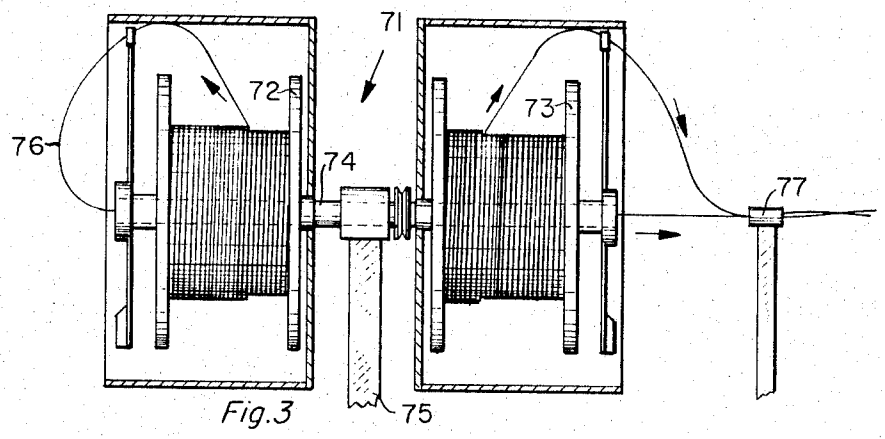


Fig. 3

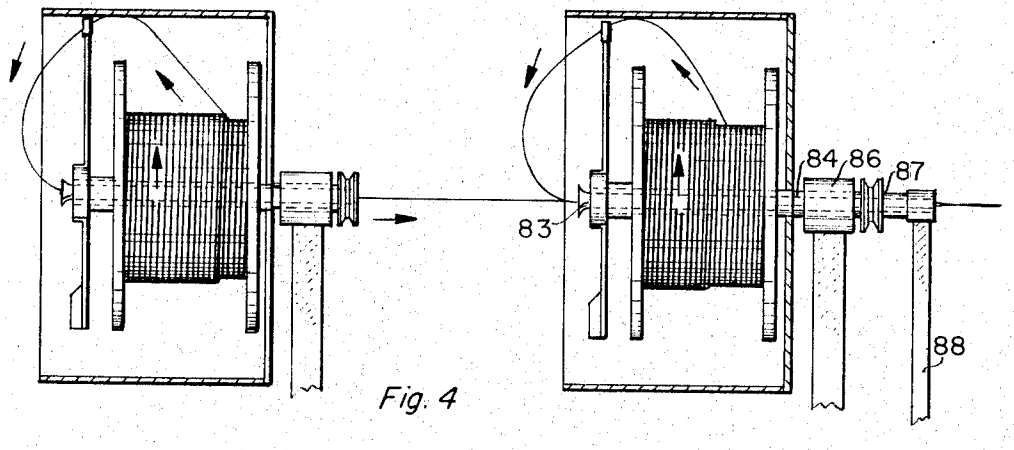


Fig. 4

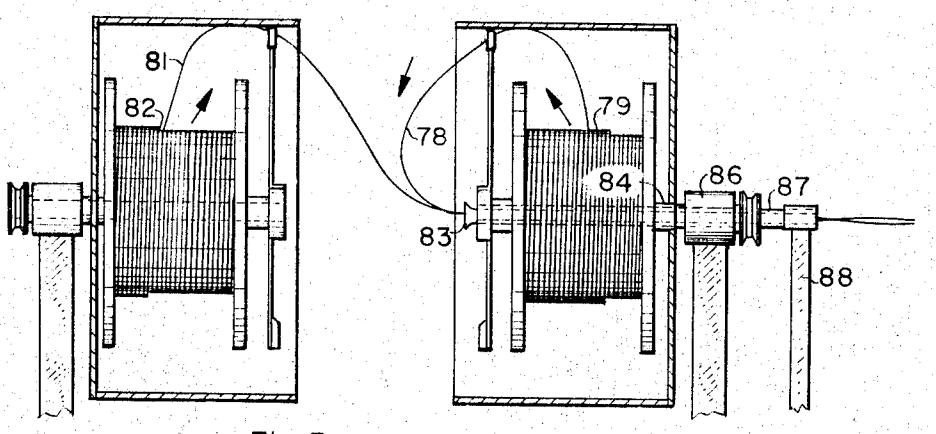


Fig. 5

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STRANDING APPARATUS

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6 Claims. (Cl. 57—59)

ABSTRACT OF THE DISCLOSURE

Stranders for insulated wire pay the wire from coils mounted on cantilevered rotating shafts on which are mounted flyers that rotate with the shafts and rotating hoods that surround both the flyers and the coils. The shafts are hollow, and the strands pass through their centers.

My invention relates to apparatus for wire stranding and particularly to such apparatus wherein the wire is withdrawn over the side of the supply coil.

Stranding machines for wire and other filaments may be classed in two basic types: those in which the supply is rotated to provide the necessary twist, and those in which the twisting is accomplished by rotating the take-up means.

Since the reel on which the twisted strand is taken up is commonly larger and heavier than the individual supply reels, the first type of strander has the advantage that the rotating elements may be lighter and have a smaller diameter than the second type, and the present invention is directed toward a novel strander of the type in which the supply is rotated to provide the necessary twist.

I propose by my invention to provide a strander capable of operating at very high speed.

I further propose by my invention to provide a strander that does not apply excessive tension to the strands. For this reason, among others, my strander is particularly useful for twinning telephone conductors in the manufacture of twisted pairs.

I propose by my invention to provide a high-speed strander capable of handling a large supply of strand without reloading.

I further propose by my invention to provide a strander which can be quickly and easily loaded.

And I further propose by my invention to provide a strander that is simple, and economical to build.

In accordance with the aforesaid purposes my strander comprises at least one cantilever means supporting a coil of a first elongated strand rotatable around a horizontal axis, means rotatingly driving the coil, and flyer means rotating around this axis guiding the strand from the coil. It also comprises a strand-confining hood surrounding the coil and, preferably, rotating around the axis, means dispersingly supporting a supply of a second elongated strand, means guiding the second strand through the coil, a forming die, and means advancing the first and second strands through the die with the strands being twisted in the die.

In certain embodiments my strander comprises a plurality of supporting means, which may be standards, consecutively disposed in upstream and downstream relation and a like plurality of shafts each mounted on one of the supporting means. The shafts are horizontally positioned along a common axis with each of the shafts cantilevered to project down-stream of its respective supporting means and at least those of said shafts downstream of the furthest upstream of the shafts are hollow. There are means for rotating coils of strands around each of the shafts which may comprise having the shafts mounted in journals and providing means to rotate the shafts. There are means guiding the strands through the downstream shafts and a plurality of flyer means, each rotatable around one of the shafts guiding loops of the strands from the coils. My strander comprises hoods surrounding each of the shafts and confining the strand loops. Preferably, the hoods are rotated with the shafts. There is also a forming die mounted downstream of the furthest downstream of the shafts, on the line of the axis of the shafts, and means advancing the strands through the die where they are twisted together.

An embodiment of my strander comprises a twinner comprising a journal mounted on supporting means with a shaft rotatably mounted in the journal and projecting from both ends sufficiently to support two coils of strand. The flyers are mounted at both ends of the shaft and there are means guiding the strand from the upstream coil back through the shaft. Another embodiment, which comprises a plurality of standards, and shafts rotatably mounted on the standards, has the shafts cantilevered to project upstream of their respective standards, and means guiding the strands back through their coils.

An embodiment of my strander comprises a twinner with the shafts cantilevered to project toward each other between the standards and means guiding both strands through the downstream coil.

A more thorough understanding of my invention may be gained from a study of the appended drawing.

In the drawing:

FIGURE 1 shows a side view, partly in section, of an apparatus of my invention.

FIGURE 2 shows a side view of another embodiment of my invention.

FIGURE 3 shows a side view of still another embodiment of my invention.

FIGURE 4 shows a side view of still another embodiment of my invention.

FIGURE 5 shows a side view of still another embodiment of my invention.

Referring to FIGURE 1, a strander, indicated generally by the numeral **10**, comprises two standards **11**, **12** mounted in an upstream and downstream relation, the standard **11** being upstream. The strander **10** comprises only two standards for stranding together two insulated telephone wires **13**, **14**. It is therefore within the class of stranders commonly referred to as "twinners." My invention is not limited to twinners, however, as may be seen in the embodiment of FIGURE 2. Particularly, for twisting telephone conductors, it will have applicability for quadders. Nor is my invention confined to apparatus for telephone conductors, or even insulated wires but may be used for twisting bare wires to form a stranded conductor or for plastic or textile strands. A journal **16** is mounted on the standard **11** and a journal **17** is mounted on the standard **12**. A shaft **19** is cantilevered in the journal **16** and a shaft **21** is similarly cantilevered in the journal **17** so that each of the shafts has its greater length protruding downstream of its respective journal. The upstream ends of the shafts **19**, **21** are fitted respectively with pulleys **22**, **23** and drive belts **24**, **25** by means of which the shafts are driven in rotation from a line shaft **26** driven, in turn, by a motor **27**. A cylindrical hood **28** is rigidly locked to the shaft **19** by means of a collar **29** so that the hood rotates along with the shaft. And, similarly a hood **31** is locked to the shaft **21** with a collar **32**. The hood **28** is large enough to cover a reel **33** which holds a coil **34** of the wire **13** and the hood **31** covers a similar reel **36** holding a coil **37** of the strand **14**. Pins **38**, **39** projecting from the backs of the hoods **28**, **31** fit into holes **41**, **42** in the flanges of the reels **33**, **36** to drive the reels around with the shafts. The reel **33** is locked onto the shaft **19** by means of a collar **43** that is fastened to the shaft with a set screw **44**. The collar **43** is grooved for a ball race **46** which supports a flyer **47** free to rotate therearound. The flyer **47** has an arm **48** and a counterweight **49**. An

eyelet 51 serves to guide the strand 13 in a loop 52 as it is pulled from the coil 34. A similar flyer 53 is used to guide the strand 14. The strands are pulled from the reels 33, 36 by a capstan 54 acting on a twisted pair 56 into which the strands are twisted in the stranding operation. The twisted pair 56 is finally taken up on a reel 57, both the capstan 54 and reel 57 being driven from the line shaft 26 in a known manner. Although the illustrated embodiment has a capstan and take-up it will be understood that the strander of my invention may pay directly into some subsequent operation such as extruding or cabling. A grommet 58 mounted on a standard 59 in the line of the axis of the shafts 19, 21 serves as guide means for guiding the strand 13 through the shaft 21 which is hollow. For the sake of uniformity in fabrication the shaft 19 may also conveniently be hollow but this is not necessary for the successful operation of my strander. The shaft 19 is the furthest upstream of the shafts and only the shafts downstream of the furthest upstream need be hollow to permit the passage of the upstream strands through them.

In leaving the reels 33, 36 the strands 13, 14 form loops 52, 64 guided by the eyelet 51 and a similar eyelet 62 in the flyer 53. The loops tend to increase in size but are restrained by the hoods 28, 31. Abrasion of the surface of the strands is minimized by having the hoods rotate with the shafts 19, 21 so that the only circumferential abrasion on the strands is due to the rotation of the loops as they unwind from the reel. In cases where rubbing of the strands against the hoods is inconsequential either because of the toughness of the strands or their low mass, the hoods 28, 31 may be held stationary. The shafts are rotating counterclockwise, looking downstream, so that the top section of the hoods 28, 31, as seen in the drawing, are moving away from the observer into the plane of the drawing. The coils are wound clockwise (looking downstream) on the reels so that they unwind counterclockwise. This means that the flyer 47, and the similar flyer 53 associated with the reel 36 are rotating at a speed greater than the speed of rotation of the shafts and reels, the difference in speed being required to unwind the strands from the reels. I have found that this means of operation is capable of withdrawing strand smoothly at very high speeds. A means of operation in which the flyer rotates at a slower speed than the reels will not perform satisfactorily.

The strand 14 is brought in contact with the strand 13 which has passed through the shaft 21, and thus through the coil 37, at a forming die 67 mounted in the line of the axis of the shafts 19, 21. The two wires within the die 67 are twisted due to the rotation of the coils 34, 37 and flyers 47, 53 to form the twisted pair 56. The length of lay of the twist depends, in a known manner, on the speed of rotation of the capstan 54 compared to the speed of rotation of the coils.

Other possible embodiments of my invention are shown in FIGURES 2–5.

In FIGURE 2 a reel 68 that is furthest upstream is not rotated while the rotation of the downstream reel serves to wrap the downstream strands around a strand 69 from the reel 68. When the downstream reels are six in number this embodiment of my invention has particular utility for the manufacture of seven-strand cable.

In FIGURE 3 I have shown a twinner indicated generally by the numeral 71 wherein two reels 72, 73 are supported on a single shaft 74 rotatably mounted on a standard 75. In this case a strand 76 is removed from the upstream reel 72 and looped back through the center of the same reel while the strand from the downstream reel 73 is handled in the same manner as the strand from the reel 36 of FIGURE 1. Both strands are twisted in a forming die 77 as before.

In the strander of FIGURE 4, both the upstream and downstream reels have the strands looped back through their own coils. And in FIGURE 5 I show a strander that accommodates the loops from two strands by looping a strand 78 from a downstream coil 79 back through the coil while a strand 81 from an upstream coil 82 is handled in the manner of the strand of FIGURE 1. In FIGURES 4 and 5 a forming die 83 fits into the upstream end of a hollow shaft 84 rotating in a journal 86. The die 83 may be held stationary by a non-rotating tube 87 that fits through the shaft 84 and is supported by a standard 88, or it might be mounted similarly to the die 67 (FIGURE 1).

The embodiments of my invention described hereinabove have been exemplary rather than definitive and other embodiments coming within the scope of my invention are defined by the appended claims.

I claim:

1. A strander for insulated wire comprising:
(A) a plurality of supporting means consecutively disposed in upstream and downstream relation,
(B) a like plurality of shafts
  (a) each mounted on one of said supporting means,
  (b) said shafts being horizontally positioned along a common axis,
  (c) each of said shafts being canilevered to project downstream of its respective supporting means,
  (d) at least those of said shafts downstream of the furthest upstream of said shafts being hollow,
(C) means for rotating coils of insulated wires around each of said shafts,
(D) means guiding said insulated wires through the downstream shafts,
(E) a plurality of flyer means,
  (a) each comprising an arm mounted to rotate freely on one of said shafts,
  (b) guiding loops of said insulated wires from said coils,
(F) a plurality of hoods
  (a) each surrounding one of said shafts and said flyers and
  (b) confining said loops,
(G) a forming die
  (a) mounted in the line of said axis
  (b) downstream of the furthest downstream of said shafts, and
(H) means advancing said insulated wires through said die, said insulated wires being twisted together in said die.

2. A strander for insulated wires comprising:
(A) a plurality of standards,
(B) a like plurality of journals individually mounted on said standards,
(C) a like plurality of shafts
  (a) rotatably mounted in said journals along a common axis,
  (b) at least those of said shafts downstream of the furthest upstream of said shafts being hollow,
(D) means rotating said shafts,
(E) a like plurality of hoods individually mounted on said shafts and rotating therewith,
(F) a like plurality of reels holding coils of insulated wire individually mounted on said shafts within said hoods and rotating therewith,
(G) a like plurality of flyers comprising arms mounted on said shafts and rotating freely around said axis within said hoods and guiding said insulated wires from said reels,
(H) means guiding said insulated wires through said hollow shafts,
(I) a forming die mounted on said axis, and
(J) means advancing said insulated wires through said die, said insulated wires being twisted together in said die.

3. A strander for insulated wires comprising:
(A) a plurality of supporting means consecutively disposed in upstream and downstream relation,
(B) a like plurality of journals individually mounted on said supporting means,
(C) a like plurality of shafts
(a) rotatably mounted in said journals,
(b) at least those of said shafts downstream of the furthest upstream of said shafts being hollow,
(c) said shafts having a common horizontal axis, and
(d) each of said shafts being cantilevered to project downstream of its respective supporting means,
(D) means rotating said shafts,
(E) a plurality of flyer means, each comprising an arm mounted upon and freely rotatable around one of said shafts,
(F) a plurality of hoods
(a) each surrounding one of said shafts and said flyer means and
(b) rotating therewith,
(G) a forming die
(a) mounted in the line of said axis
(b) downstream of the furthest downstream of said shafts, and
(H) means advancing said insulated wires through said die.

4. A twinner for insulated telephone wires comprising:
(A) supporting means,
(B) a journal mounted on said means,
(C) a shaft rotatably mounted in said journal and
(a) projecting from both ends of said journal sufficiently to support two coils of said telephone wires,
(b) said shaft being hollow,
(D) means rotating said shaft,
(E) flyers comprising arms mounted upon both ends of said shaft for guiding telephone wires from said coils,
(F) a plurality of hoods
(a) rotatably mounted on said shaft,
(b) surrounding said coils and said flyers,
(G) means guiding the telephone wires from the upstream of said coils back through said shaft,
(H) a forming die
(a) mounted on the axis of rotation of said shaft,
(b) downstream thereof, and
(I) means advancing said telephone wires from said coils through said die, said telephone wires being twisted in said die.

5. A strander for insulated wires comprising:
(A) a plurality of standards,
(B) a like plurality of journals individually mounted on said standards,
(C) a like plurality of hollow shafts
(a) rotatably mounted in said journals along a common axis,

(b) said shafts being cantilevered to project upstream of their respective standards,
(D) means rotating said shafts,
(E) a like plurality of hoods individually mounted on said shafts and rotating therewith,
(F) means mounting a like plurality of coils of insulated wire on said shafts within said hoods and rotating therewith,
(G) a like plurality of flyers comprising arms mounted upon and freely rotating around said shafts within said hoods and guiding said insulated wires from said coils,
(H) means guiding each insulated wire back through its respective coil,
(I) a forming die mounted on the line of said axis, and
(J) means advancing said insulated wire through said die, said insulated wires being twisted together in said die.

6. A twinner for insulated telephone wires comprising:
(A) two standards,
(B) two journals individually mounted on said standards,
(C) two shafts
(a) rotatably mounted in said journals along a common axis,
(b) said shafts being cantilevered to project towards each other between said standards,
(D) means rotating said shafts,
(E) hood means mounted on said shafts and rotating therewith,
(F) means mounting two coils of insulated telephone wires on said shafts within said hood means and rotating therewith,
(G) two flyers comprising arms mounted upon and freely rotating around said shafts and guiding said telephone wires from said coils,
(H) means guiding both telephone wires through the downstream of said coils, and
(I) means advancing said telephone wires.

References Cited

UNITED STATES PATENTS

1,748,119	2/1930	Firtion	57—18
2,276,797	3/1942	Schlums	57—16
2,782,590	2/1957	Lowe	57—58.55 X
2,826,035	3/1958	Cogger	57—63 X
3,119,224	1/1964	Kocks	57—58.52
3,124,923	3/1964	Volk	57—17
3,124,924	3/1964	Smith	57—18

FOREIGN PATENTS

915,345	7/1946	France.
942,211	11/1963	Great Britain.
531,319	8/1955	Italy.

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