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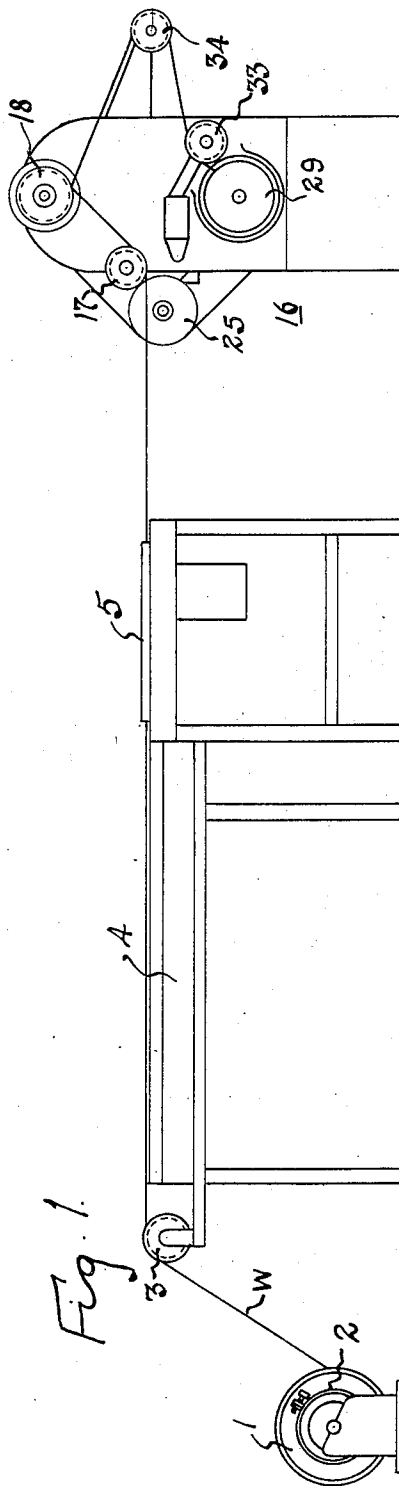
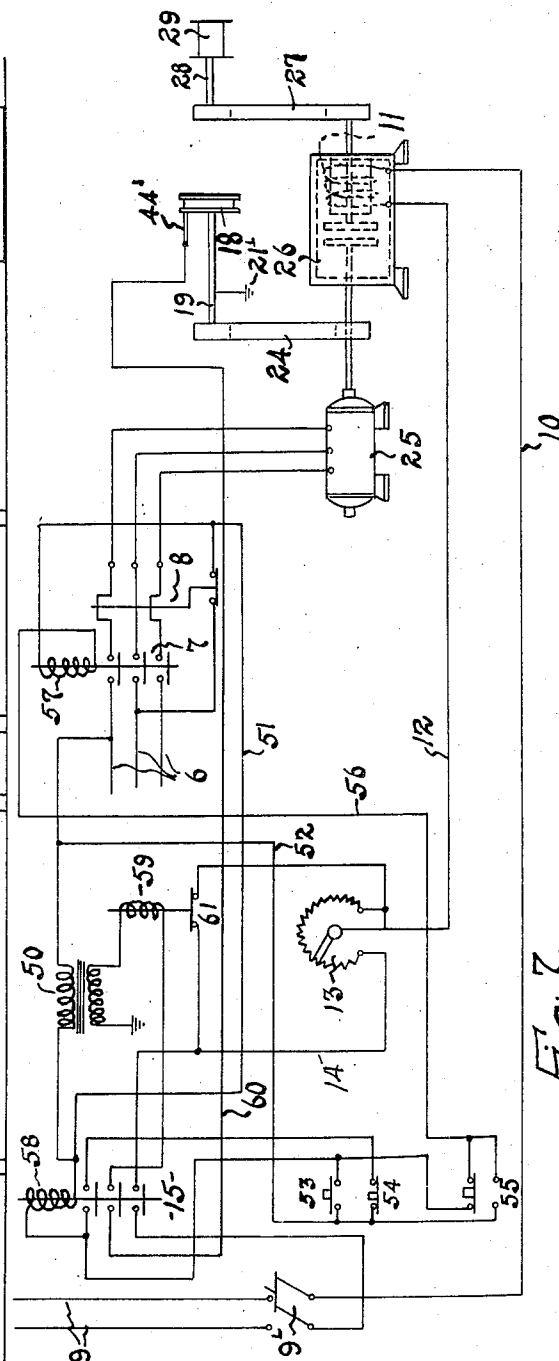
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2,332,397

STRAND SPOOLING MACHINE

Filed May 5, 1942

6 Sheets-Sheet 1



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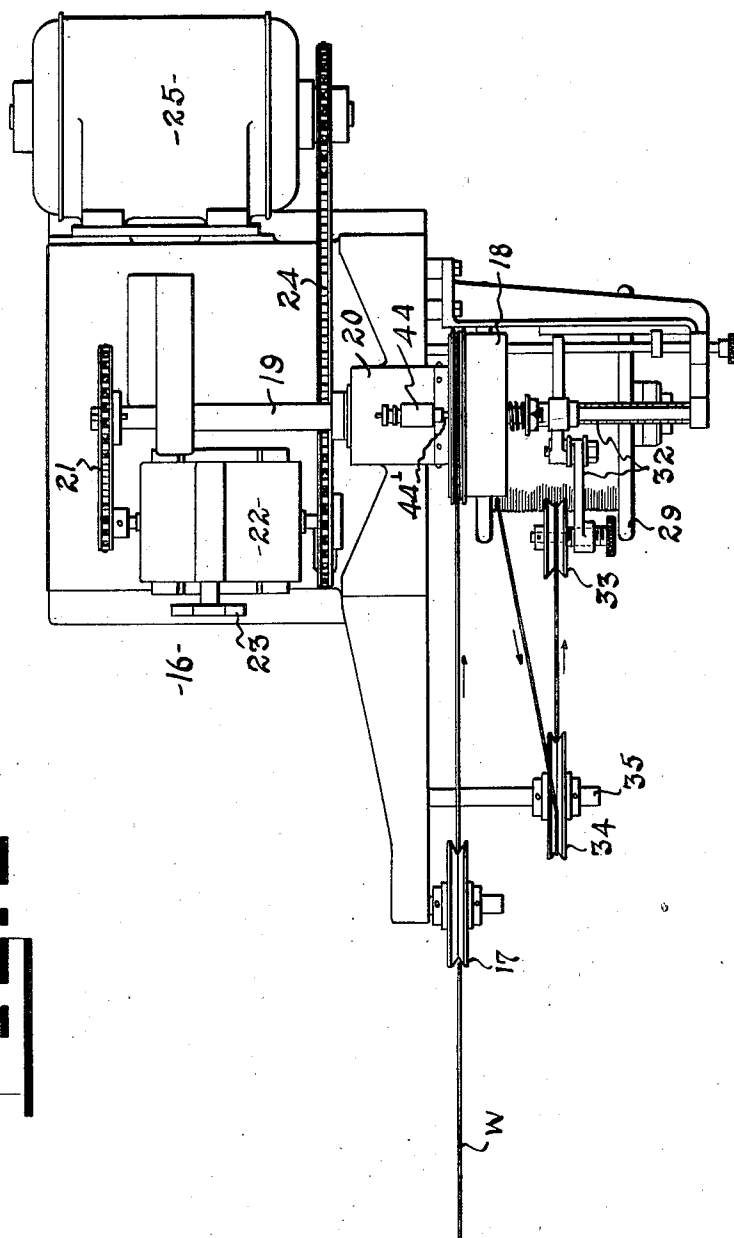
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STRAND SPOOLING MACHINE

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6 Sheets-Sheet 2

Fig. 2



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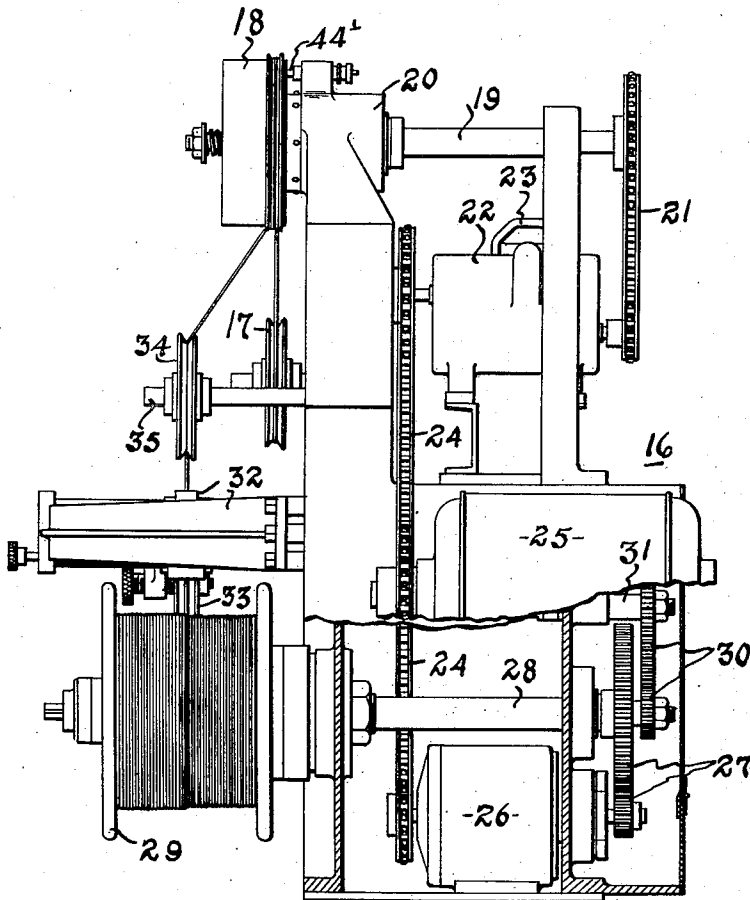
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STRAND SPOOLING MACHINE

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6 Sheets-Sheet 3

Fig. 3



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STRAND SPOOLING MACHINE

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6 Sheets-Sheet 4

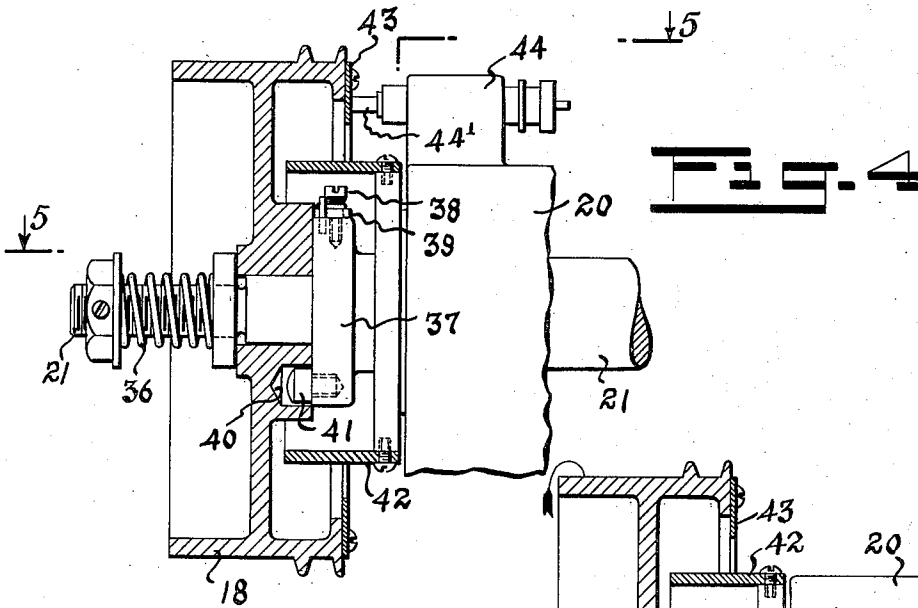


Fig. 5

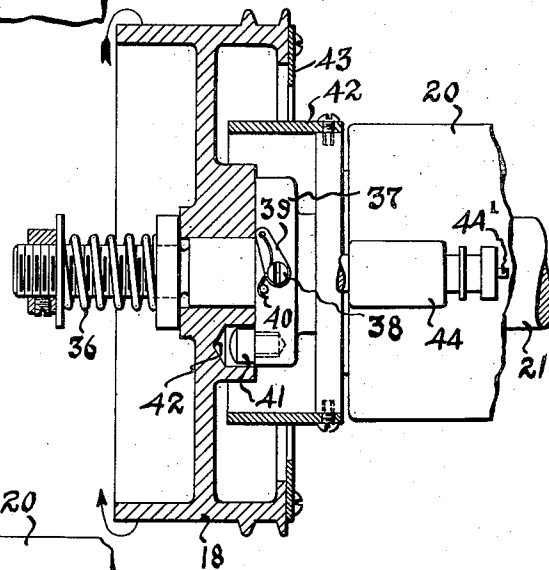
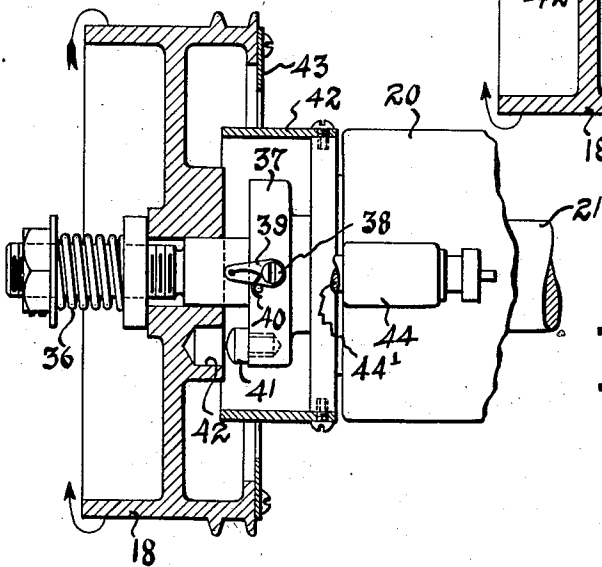


Fig. 6

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STRAND SPOOLING MACHINE

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6 Sheets-Sheet 5

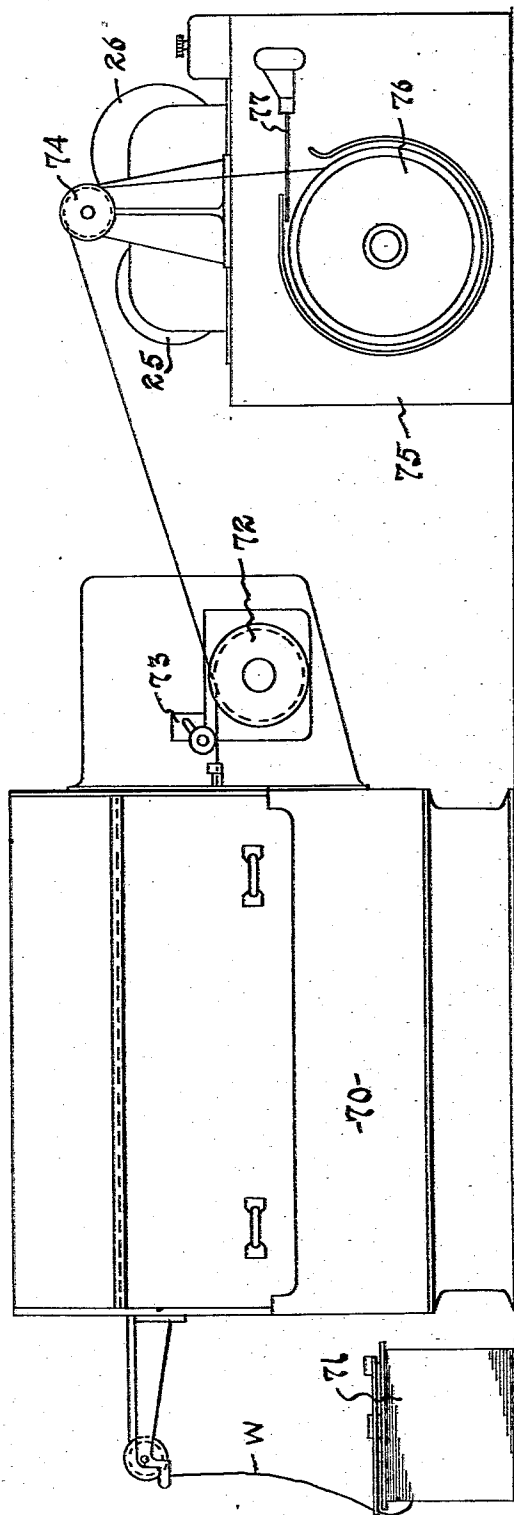


Fig. 8.

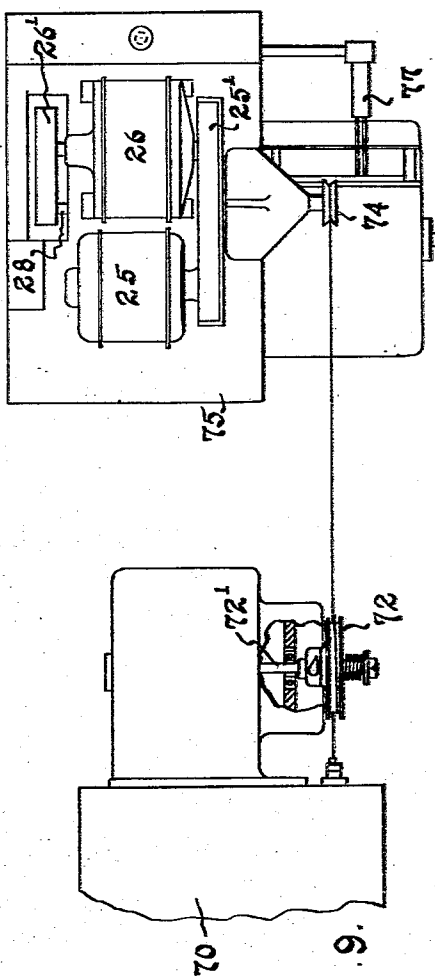


Fig. 9.

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STRAND SPOOLING MACHINE

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6 Sheets-Sheet 6

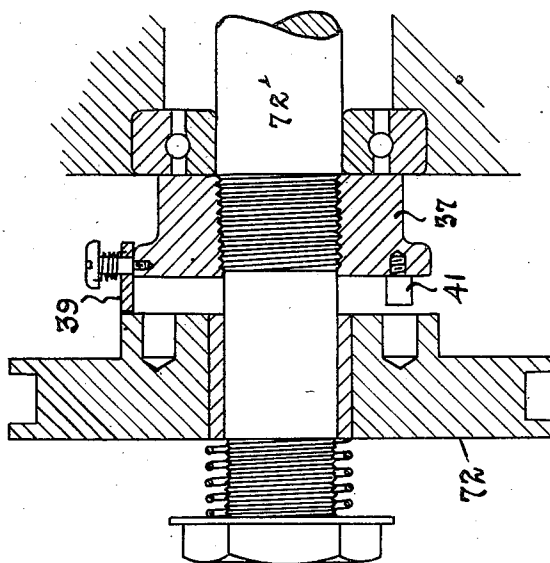


Fig. 10.

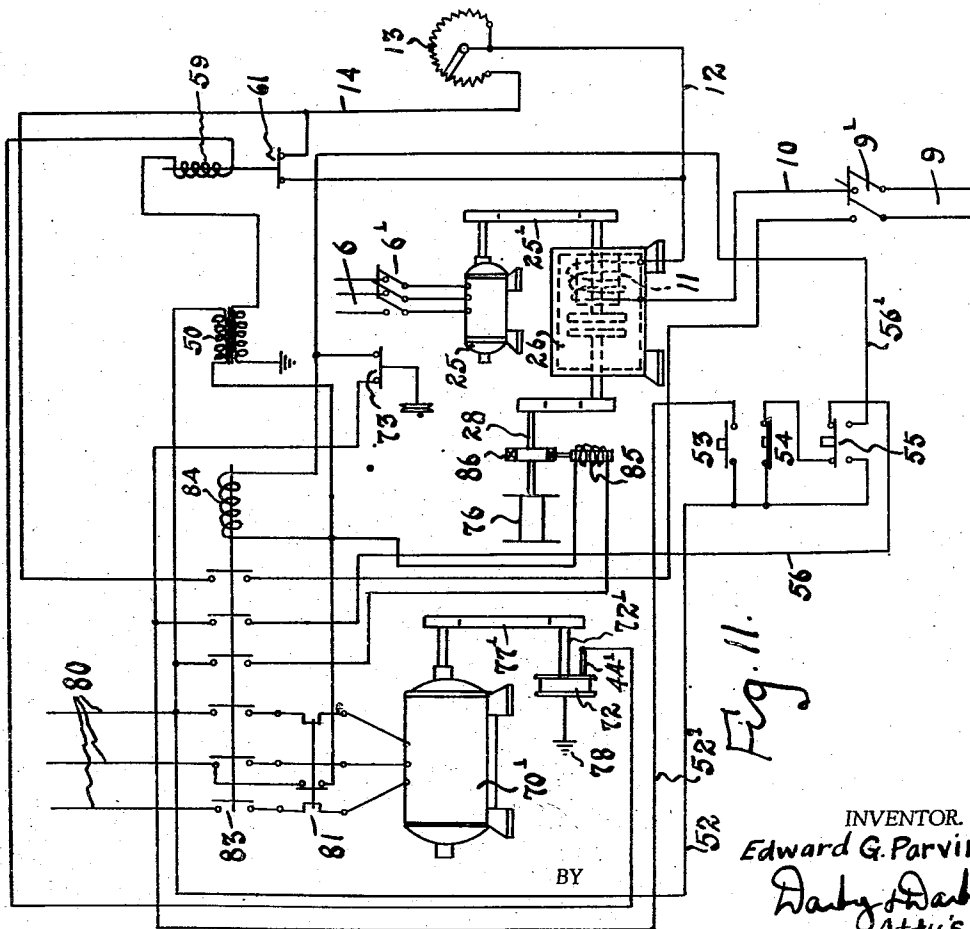


Fig. 11.

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UNITED STATES PATENT OFFICE

2,332,397

STRAND SPOOLING MACHINE

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Application May 5, 1942, Serial No. 441,833

12 Claims. (Cl. 205—16)

This invention relates to improvements in strand processing machines, with particular relation to the power driven capstans frequently used in them, as for example the power driven capstan of strand spooling and coiling machines and the finishing capstan of a wire drawing machine.

As will be apparent from the following detailed description of several embodiments of this invention, it is applicable for use in spooling and coiling wire of all cross-sectional forms, and of various materials, for example it is capable of spooling or coiling wire and metal strips, thread, tapes and the like.

As a more specific example, and as illustrated in the drawings, the invention is capable of use in various machines and combinations of machines for processing wire, as for example in wire drawing, wire annealing, wire coating, wire reeling and coiling, and the like.

In the operation of machine combinations of this type, difficulty is frequently encountered in the starting of the machine. For example, in the case of the combination of a wire drawing machine with a wire spooling or coiling machine which receives the wire after it is drawn directly from the wire drawing machine, the wire is frequently broken during the starting period due, among other things, to the difficulties of properly synchronizing the two machines during starting. Likewise, and as will be clear hereinafter, a wire spooling or coiling machine involves the combination of power driven elements which during the period of starting may cause wire breakage.

The essential feature of this invention is concerned with the wire feeding capstan of either a wire reeling or coiling machine, or of a wire drawing machine, which may be disconnected from its driving shaft during the starting period and manually or automatically reconnected to that shaft after the mechanism has come up to full and normal operating speed. During the starting period the wire drives the capstan and at the end of the starting period the capstan is reconnected to its power source and it then drives, feeds or controls the wire. In the usual arrangements of this type these capstans drive, control or feed the wire not only during the normal running periods, but also throughout the entire starting period. Due in part at least to this latter arrangement the strand frequently breaks or is undesirably stretched during starting. With the arrangement of this invention a substantially uniform tension is maintained in the wire during the starting period, as well as during the normal running period.

This invention resides substantially in the combination, construction, arrangement, and relative location of parts, all as will be set forth more fully hereinafter in connection with the attached drawings.

In the accompanying drawings, in which the same reference numerals will be used in the various views to indicate the same or similar parts,

Figure 1 is a side elevational view of one combination in accordance with this invention showing diagrammatically a wire processing machine in combination with a wire spooler or coiler;

Figure 2 is a full detailed top plan view of the actual spooler or coiler of Figure 1 with same parts shifted but the combination basically the same;

Figure 3 is a right hand end elevational view of the spooler or coiler showing some parts broken away;

Figure 4 is a vertical central cross-sectional view of the spooler capstan with a part of its supporting structure shown in broken line;

Figure 5 is a similar view taken on the line 5—5 of Figure 4;

Figure 6 is the same view as Figure 5 but showing the capstan disconnected from its driving shaft;

Figure 7 is a circuit diagram of the mechanism;

Figure 8 is a side elevational view of another combination employing this invention showing in side elevational view a wire drawing machine and a spooler or coiler receiving the wire directly therefrom;

Figure 9 is a top plan view of the combination of Figure 8 showing only a portion of the right hand end of the wire drawing machine with a part of its housing broken away;

Figure 10 is a vertical central cross-sectional view through the finishing capstan of the wire drawing machine; and

Figure 11 is a circuit diagram of this combination.

In the diagrammatic combination of Figure 1, the wire W to be processed is supplied from a reel 1 which is rotatably supported in a reel mount which is provided with an adjustable drag brake 2 so as to keep the wire under a desired tension. The wire passes around an idler pulley 3 and then passes through a machine which is diagrammatically illustrated in order to indicate that the invention may be applied to many forms of wire processing machines. By way of example the mechanism illustrated may comprise a heater or furnace 4 by means of which the wire can be heated for any processing which requires

heating, as for example annealing. The wire immediately passes then to the cooling mechanism 5 from which it passes to the spooler or coiler 16. The wire first engages the idler pulley 17 which, together with the pulley 3, determines the path of travel of the wire through the heating and cooling devices. From the idler pulley 17 the wire passes to and several times around the spooler capstan 18. This capstan is mounted upon a driving shaft and is connected thereto or disconnected therefrom in accordance with the operation of this invention, as will be described later.

The shaft 19 (Figures 2 and 3) is connected by suitable structures and a chain 21 to a variable speed transmission device 22, the details of which are of no particular importance here. The spooler illustrated in Figures 1 and 2 comprises basically the same combination of elements. Superficial differences between the spooler construction in Figures 1 and 2 are the result of the fact that the showing in Figure 1 is diagrammatic while the showing in Figure 2 is of an actual machine. Nevertheless the only differences between these two figures wherein the same parts appear are that the elements, as for example the drive motor 25, have been placed in different places, but functionally their relationship with the other elements is the same in both figures. This variable speed device is provided with an adjacent hand wheel 23 so that the speed of rotation of shaft 19 may be accurately adjusted. Power is supplied to the variable speed transmission 22 by means of suitable structures and a driving chain 24 which is driven from the spooler or coiler motor 25. As is clear from Figure 3, the chain 24 also drives a suitable form of clutch 26. As illustrated, this clutch is a magnetic slip clutch. The output side of the clutch 26 is connected by a gear train 27 to the spooler or coiler shaft 28 upon which is removably mounted the receiving spool 29. As previously indicated, a coil block may be used in place of the spool so that the strand is formed in open coils when desired.

The output side of the clutch 26 is also connected by a gear train 30 to the shaft 31 of the distributor mechanism 32 of which the grooved guide wheel 33 is a part. This distributor device is of a type commonly used in this art and is, of course, intended to guide the wire so as to lay it on the spool in uniform layers.

As is clear from Figure 1, the strand passes from the capstan 18 over a guide wheel 34 slidably and rotatably mounted on a stud 35 so that the wire is properly guided to the wheel 33 of the distributor.

The method of connecting and disconnecting the capstan from its drive shaft is illustrated in detail in Figures 4, 5 and 6. The capstan is rotatably mounted on the end of its drive shaft 21 which projects beyond the bearing support 20. The projecting end of the shaft is provided with an enlarged integral head 37 against which the capstan is forced by means of a spring 36. Pivotaly mounted on the head 37 by means of a pivot screw 38 is a latch arm 39. A suitably applied spring 40 acts to move the latch arm 39 from its position in Figure 5 to its position in Figure 6, when the capstan 18 is pulled out axially on the shaft 21 against the resistance of spring 36.

The face of the head 37 is provided with a projecting pin 41 adapted to fit in one or more recesses 42 on a adjacent face of the capstan 18.

Figure 4 indicates such engagement. When the capstan is pulled out so that the pin 41 is fully retracted from the recesses 42, the spring 40 swings the latch arm 39 out to a position at right angles to the face of the capstan where it holds it with spring 36 compressed. These parts of the mechanism are housed within a protective shell 42 as is clear from these figures.

As will appear more fully in connection with Figure 7, ring 43 and the contact 44' in holder 44 act as a switch.

Referring to Figure 7, there is illustrated the circuit connections for the various drive and control elements comprising this combination. In this figure the coiler motor is shown at 25, the slip clutch at 26, the capstan at 18, and its drive shaft at 19. The connection between the motor 25 and the shaft 19 is shown at 24. The actual connection, as shown in Figures 2 and 3, includes the variable speed device 22 as previously described. The three phase current supply wires 6 are connectable to the motor by means of a three-pole switch 7 forming part of a relay of which the winding 57 forms the operating magnet. At 8 is diagrammatically illustrated a thermal overload switch, of which there are many well known types.

The shaft 19 is grounded at 21'. The magnetizing winding 11 of the magnetic slip clutch is energized by direct current from any suitable source connected to the wires 9. A switch 9' controls this circuit. One leg of the switch is connected by a wire 10 to one terminal of the winding 11. Its other terminal is connected by the wire 12 to a rheostat 13 which, in turn, is connected by a wire 14 to one of the fixed contacts of the switch 15 forming part of a relay of which the winding 58 is the operating magnet. The corresponding fixed contact of this switch is connected by a wire to the other leg of switch 9'. The rheostat 13 is shunted by a circuit including switch 61 forming part of a relay of which the winding 59 forms the operating magnet. One terminal of winding 59 is connected to one terminal of a grounded secondary of the transformer 50. The other terminal of the winding is connected through one of the switches 15 and by wire 60 to the contact 44'.

The primary of transformer 50 is connected at one terminal to one leg of one phase of the poly-phase circuit 6 and the other terminal is connected to one terminal of the winding 58 and by wire 51 to one contact of the overload switch 8 and to one terminal of the winding 57. The other terminal of winding 58 is connected to a wire which is connected to one side of the starting switch 53 and to one side of the jogging switch 55. This wire is also connected through the remaining switch 15 to a wire which connects to one side of the stop switch 54. Wire 52 connects the other side of each of the switches 53 and 54 and to one of the lower fixed contacts of switch 55, which wire is connected to the same leg of the single phase to which the primary of transformer 50 is connected. The remaining contacts of switch 55 are connected by a common wire 56 to the other terminal of the winding 57. The other terminal of the switch 8 connects to the other leg of the single phase used for control purposes. It may be noted that the transformer 50 supplies the proper low voltage for the control circuits.

The operation of this mechanism will now be described. The threading up of the machine in preparation for the operation need not be de-

scribed since it is in accordance with the usual practice. However, with the mechanism of this invention, before the machine is started the capstan 18 is manually pulled out axially on the shaft 19 from its position shown in Figures 4 and 5 to the position shown in Figure 6.

In order to start the machine, switch 9' is closed, which partially completes a circuit for the winding 11 as follows: From one of the circuit wires 9 through wire 10, winding 11, wire 12, a portion of rheostat 13, wire 14 up to the lowermost switch 15. The shunt circuit around the rheostat is closed at the switch 61 because the secondary of transformer 50 is deenergized since the middle switch 15 in its circuit is open, as well as the switch at contact 44'. However, the primary of transformer 50 is energized as follows: From the connected wire 6 through transformer primary to wire 51, through switch 8, back to the related circuit wire 6. The overload switch 8 is normally closed, as shown.

To start the machine, switch 53 is closed, and current flows through wire 52, switch 53, through the connection therefrom to winding 58, and back through wire 51 and switch 8. The energization of winding 58 closes all of the switches 15. The lowermost switch 15 completes the circuit for the winding 11. The uppermost switch 15 completes a holding circuit for the winding 58 through switch 54 which complete circuit comprises wire 52, closed switch 54, upper switch 15, winding 58, wire 51, and switch 8. The closing of the middle switch 15 partially completes a circuit from ground through the secondary of transformer 50, winding 59, middle switch 15, wire 60, up to contact 44'. However, since the machine is starting the capstan 18 has been pulled out, as previously described, so that the circuit is broken at this point during the starting period. Switch 61 therefore remains closed and hence rheostat 13 is effectively shunted out of the energizing circuit for the winding 11 at this time.

A circuit is also completed at this time for the winding 57 as follows: From wire 52 through closed switch 54, upper switch 15, back through the closed side of jog switch 55, wire 56, winding 57, and closed switch 8. The energization of the winding 57 closes switch 7 which completes the multi-phase circuit to the motor 25 which starts the coiler mechanism in operation through the magnetic slip clutch 26. The capstan shaft 19 is driven directly from the motor 25 while the spooler shaft 28 is gradually brought up to speed through the slip clutch. During this period rheostat 13 is shunted so that the winding 11 receives the full energization so as to absorb the load of getting the spooler shaft and spool and other connected devices under way. Of course as soon as the motor 25 is energized it comes quickly to full speed, with the result that the capstan shaft 19 also comes up to full speed and rotates in a counter-clockwise direction (Figure 1). The spool and its shaft come up to full speed more slowly with the result that the capstan 18 which is free of its shaft 19 and which is being driven by the wire comes up to full speed more slowly. However, when the capstan gets up to the speed of the capstan shaft, it will tend to pull ahead of it, with the result that when the capstan over-travels the shaft the friction of the capstan on the end of the latch arm 39 is diminished. The friction which existed previously aided the spring 40 in holding the latch 39 against the stop. When the capstan over-travels this friction is eliminated

and the capstan tends to swing the latch away from stop 40, which action is aided by the heavy spring 36. Thus latch 39 is forced back to the position shown in Figure 5, as spring 36 forces capstan 18 inwardly, with the result that the capstan locks to the shaft by the engagement of the pin 41 in the recess 42.

The movement of latch 39 as described is aided by reason of its rounded end construction. The entry of pin 41 into the recess 42 locks the capstan to shaft 21. As the capstan latches in, the circuit for the winding 59 is completed at the contact 44' so that switch 61 is opened. This removes the shunt around the rheostat 13 so that the circuit to the winding 11 is now through the portion of the rheostat 13 which is in circuit, depending in turn upon the adjusted position of the rheostat arm. It follows, therefore, that the normal running current for the slip clutch, which is lower than the starting current, is now being supplied. The machine is now in full operation and the capstan 18 is power driven to maintain a substantially uniform tension in the strand going to it.

If switch 8 should open due to an over-load, the holding circuit for winding 58 would be broken, whereupon all the control circuits will be deenergized. When it is desired to stop the machine a similar result is secured by momentarily operating the stop switch 54 which breaks the holding circuit for the winding 58. In the operation of machines of this type it is sometimes necessary to operate the machine for very short periods of time, which is known as jogging. The movable contact of switch 55 is momentarily engaged with the lower set of contacts completing a circuit from wire 52 through the lower set of contacts of switch 55 to wire 56, winding 57, and back to the other side of the circuit through switch 8. Thus switch 7 is momentarily closed with the result that the motor 25 is momentarily energized. By this means the wire can be fed by means of the capstan the required amount so that the end can be attached to the spool or the machine jogged as required for any desired purpose.

Referring now to the combination shown in the remaining figures, there is illustrated at 79 a wire drawing machine, many forms of which are well known in the art, for reducing wire to finer sizes by pulling it through dies. At 72 is the power driven capstan which is mounted upon a shaft 72' driven from the operating motor for the wire drawing machine, but which is not shown in Figures 8 and 9. The capstan 72 is connectable to and disconnectable from the shaft 72', as in the case of the capstan 18. A similar mechanism is employed, as illustrated in Figure 10. The wire supply spool 71 feeds a wire W to be drawn to the entering end of the machine in accordance with the usual practice. The wire after repeated drawings issues from the machine and passes several times around the capstan 72 and from there passes to the guide pulley 74 on the coiler. A switch 73 is positioned to be held in open condition until the wire breaks or the end passes through the machine. This switch will be referred to in connection with Figure 11.

The coiler 75 is similar in most respects to that previously described. The wire passes from the idler pulley 74 to the take-up spool 76 through the distributing device 77. The main drive motor is at 25, which motor is connected by means of a drive in the protective housing 25' to the magnetic slip clutch 26. The output side of the clutch is

in turn connected in any suitable manner, as by means of a belt or chain 26', to the spool shaft 28 as before. The distributor 77 can also be driven in any suitable manner well known in the art. Further details of the spooler or coiler need not be given since it is quite like the one previously shown in full detail with the exception that there is in this case no power driven capstan on the coiler itself and with the additional exception that the spool shaft 28 is provided with a magnetic brake of any suitable construction, which brake is diagrammatically illustrated in Figure 11 at 86.

The circuit connections for this combination are illustrated in full detail in Figure 11. The main multiphase current supply is provided by the three circuit wires 80 which are controlled by the three left hand switches 83 forming part of a relay of which the winding 84 is the operating magnet. This circuit is connected through these switches and a thermal over-load switch 81 to the wire drawing machine driving motor 70'. In this figure the manner of driving the capstan shaft 72' is illustrated as a direct belt or chain drive 77' from the motor 70'. The magnetic slip clutch 26 is shown connected at its input side to the spooler motor 25. This motor is supplied with polyphase current from the circuit 6 through the manual switch 6'. The circuit for the energizing winding 11 of the slip clutch is similar to that previously described. It is a direct current circuit 9 having the manual switch 9'. One side of the circuit is connected by wire 10 to one terminal of winding 11. The other terminal is connected by wire 12 to rheostat 13, which in turn is connected by wire 14 to one of the switches 83. The other side of this switch goes back to the other leg of circuit 9. As before rheostat 13 is shunted by means of switch 61 forming part of a relay of which the operating winding 59 forms the operating magnet. The winding 59 is grounded through the secondary of transformer 50 and its other terminal is connected by a wire, as before, to the contacts 44' so that the circuit may be completed to ground at 78.

The primary of transformer 50 is connected to one of the wires 80 at one side, and at the other side is connected to another circuit wire 80 through switch 81. One of the circuit wires 80 is connected by wire 52 to one side of the starting switch 53, one side of stop switch 54 and to one of the contacts of jog switch 55. The other side of the starting switch 53 is connected by a wire 52' to the broken wire switch 73 which is closed when the machine is in operation, and thence to one terminal of the winding 84 the other terminal of which is connected through switch 81 to the other side of the control phase. Thus when switch 53 is closed winding 84 is energized and switches 83 close. The second switch 83 from the right provides a holding circuit, as before, for the winding 84 from wire 52 through stop switch 54, switch 55, wire 56, connected switch 83, switch 73, winding 84, and switch 81. Thus if the stop switch 54 is opened, or the broken wire switch 73 opens, or the over-load switch 81 opens, winding 84 will be deenergized, and switches 83 will all open.

The jog circuit can be completed by switch 55 from wire 52 through wire 56 so that the winding 84 may be momentarily energized as before. The operating winding 85 for the brake 86 is completed through the third switch 83 from the right as follows: From connected wire 80 through that

switch 83, to winding 85 and back through switch 81. Brake 86 is of the type which is released when the winding 85 is energized and which is applied whenever that winding is deenergized.

The operation of this system is quite similar to that previously described. In starting capstan 72 is pulled out to disconnect it from its shaft 72'. At the same time the circuit for the winding 59 is broken at contact 44'. Thus switch 61 is closed completing the shunt around the rheostat 13. Switch 9' is closed, as is switch 6'. Starting switch 53 is momentarily closed completing the circuit previously described for the winding 84. Thus all of switches 83 close. It will be noted that with the machine in operative condition the pulley on the switch arm of switch 73 engages the wire, as shown in Figure 8, and thus switch 73 is closed. The closing of switches 83 completes the circuit to motor 70' which starts the wire drawing machine in operation, coming up slowly to full speed and carrying shaft 72' with it.

Closing of the other three switches 83 reading from right to left completes circuits as follows: The switch at the extreme right completes the energizing circuit for winding 11, the next switch to the left completes the holding circuit for winding 84, and the next switch to the left completes the circuit for winding 85, releasing the brake. Although motor 25 has been operating it has no effect on the coiler or spooler until the winding 11 is energized. As soon as this occurred the spool shaft 28 and spool 76 are brought up to speed, with the winding 11 having its maximum energization. Thus as the spool comes up to speed the capstan shaft 72 which is driven by the wire also comes up to speed. As soon as it overruns the shaft 72' it latches thereto, as described in connection with capstan 18. As this occurs the circuit for winding 59 is completed at contact 44' and the short circuit around the rheostat is removed, thereby cutting down the current to the winding 11 to normal running current. This is an effective starting combination because the spool 76 being driven by means of a slip clutch will spool up whatever wire is delivered to it from the wire drawing machine, without breaking the wire, since slippage can of course occur in the clutch. A slip clutch suitable for the purpose is disclosed in my U. S. Patent No. 2,233,060 issued February 25, 1941.

In passing it may be noted that should the wire break the holding circuit for the winding 84 will break at switch 73 deenergizing the motor 70', winding 11 and winding 85. Thus the drawing machine and associated parts will come to a stop, as will the spool, which will all aid in its stopping by means of the brake 86. Although motor 25 remains energized this does no harm since the slip clutch is deenergized. Likewise the entire machine may be stopped by momentarily opening switch 54 or, if the over-load switch 81 opens, the machine will stop in a similar manner.

The jogging operation is similar to that previously described. By moving switch 55 to the lower contacts a circuit is completed from wire 52 to wire 56 to directly energize winding 84 to complete circuits as described before, which are momentarily broken as soon as switch 55 is released. In other words, in both circuit combinations the jog switch 55 does not set up a holding circuit for the winding 84, because when it closes on its lower set of contacts it opens at its upper set which are in the holding circuit for the winding 84. Thus the apparatus is only energized as long as switch 55 is depressed.

With this arrangement it will be at once apparent to those skilled in the art that the irregularities in the starting conditions, that is, lack of synchronism during starting which produces undesired stresses in the strand W, will be eliminated and the tendency of the strand to break will likewise be minimized. Breakage due to these starting conditions is thus substantially eliminated with the mechanism of this invention.

Those skilled in the art will readily appreciate that many changes can be made in the physical embodiment and combinations, employing the novel subject matter of this invention. I do not, therefore, desire to be strictly limited by the disclosure which has been given in an illustrative sense, but rather by the scope of the claims granted me.

What is claimed is:

1. In a machine combination of the type described, the combination including a power driven spooler, a power driven rotatable capstan shaft, a capstan, from which a strand is fed to said spooler, rotatably mounted on said shaft, and means for clutching said capstan to said shaft, when they both reach the same speed of rotation.

2. In a machine of the type described, the combination including a power driven spooler, and a power driven capstan shaft brought to running speed at different times, of a capstan rotatably mounted on said shaft and driven by a strand fed therefrom to said spooler, and means for automatically clutching said capstan to said shaft when they both reach running speed.

3. In a mechanism of the type described, the combination including a power driven means for supplying a strand, a power driven spooler for receiving the strand from said means, a power driven capstan shaft forming part of said spooler, a capstan rotatable on said shaft by the strand, means for clutching said capstan to said shaft and means for preventing the engagement of said clutch after disengagement until the capstan reaches the shaft speed.

4. In a mechanism for preventing strand breakage during spooling, the combination with a power driven strand supply means of a power driven spooler having a power driven capstan shaft and a capstan slidably and rotatably mounted on said shaft, a clutch for connecting said capstan to said shaft, means for causing said clutch to engage and means for preventing said clutch from engaging until the capstan driven by the strand during starting reaches normal running speed, whereupon said last means is rendered ineffective and the clutch engaging means causes the clutch to engage.

5. In a wire drawing and spooling mechanism the combination with a wire drawing machine having a power driven capstan, of a spooler having a power driven spool, a power driven capstan shaft, a capstan mounted on said shaft to receive the wire from said first capstan, the second capstan being driven by the wire in passing to the spool and means for connecting the second capstan to and disengaging it from its shaft, whereby during starting that capstan being disconnected from its shaft is automatically connected thereto at the end of the starting period.

6. In a mechanism of the type described, the

combination with a wire processing machine of a power driven spool, a power driven capstan shaft, a capstan rotatably mounted on said shaft and rotated by the wire in passing to the spool, and means for automatically clutching said capstan to said shaft when they are rotating at substantially the same speed.

7. In a mechanism of the type described the combination with a wire drawing machine having a power driven capstan shaft, a capstan rotatably mounted on said shaft, a power driven spool receiving wire from the capstan and driving the capstan when unclutched from said shaft, and means for clutching said capstan to said shaft when the wire brings the capstan up to the shaft speed.

8. In a mechanism of the type described, the combination with a wire drawing machine having a power driven capstan shaft, a capstan rotatably mounted on said shaft and driven by the wire during starting of the machine, and means for clutching said capstan to said shaft when the capstan is rotating at substantially the same speed as the shaft, of a power driven spooler fed from said capstan having a spool, a drive motor, and a magnetic slip clutch connecting said motor to said spool.

9. In a mechanism of the type described, the combination with a wire drawing machine having a power driven capstan shaft, a capstan rotatably mounted on said shaft, and means for automatically clutching said capstan to said shaft when they are rotating at substantially the same speed, of a power driven spooler fed from said capstan having a spool, a drive motor, and a magnetic slip clutch connecting said motor to said spool, and means controlled by said capstan for controlling the energization of said slip clutch.

10. In a mechanism of the type described, the combination including a motive device, a spooler, a magnetic slip clutch for connecting said spooler to said motive device, a circuit for said magnetic slip clutch, a capstan shaft driven from said motive device, a capstan rotatably mounted on said shaft, means for automatically clutching said capstan to said shaft when they are running at the same speed, and means for completing said slip clutch circuit when said capstan is clutched to its shaft.

11. In a mechanism for preventing strand breakage during spooling, the combination comprising a strand processing machine, a power driven spooler having a power driven capstan shaft receiving the strand from said machine, a capstan slidably and rotatably mounted on said shaft, a clutch for connecting said capstan to said shaft, means for causing said clutch to engage and means for preventing said clutch from engaging until the capstan driven by the strand during starting reaches normal running speed.

12. In a mechanism for preventing strand breakage during spooling, the combination comprising a strand processing machine, a power driven spooler having a power driven capstan shaft, a capstan slidably and rotatably mounted on said shaft, a clutch for connecting said capstan to said shaft, and means cooperating with the capstan for engaging said clutch when the capstan reaches normal running speed.

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