S. J. SILL.

MACHINE FOR REINFORCING HOSE.

APPLICATION FILED DEC. 9, 1911.

1,149,224.

Patented Aug. 10, 1915.

4 SHEETS—SHEET 1.

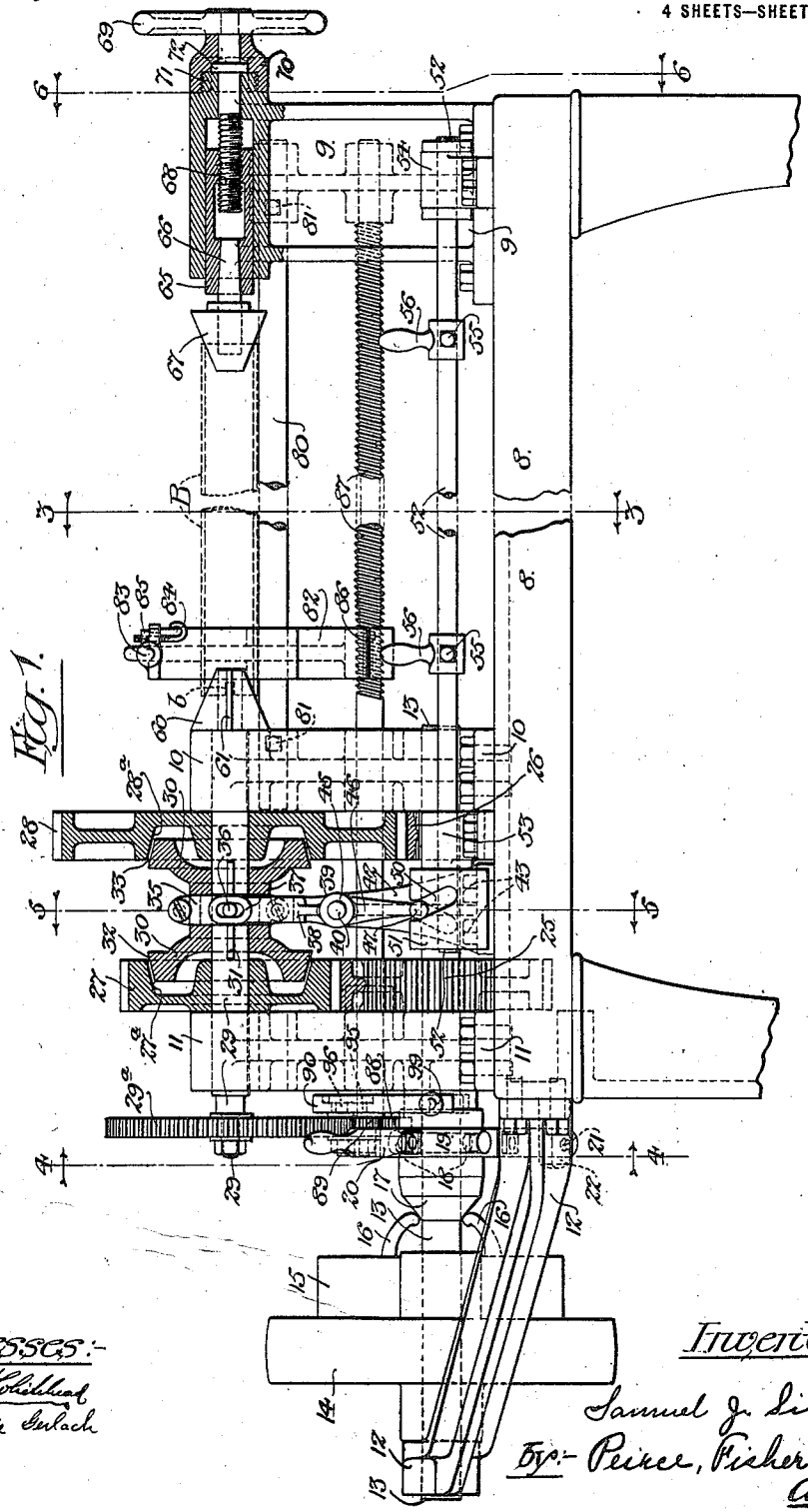


Fig. 1.

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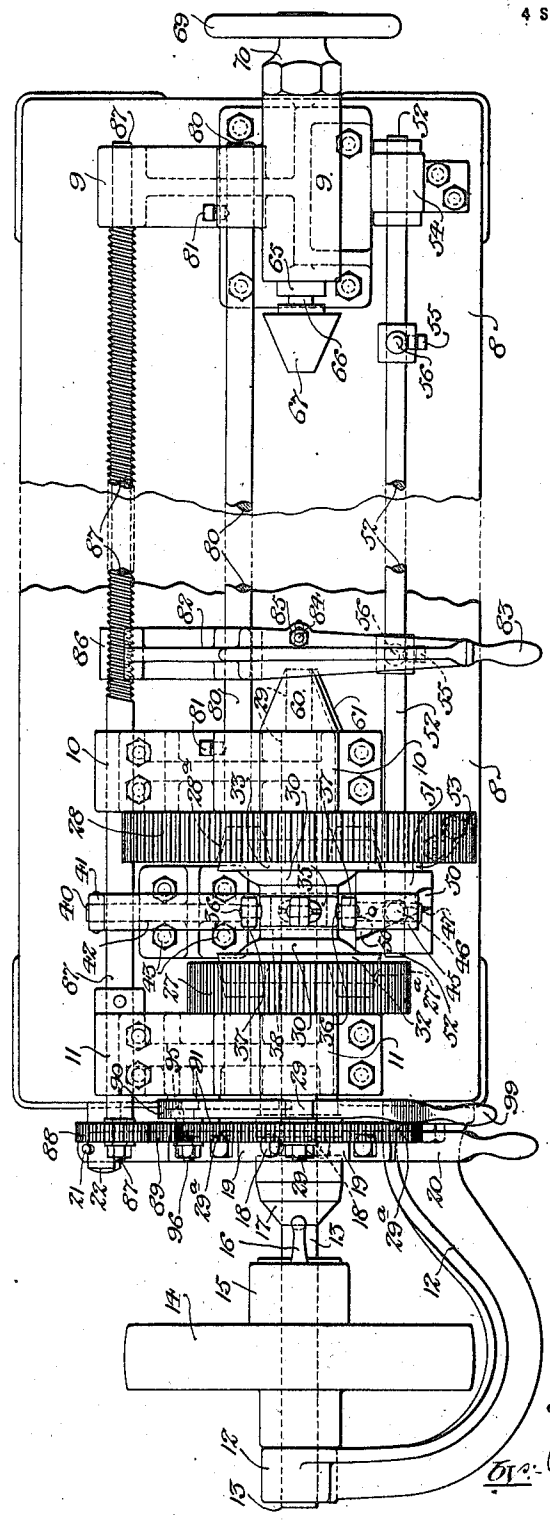


Fig. 2.

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4 SHEETS—SHEET 3.

Fig. 3.

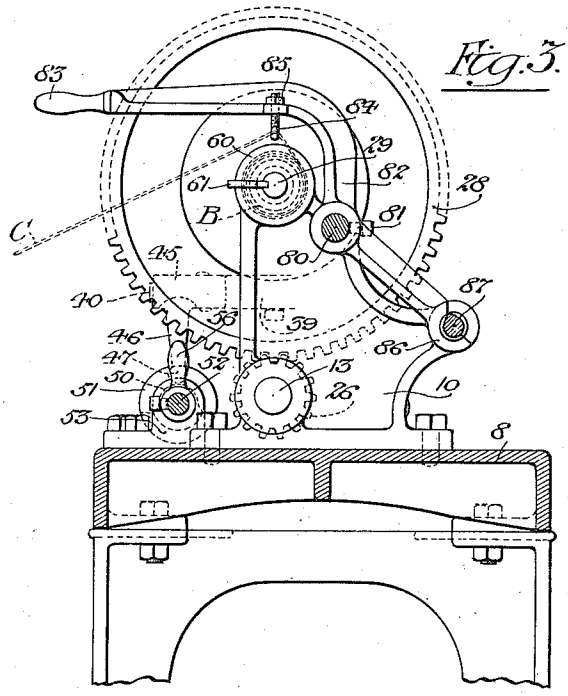
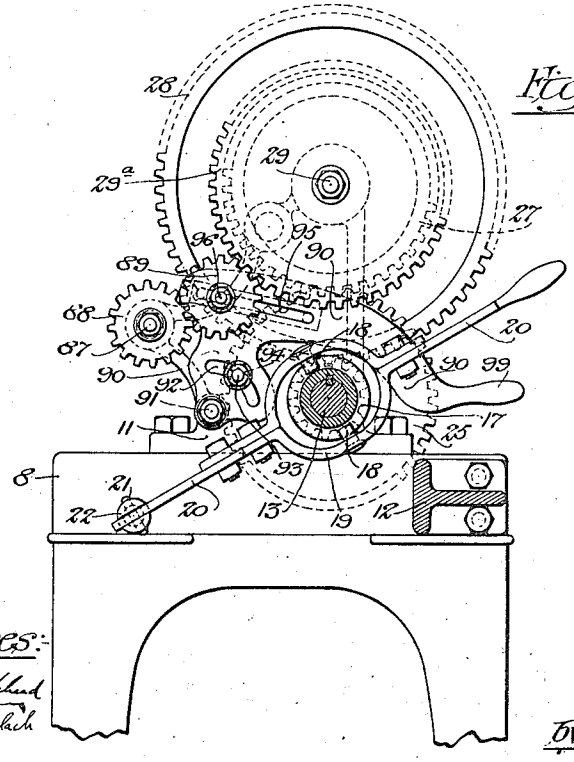


Fig. 4.



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4 SHEETS—SHEET 4.

Fig. 6.

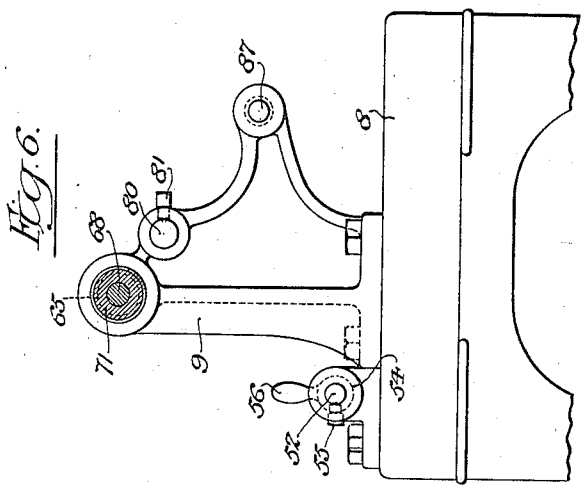


Fig. 7.

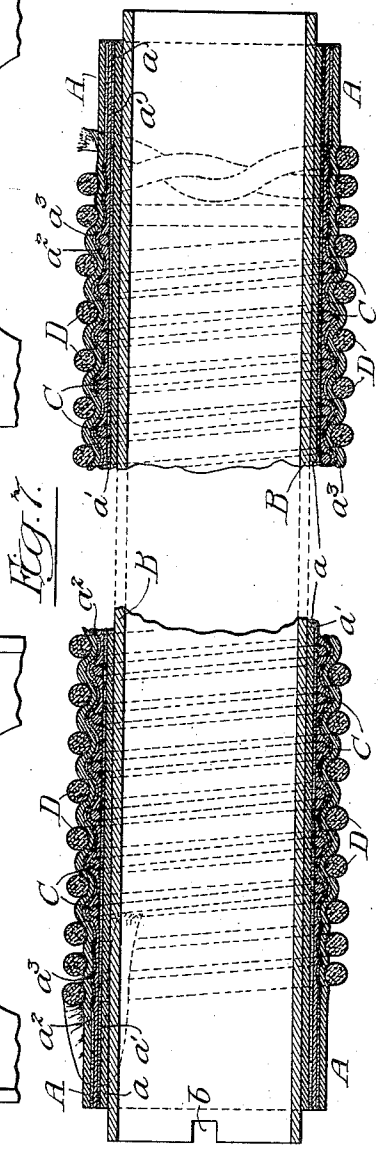
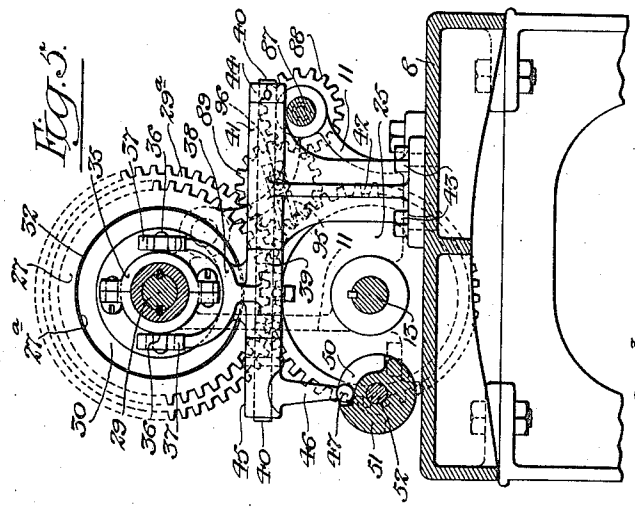


Fig. 5.



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UNITED STATES PATENT OFFICE.

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MACHINE FOR REINFORCING HOSE.

1,149,224. Specification of Letters Patent. Patented Aug. 10, 1915.

Application filed December 9, 1911. Serial No. 664,870.

To all whom it may concern:

Be it known that I, SAMUEL J. SILL, a citizen of the United States, and a resident of Buffalo, county of Erie, and State of New York, have invented certain new and useful Improvements in Machines for Reinforcing Hose, of which I do declare the following to be a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

Figure 1 is a view in front elevation, parts being shown in vertical section, of a machine embodying my invention. Fig. 2 is a plan view. Fig. 3 is a view in vertical section on line 3—3 of Fig. 1. Fig. 4 is a view in vertical section on line 4—4 of Fig. 1. Fig. 5 is a view in vertical section on line 5—5 of Fig. 1. Fig. 6 is a view in vertical section on line 6—6 of Fig. 1. Fig. 7 is an enlarged view in central vertical section through a section of hose mounted upon a mandrel and illustrating the purposes of my invention.

In the manufacture of certain types of rubber hose for railway train service and more particularly in the manufacture of the hose sections coupling the locomotive and tender, it is desirable to reinforce the hose by winding about the same a coil of wire in order to strengthen and prevent the collapsing of the hose.

In Fig. 7 of the drawing is shown a section of hose A mounted upon a tubular mandrel B, this hose section being formed in the following manner: An inner tube a of rubber is first wound with a layer of duck a'. The mandrel B with the inner tube a and duck layer a' is then wound with a coil of reinforcing wire C, as indicated in Fig. 7 of the drawing. Two plies of duck a^2 and a ply of rubber a^3 are then wound around the hose section. A temporary wrapper of cloth will then be wound about the hose and, finally, a coil of rope D will be tightly wound about the hose to draw its outer plies snugly in between the coils of the wire C. After the vulcanization of the hose has been effected, the rope D and the temporary cloth wrapper (not shown) will be removed.

The object of my invention is to provide a simple and effective means whereby the winding of the reinforcing wire about the hose (and the winding also of the rope D, if the rope be employed) may be quickly and securely accomplished.

The invention consists in the features of novelty hereinafter described, illustrated in the accompanying drawings and particularly pointed out in the claims at the end of this specification.

From the bed 8 of the main frame rise the standards 9, 10 and 11. At the left hand end of the bed 8 of the main frame is bolted a bracket 12 in which is journaled the outer end of the main drive shaft 13. The inner end of the drive shaft 13 is journaled in suitable bearings formed in the lower portion of the standards 10 and 11. Upon the main drive shaft 13 is mounted a drive pulley 14 having connected thereto a suitable friction clutch member 15, the arms 16 of this clutch member being arranged to be engaged by the cone sleeve 17 that is keyed to and slidably mounted upon the main drive shaft 13. The cone sleeve 17 is formed with a peripheral groove to receive the studs 18 that project inward from the yoke-shaped portion 19 of the clutch lever 20. This clutch lever 20 is shown as pivotally connected, as at 21, to a stud or offset 22 projecting from the end of the main frame of the machine (see Fig. 4). The friction clutch, its cone sleeve and the clutch lever are of familiar construction and will be readily understood by those conversant with this class of devices. Upon the main drive shaft 13 and between the standards 10 and 11 are keyed the large gear wheel 25 and the smaller gear wheel 26. These gear wheels 25 and 26 mesh respectively with the gear wheels 27 and 28 that are loosely mounted upon the mandrel shaft 29 journaled in the upper ends of the standards 10 and 11. Upon the shaft 29 and between the gear wheels 27 and 28 is slidably mounted a friction clutch 30, this clutch being united to the shaft 29 by splines 31 (see Figs. 1 and 5) and having at its opposite ends the conical friction surfaces 32 and 33 adapted to engage respectively with corresponding conical surfaces 27^a and 28^a of the gear wheels 27 and 28. The clutch 30 is formed centrally with a peripheral groove within which loosely fits a clutch ring 35, this

clutch ring having studs or trunnions 36 that are engaged by the upwardly projecting ends 37 of a yoke 38 (see Figs. 1 and 5).

The yoke 38 is shown as formed integral with a sleeve 39 that is fixed to a short shaft 40 that is journaled in the upper portion 41 of a standard 42 that rises from and is bolted to the bed plate 8 of the main frame, as shown at 43 (see Fig. 5). A collar 44 at the rear end of the shaft 40 holds it in position within its bearing. Upon the opposite end of the shaft 40 is fixed a sleeve 45 from which depends an arm 46, and the end 47 of this arm enters a peripheral slot 50 of a shifting cam 51 that is fixed to the shaft 52 and is journaled in suitable bearings 53 and 54 on top of the bed plate 8 of the machine frame (see Figs. 1 and 2). To the shaft 52 are fixed, as by set screws 55, suitable handles (one or more) 56 whereby the shaft 52 may be conveniently operated, so as to throw the clutch 30 into engagement with either of the gear wheels 27 and 28 or to move the clutch to the central and idle position shown in Fig. 1 of the drawings.

The inner end of the shaft 29 is provided with a suitable part, as, for example, a conical head 60 to engage one end of the mandrel B (see Fig. 7), whereon is mounted the section of hose to be wrapped by the wire, and, as shown, the conical head 60 is provided with a rib 61 adapted to enter the slot *b* in the end of the mandrel to insure the revolution of the mandrel. The top of the standard 9 (see Figs. 1, 2 and 6) is shown as chambered to receive an adjustable head block 65 on the stem 66 of which is revolubly mounted the conical head 67, adapted to enter one end of the mandrel B. The head block 65 has its outer end threaded to receive an adjusting screw 68 that is provided at its outer end with a hand wheel 69. The screw 68 passes through a hole formed in a cap 70 that is screw threaded to engage a correspondingly threaded portion 71 formed at the top of the standard 9 and the shaft of the screw 68 is also provided with an annular flange or offset 72 to hold it against displacement. By means of the adjustable head block 65 the conical head 67 may be readily retracted when the mandrel with the hose section thereon is to be placed upon or withdrawn from the machine.

From the foregoing description it will be seen that when the clutch 30 is in the idle position shown in Fig. 1, no revolution will be imparted to the shaft 29, although the gear wheels 27 and 28 are being driven from the main drive shaft 13. If the clutch 30 be moved to the right (see Fig. 1), so as to cause its friction surface 33 to engage with the corresponding friction surface 28^a of the gear wheel 28, revolution will be imparted from the main drive shaft 13 to the mandrel driving shaft 29 through the small gear wheel 26, the large gear wheel 28 and the clutch 30, and this will cause the mandrel driving shaft 29 to revolve at a relatively slow speed. This slow speed of the mandrel driving shaft will be preferably employed as the wrapping of the reinforcing wire about the hose section is begun; but when the wrapping of the reinforcing wire has been accurately started at the slow speed, the clutch 30 will be shifted to the left so as to cause its friction surface 32 to engage with the corresponding friction surface 27^a of the gear wheel 27. This shifting of the clutch 30 will cause the mandrel driving shaft 29 to receive revolution from the gear wheel 27 and the gear wheel 25, at a relatively greater speed. By this means, the operator is enabled to start the winding of the reinforcing wire at a slow speed and when this winding is accurately begun to complete it, at a higher speed. The shifting of the clutch 30 can be readily effected by the operator standing at the front of the machine through the medium of the handles 56 on the shaft 52, as the turning of the shaft 52 causes the shifter cam 51 to actuate the arm 46 and throw the clutch yoke 38 in either direction.

Between the standards 9 and 10 extends a shaft 80, the ends of which are fixed, as by set screws 81, (see Figs. 1 and 2) in suitable sockets formed in the standards. Upon this shaft 80 is mounted in manner free to slide, the wire laying arm 82. This wire laying arm 82 is formed to extend up and over the mandrel in the hose section when they are in position to be wound with the reinforcing wire, and the front end of this arm 82 is furnished with a suitable handle 83 that may be readily grasped by the operator standing at the front of the machine. From the arm 82 depends a wire support or guide 84 (see Figs. 1 and 3) that consists preferably of a steel hook, the screw threaded end of which passes up through the arm 82 and is held in position by means of a nut 85. The lower end of the wire laying arm 82 is shown as extending downward and rearward from the shaft 80 and is provided with a semi-cylindrical portion 86 that is formed upon its interior upper surface with screw threads corresponding to the threads of the screw shaft 87 (see Figs. 1, 2 and 3) that extends from end to end of the machine and is journaled in suitable bearings at the base of the several standards 9, 10 and 11. The purpose of this screw shaft 87 is to advance the wire laying arm 82 and cause the wire to be coiled uniformly about the surface of the hose section, as the mandrel carrying this section is revolved by the mechanism hereinbefore described.

In order to permit the pinion 88 and the gear wheel 29^a to be replaced with a pinion

and gear wheel of different diameter, when it is desired to vary the relative speed of revolution imparted by the gear wheel 29ª to the pinion 88, I prefer to mount the idler pinion 89 in a swinging arm 90 as next described. This swinging arm 90 is pivoted, as at 91, to a stud projecting from one side of the standard 11 and the arm 90 is formed with a curved slot 92 through which passes the reduced threaded end of a stud 93 that is provided with a nut 94 that enables the arm to be set at any desired position. The upper portion of the arm 90 is formed with a long slot 95 through which passes a bolt 96 on which is revolubly mounted the idler pinion 89. The bolt 96 has a square head that sets within a groove formed on one side of the pivoted arm, this groove being indicated by dotted lines in Fig. 4 of the drawings. When it is desired to vary the speed of revolution imparted by the gear wheel 29ª to the pinion 88, as, for example, to impart a slower speed of revolution to the screw shaft 87, the operator will remove the pinion 88 and the gear wheel 29ª, will then loosen the screw 94 so as to permit the swinging arm 90 to be turned downward and will then substitute for the pinion 88 and the gear wheel 29ª the pinion and gear wheel of required diameter. Having done this, the operator will then swing upward the arm 90 to bring the idler pinion 89 into mesh with the substituted pinion and gear wheel and will adjust the stud that carries the idler pinion 89 in the slot 95 and will reset the nut 94 that positions the swinging arm 90 so as to hold the idler pinion in engagement with the substituted pinion and gear wheel.

From the foregoing description it will be seen that when a hose section is to be wrapped with reinforcing wire C, the mandrel B (see Fig. 7) will be placed in position between the conical heads 60 and 67, as indicated by dotted lines in Fig. 1 of the drawings. The operator will then lay one end of the wire C (see dotted line in Fig. 3) upon the hose section adjacent its end and will fasten this end of the wire preferably by means of a piece of rubber tape, so as to hold it as the winding operation is begun. The operator will then shift the clutch 30 so as to cause the mandrel driving shaft 29 to be initially driven through the medium of the larger gear wheel 28 which will cause a slow revolution to be given to the mandrel and the hose section thereon. It will be understood, of course, that as revolution is thus imparted to the mandrel B, the wire laying arm 82, by reason of the engagement of the threaded portion 86 with the screw shaft 87 will be gradually advanced from left to right, so as to lay the wire C in uniform coils upon the surface of the hose. As soon as the initial winding of the wire C has been fairly started, the operator may shift the clutch 30 so as to cause the mandrel driving shaft 29 to be driven at a higher speed through the medium of the smaller gear wheel 27, and by this means the winding of the wire C about the hose can be rapidly and quickly completed, and when the winding of the wire around a hose section is finished, the operator will secure the end of the wire by means of rubber tape and the mandrel will then be removed from the machine, so that the additional layers of duck and rubber may be applied. Subsequently, the rope D (see Fig. 7) may be wound upon the outer surface of the hose to squeeze the outermost layers between the coils of wire C, and after the rope D has been thus wound, a temporary wrapper of cloth will be wound around the hose and it will be subjected to the vulcanizing operation.

When a section of hose has been wrapped with wire, the operator, by lifting the handle 83 of the wire laying arm 82 will cause the threaded end 86 of the arm 82 to be disengaged from the screw shaft 87 and the arm 82 can then be quickly slid back into position (as shown in Fig. 1), to again begin the winding operation.

My invention presents an exceedingly simple and effective machine for accomplishing the winding of the reinforcing wire about the hose sections and while I have described what I regard the preferred form of my invention, it will be understood that its precise details may be varied by the skilled mechanic without departing from the spirit of the invention. Thus, while what I have termed the wire laying arm 82 affords a most effective means for carrying the wire C during the winding operation, it is obvious that any other suitable form of traveling guide or support for the wire may be employed within the broad scope of my invention without departing from the spirit thereof. So, also, while I have described what I regard as the preferred form of variable speed gear for imparting different speeds to the mandrel driving shaft from the main drive shaft, it is obvious that other forms of variable speed mechanism might be employed without departing from the scope of the invention.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is:—

1. In a machine of the character described, the combination of a frame having head and tail standards thereon, of a drive shaft journaled in said head standard and having a conical head for engaging and interlocking with one end of a hollow mandrel, an adjustable block on said tail standard, a revoluble conical head for engaging the opposite end of the hollow mandrel rotatably mount-

ed on said adjustable block in axial alinement with said drive shaft, a power shaft journaled at the head end of said frame, clutch-controlled gearing connecting said power shaft and said mandrel drive shaft, a screw shaft and a parallel guide rod extending longitudinally between and mounted upon said head and tail standards, gears fixed to and pivotally connecting said mandrel drive shaft and said screw shaft, and a transversely disposed wire-laying arm pivotally and slidably mounted on said guide rod, said wire-laying arm having a wire guide or holder and a half-nut detachably engaging said screw shaft, substantially as described.

2. In a machine of the character described, the combination with a frame, of a drive shaft having a head for engaging one end of a mandrel, a coöperating longitudinally adjustable, rotatable head for engaging the opposite end of the mandrel, a screw shaft, intermeshing gears connecting said screw shaft and said mandrel drive shaft, a longitudinally extending guide rod, and a wire laying arm pivotally and slidably mounted on said guide rod, said wire laying arm having a wire guide or holder and a half nut engaging said screw shaft, the parts being so arranged that tension exerted upon the wire passing through said guide will hold said half nut in engagement with said screw shaft, substantially as described.

3. In a machine of the character described, the combination with a frame, of a drive shaft having a head for engaging one end of a mandrel, a coöperating longitudinally adjustable, rotatable head for engaging the opposite end of the mandrel, a screw shaft, intermeshing gears connecting said screw shaft and said mandrel drive shaft, a longitudinally extending guide rod, and a wire laying arm pivotally and slidably mounted between its ends upon said guide rod, said arm having a half nut on one end and a wire guide and a handle on its opposite end, the parts being so arranged that tension exerted upon the wire passing through said guide will hold said half nut in engagement with said screw shaft, substantially as described.

4. In a machine of the character described, the combination with a frame, of head and tail standards on said frame, a drive shaft journaled in said head standard and having a head for engaging one end of a mandrel, a coöperating, longitudinally adjustable, rotatable head mounted in said tail standard for engaging the opposite end of the mandrel, a power shaft journaled at the head end of said frame, two sets of variable speed gears connecting said power shaft and said mandrel drive shaft, a clutch for throwing either of said sets of gears into operation, a longitudinally extending screw shaft and a longitudinally extending guide rod mounted on said frame, intermeshing gears connecting said mandrel drive shaft and said screw shaft, and a wire laying arm pivotally and slidably mounted on said guide rod and having a half nut detachably engaging said screw shaft, substantially as described.

5. In a machine of the character described, the combination with a frame, of head and tail standards on said frame, a drive shaft journaled in said head standard and having a head for engaging one end of a mandrel, a coöperating, longitudinally adjustable, rotatable head mounted in said tail standard for engaging the opposite end of the mandrel, a power shaft journaled at the head end of said frame, two pairs of variable speed gears mounted on said power shaft and said mandrel drive shaft, a sliding friction clutch on said mandrel drive shaft between the gears thereon and arranged to connect either of said gears to said shaft, a shifter for said clutch, a longitudinally extending screw shaft and a longitudinally extending guide rod, gears directly connecting said screw shaft and said mandrel drive shaft, a wire laying arm pivotally and slidably mounted on said guide rod and having a half nut engaging said screw shaft, substantially as described.

6. In a machine of the character described, the combination with a frame, of head and tail standards on said frame, a drive shaft journaled in said head standard and having a head for engaging one end of a mandrel, a coöperating, longitudinally adjustable, rotatable head mounted in said tail standard for engaging the opposite end of the mandrel, a power shaft journaled at the head end of said frame, two pairs of variable speed gears connecting said power shaft and said mandrel drive shaft, a sliding clutch on one of said shafts for throwing either of said sets of gears into operation, a clutch shifting shaft longitudinally mounted at the front of the machine frame provided with a handle, operating connections between one end of said shaft and said shifting clutch, a longitudinally extending screw shaft and a longitudinally extending guide rod at the rear of the machine frame, gears connecting said screw shaft to said mandrel drive shaft and a wire laying arm pivotally and slidably mounted on said guide rod and having a half nut engaging said screw shaft, substantially as described.

7. In a machine of the character described, the combination with a frame having head and tail standards, of a drive shaft journaled in said head standard and having a conical head arranged to engage and interlock with one end of a hollow mandrel, a sliding block mounted in said tail standard, a conical head longitudinally mounted in said block and arranged to engage the opposite end of the hollow mandrel, a screw

and hand wheel for adjusting said block and the head thereon, a longitudinally extending screw shaft and a longitudinally extending guide rod mounted on the frame, a wire laying arm pivotally and slidably mounted on said guide rod and having a half nut engaging said screw shaft, the parts being so arranged that tension exerted upon the wire passing through said guide will hold said half nut in engagement with said screw shaft, substantially as described.

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