Dec. 22, 1953 J. J. HARLEY 2,663,544

CABLE LASHING MACHINE

Filed Dec. 27, 1951 10 Sheets-Sheet 1

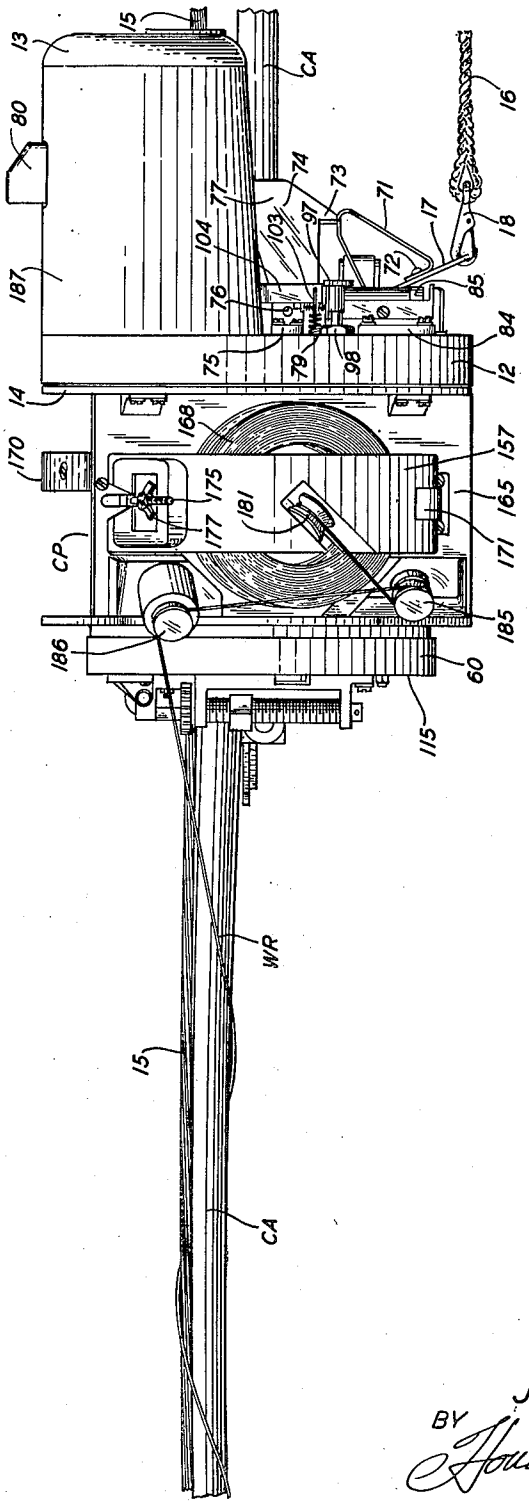



FIG. 1

INVENTOR
J. J. HARLEY
BY Howard C. Flamm
ATTORNEY

Dec. 22, 1953 J. J. HARLEY 2,663,544

CABLE LASHING MACHINE

Filed Dec. 27, 1951 10 Sheets-Sheet 2

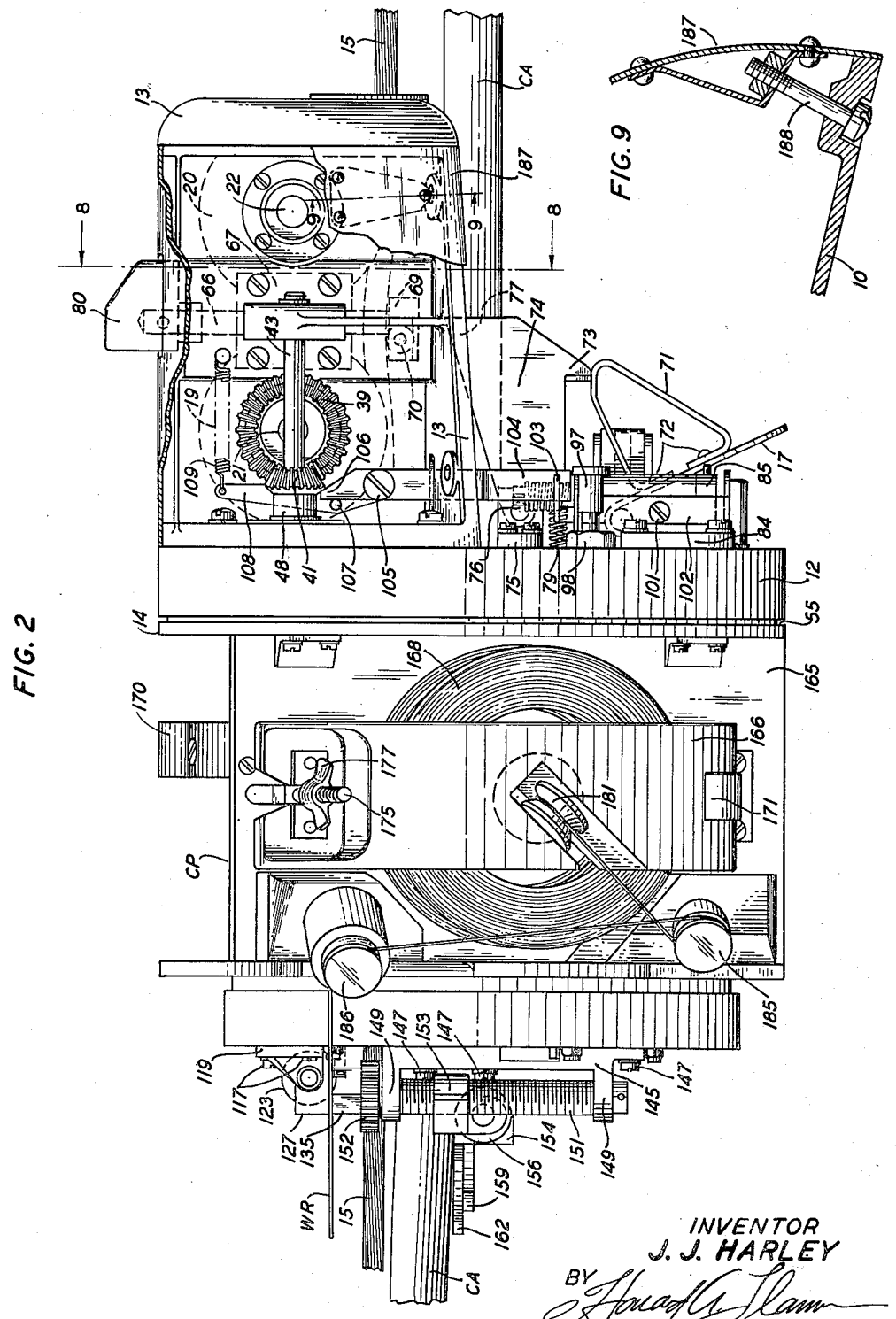



FIG. 2




FIG. 9

INVENTOR
J. J. HARLEY
BY Howard G. Flamm
ATTORNEY

Dec. 22, 1953 J. J. HARLEY 2,663,544

CABLE LASHING MACHINE

Filed Dec. 27, 1951 10 Sheets-Sheet 3

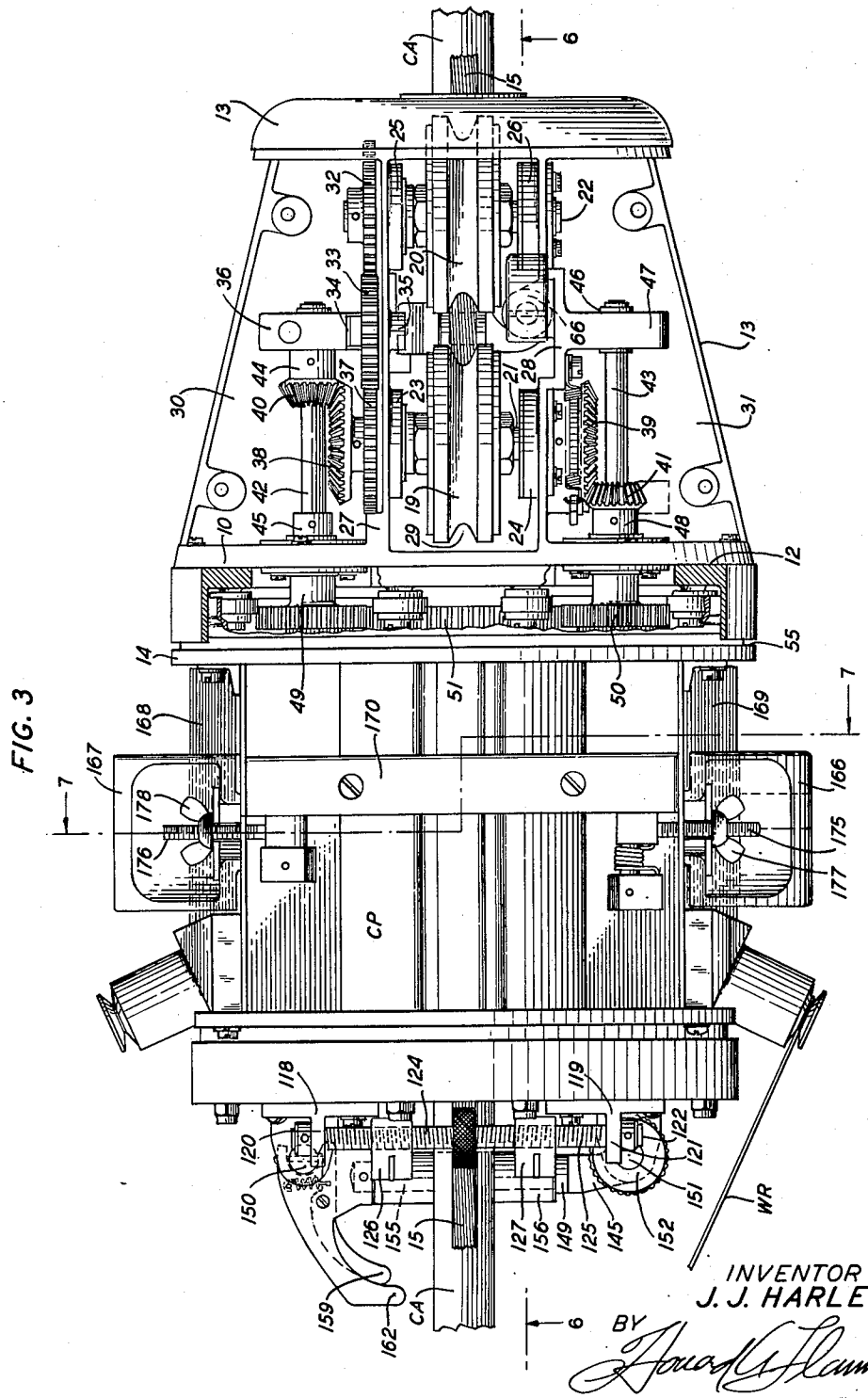



FIG. 3

INVENTOR
J. J. HARLEY

BY Howard G. Flamm

ATTORNEY

Dec. 22, 1953 J. J. HARLEY 2,663,544

CABLE LASHING MACHINE

Filed Dec. 27, 1951 10 Sheets-Sheet 4

FIG. 5

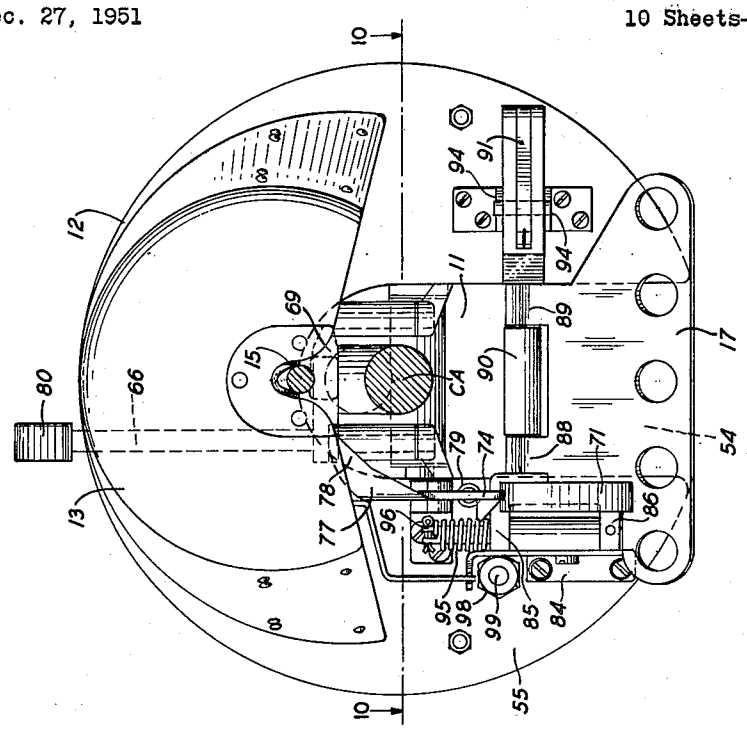
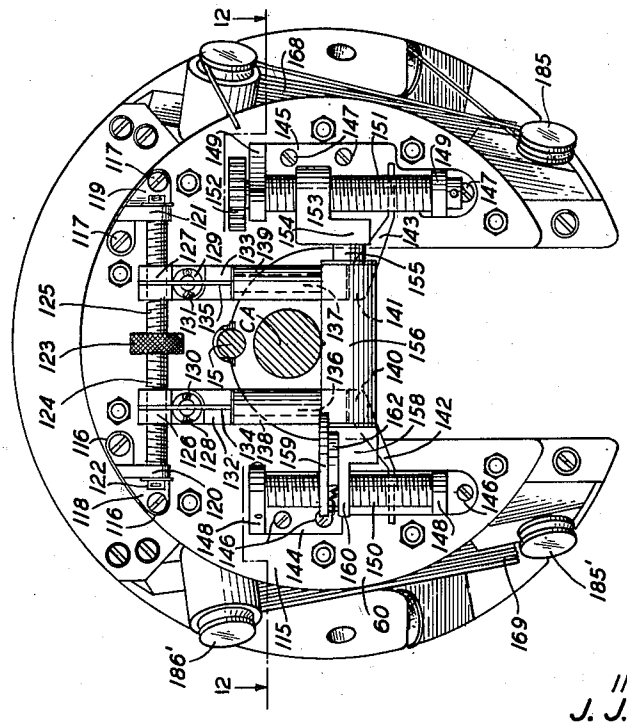



FIG. 4




INVENTOR
J. J. HARLEY
BY
Howard G. Flamm
ATTORNEY

Dec. 22, 1953 J. J. HARLEY 2,663,544

CABLE LASHING MACHINE

Filed Dec. 27, 1951 10 Sheets-Sheet 5

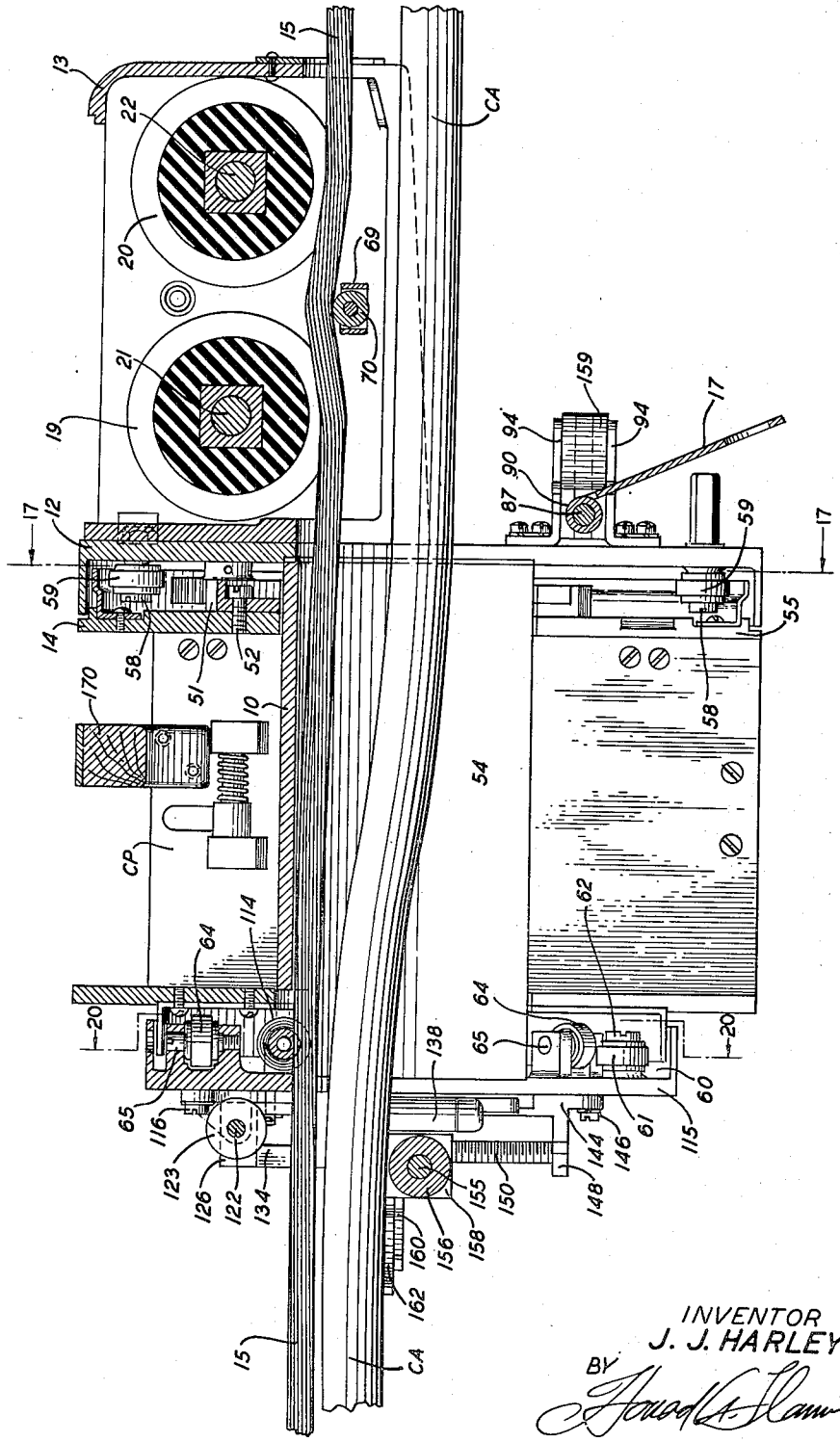



FIG. 6

INVENTOR
J. J. HARLEY
BY
ATTORNEY

Dec. 22, 1953 J. J. HARLEY 2,663,544

CABLE LASHING MACHINE

Filed Dec. 27, 1951 10 Sheets-Sheet 6

FIG. 8

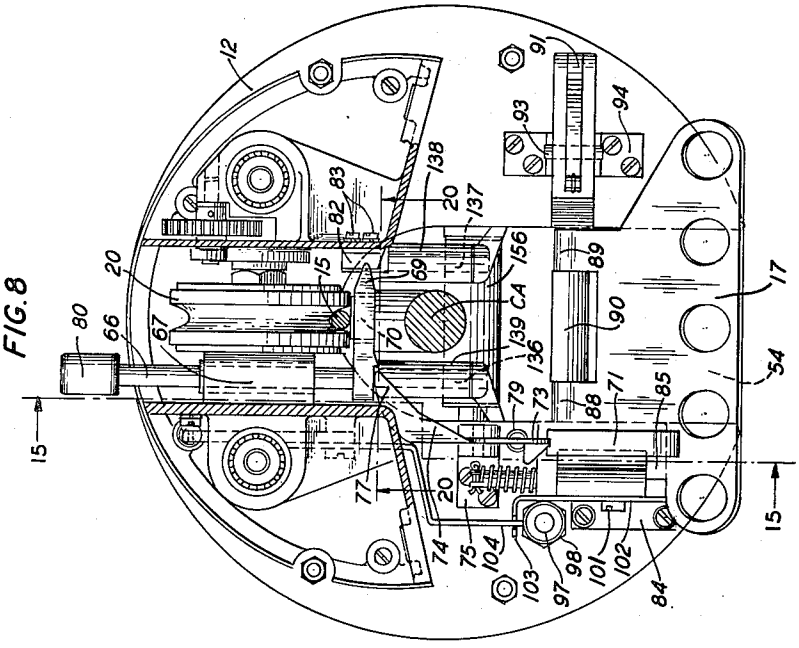
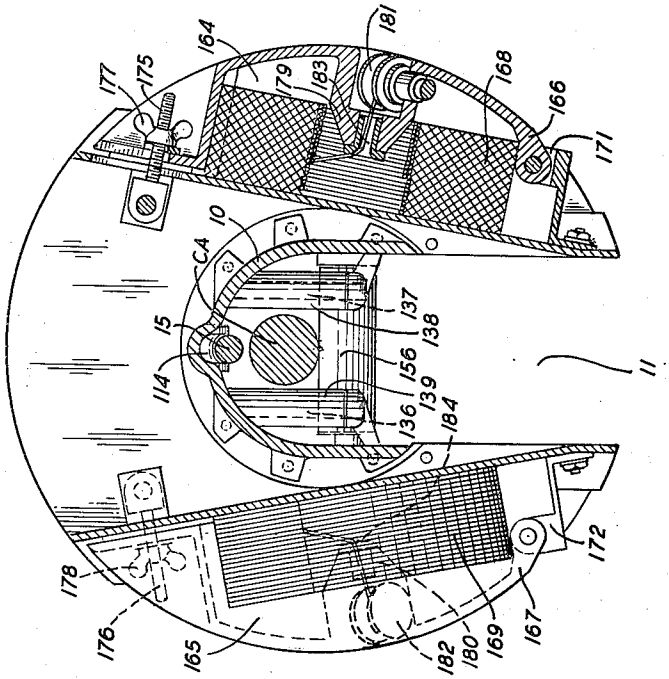



FIG. 7




INVENTOR
J. J. HARLEY
BY Howard C. Flamm
ATTORNEY

Dec. 22, 1953 J. J. HARLEY 2,663,544

CABLE LASHING MACHINE

Filed Dec. 27, 1951 10 Sheets-Sheet 7

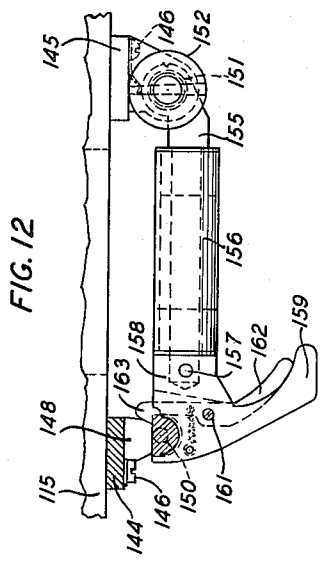



FIG. 12

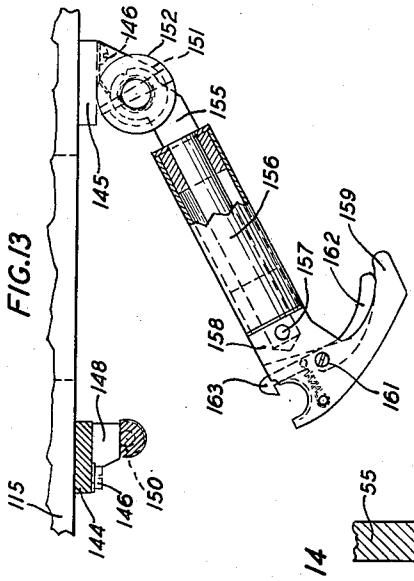



FIG. 13

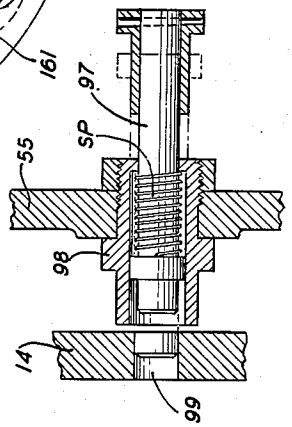



FIG. 14

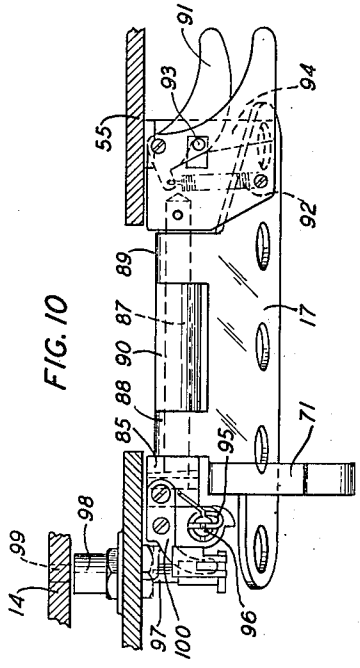



FIG. 10

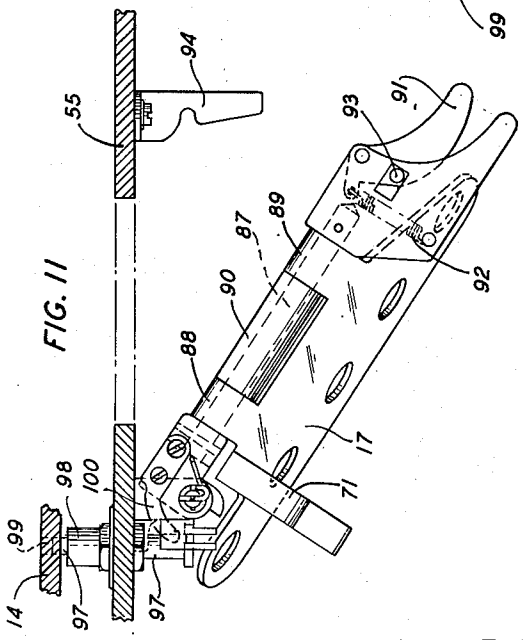



FIG. 11

INVENTOR
J. J. HARLEY
BY
ATTORNEY

Dec. 22, 1953 J. J. HARLEY 2,663,544

CABLE LASHING MACHINE

Filed Dec. 27, 1951 10 Sheets-Sheet 8

FIG. 16

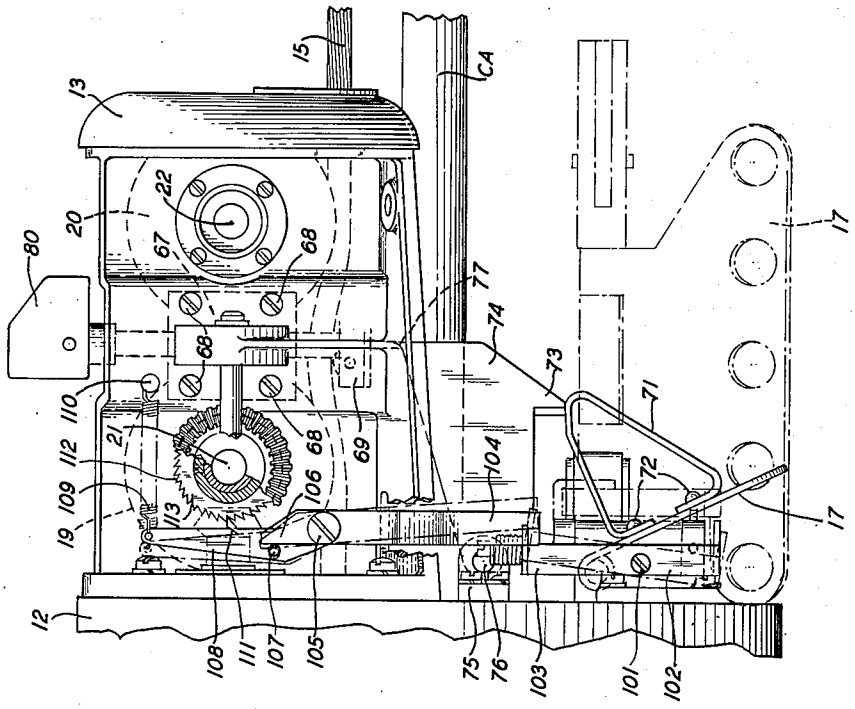
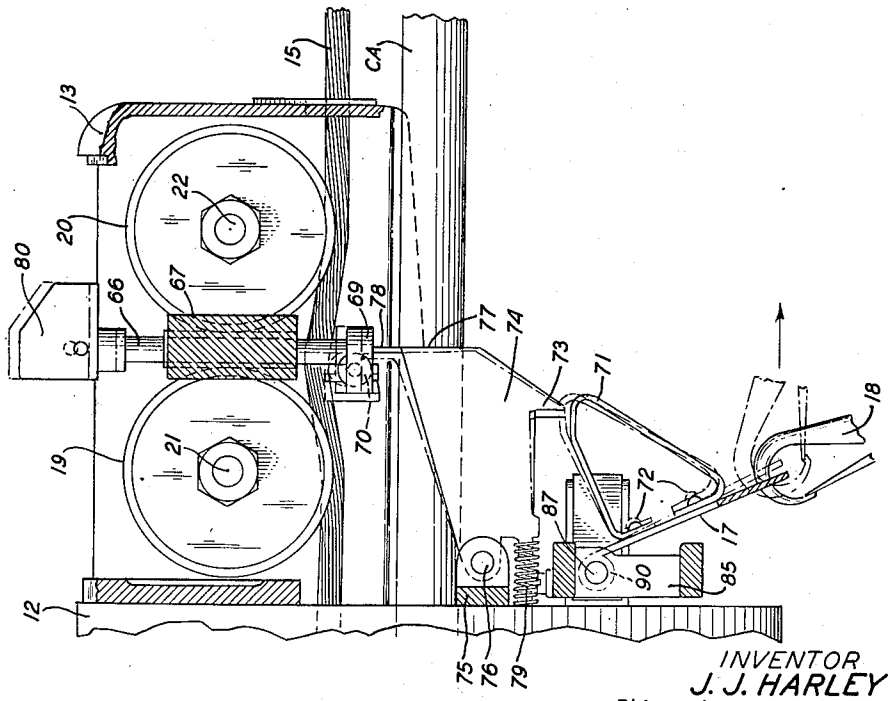



FIG. 15




INVENTOR
J. J. HARLEY
BY
ATTORNEY

Dec. 22, 1953 J. J. HARLEY 2,663,544

CABLE LASHING MACHINE

Filed Dec. 27, 1951 10 Sheets-Sheet 9

FIG. 18

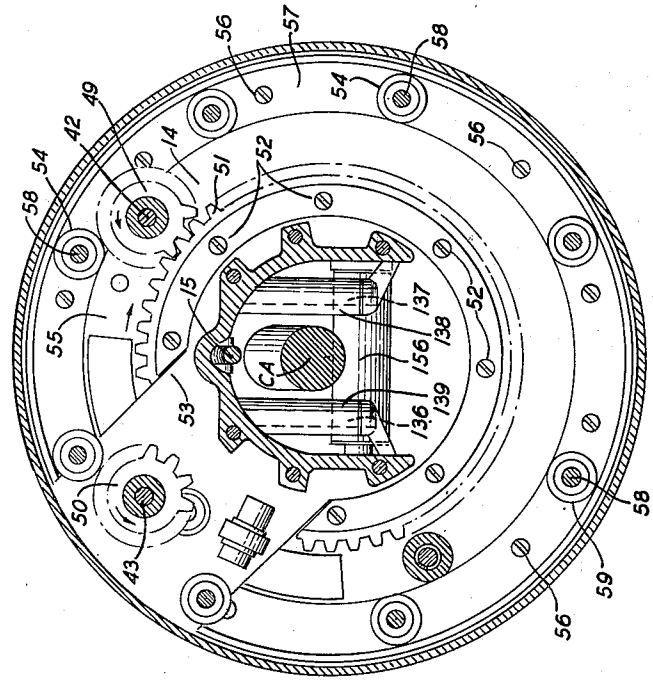



FIG. 19

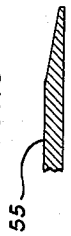
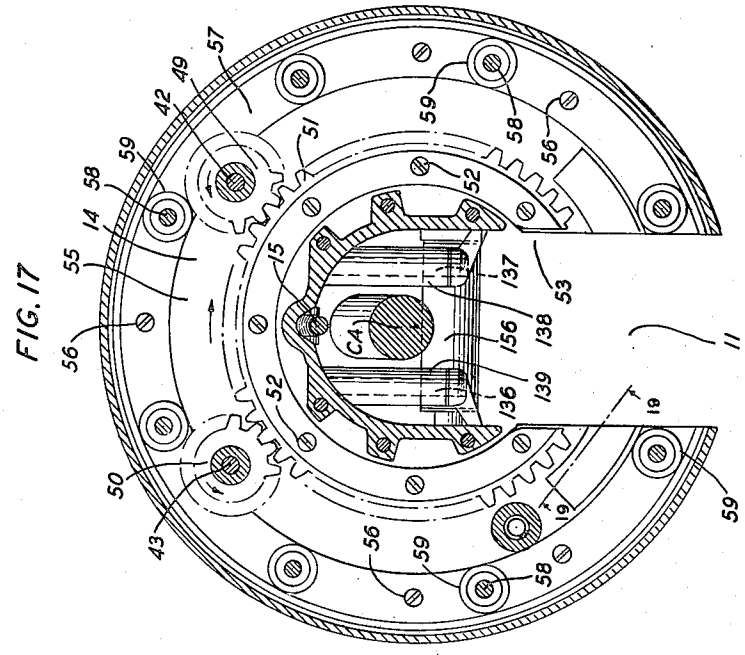



FIG. 17




INVENTOR
J. J. HARLEY
BY Donald C. Slann
ATTORNEY

Dec. 22, 1953 J. J. HARLEY 2,663,544

CABLE LASHING MACHINE

Filed Dec. 27, 1951 10 Sheets-Sheet 10

FIG. 21

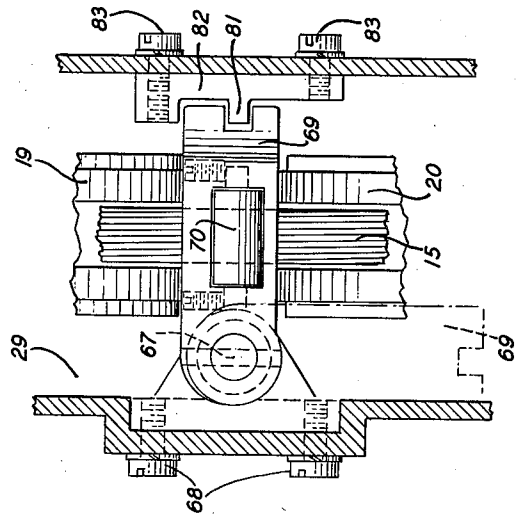
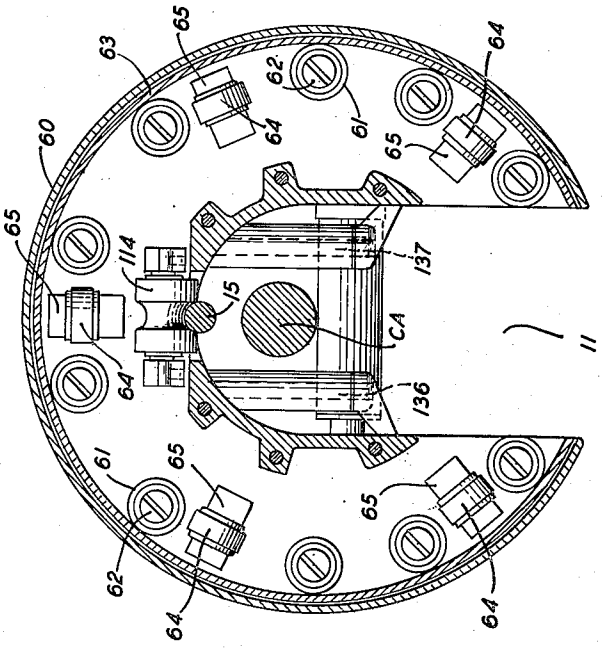



FIG. 20




INVENTOR
J. J. HARLEY
BY Harad & Ram
ATTORNEY

Patented Dec. 22, 1953

2,663,544

# UNITED STATES PATENT OFFICE

2,663,544

## CABLE LASHING MACHINE

Joseph J. Harley, Summit, N. J., assignor to Bell Telephone Laboratories, Incorporated, New York, N. Y., a corporation of New York

Application December 27, 1951, Serial No. 263,675

14 Claims. (Cl. 254—134.3)

1

This invention relates to the installation of aerial cable and more particularly to a machine for securing an aerial cable to a messenger or supporting strand.

One object of the present invention is to provide a machine for securing an aerial cable to a supporting strand in such a manner that the tension on the towing line secured to the front end of the machine forces the supporting strand into intimate engagement with the driving wheels in the forward part of the machine housing.

Another object of the invention is the provision of a cable lashing machine which maintains the supporting strand and the cable in close relation and at the same time serving a lashing wire therearound to secure the cable and supporting strand together.

A further object of the invention is the provision, in a cable lashing machine, of means for preventing the backward movement of the machine when forward tension on the machine is released.

A still further object of the invention is the provision of a positive action driving mechanism for operating the rotating drum which carries the coils of lashing wire.

The machine of my invention is an improvement over the cable lashing machines shown in Patents 2,231,962, 2,272,253 and 2,544,313.

In the preferred form of my cable lashing machine, I provide a chassis having spaced apart stationary front and rear portions and a rotatable cylinder or drum positioned therebetween and rotatable on the chassis. The forward part of the machine, that is, the stationary part, houses the driving mechanism for the drum and supports the front end of the machine. The rear end of the machine is provided with means for supporting the rear end and provides means for holding the cable to be secured to the supporting strand in juxtaposition as it is lashed to the supporting strand. The rotating drum is provided with suitable compartments which are diametrically opposed and carry preformed coils of lashing wire. The wire from either reel is paid out and wrapped around the supporting strand and cable as the machine advances along the supporting strand and secures the strand and cable together in such a manner that there is little or no movement therebetween after the installation is completed.

Means are located in the forward part of the machine associated with the driving means for preventing the lashing wire from slacking off due to the lashing machine moving backward when forward tension on the machine is released.

2

Means have also been provided in the forward part of the machine and associated with the driving mechanism wherein the tension on the towing line controls the pressure of the driving wheels on the supporting strand by means associated therewith which forces the strand up into intimate contact with the driving wheels.

In the machine of my invention I have incorporated at the rear end thereof an improved means for supporting and positioning the cable and supporting strand just prior to the lashing wire being applied therearound.

The invention and the several features thereof will be more clearly understood from the following detailed description with reference to the accompanying drawings in which:

Fig. 1 is a perspective view of the cable lashing machine of my invention in position on a fragment of strand with a cable in the process of being lashed thereto;

Fig. 2 is a side elevation of the lashing machine shown in Fig. 1 with parts of the forward housing broken away to clearly show the mechanism for driving the rotatable drum;

Fig. 3 is a top plan view of the machine shown in Figs. 1 and 2 with the top plate of the forward housing removed and a portion of the gear housing for the driving mechanism broken away;

Fig. 4 is a rear end view of the machine shown in Figs. 1, 2 and 3 with the rotating drum in its locked position;

Fig. 5 is a front end view of the machine shown in Figs. 1, 2 and 3;

Fig. 6 is a longitudinal view in section taken on line 6—6 of Fig. 3;

Fig. 7 is a cross sectional view taken on line 7—7 of Fig. 3;

Fig. 8 is a cross sectional view taken on line 8—8 of Fig. 2;

Fig. 9 is a fragmentary view partly in section of the securing means for the cover on the forward housing of the machine;

Fig. 10 is a fragmentary view partly in section taken on line 10—10 of Fig. 5 and shows the front cable guide roller in its locked position;

Fig. 11 is a fragmentary view similar to Fig. 10 with the front cable guide in its opened position;

Fig. 12 is a fragmentary view taken on line 12—12 of Fig. 4 and shows the rear cable guide roller in its locked position;

Fig. 13 is a view similar to Fig. 12 with the rear cable guide in its open position;

Fig. 14 is a fragmentary view, partly in section, of the locking pin for preventing the drum from rotating when the front cable guide roller is in its open position, as shown in Fig. 11;

Fig. 15 is a fragmentary view partly in cross section of the forward end of the machine illustrating in detail the mechanism for forcing the supporting strand into contact with the driving wheels taken on line 15—15 of Fig. 8;

Fig. 16 is a fragmentary view partly in section of the forward part of the machine illustrating the driving mechanism and showing in dot and dash lines the position assumed by the gate which operates the strand tension mechanism when it is in its inoperated or open position;

Fig. 17 is a cross sectional view of the machine of this invention taken on line 17—17 of Fig. 6;

Fig. 18 is a fragmentary view partly in cross section similar to Fig. 17 but with the rotatable drum rotated approximately 120° from its normal position;

Fig. 19 is a fragmentary view, in cross section, taken on line 19—19 of Fig. 17;

Fig. 20 is a fragmentary view partly in cross section taken on line 20—20 of Fig. 6; and

Fig. 21 is a bottom view partly in section of the roller mechanism which bears against the underside of the supporting strand, and shows in dot and dash lines the position assumed by the roller mechanism when it is shown out of position to permit the cable lashing machine to be placed on the strand.

As shown in the drawings, the cable lashing machine of this invention comprises a chassis or frame 10 having a longitudinally extending passage 11 therethrough. The front end 12 of the chassis 10 has mounted thereon an extended frame portion 13, on which there is mounted the driving mechanism for a rotatable drum 14 which is mounted on the chassis 10 toward the rear of the frame 13. The drum 14 is adapted to be rotated when the machine is towed along the strand 15 by means of the hand line 16 which is secured to the cable guide plate 17 by the attachment 18.

As shown in Figs. 1, 2, 3 and 6, the front end housing 12 has mounted thereon an extending frame portion 13 which with the chassis 10 forms the stationary part of the machine and contains the driving mechanism for the drum 14.

As shown in Figs. 2, 3, 6, 8, 15 and 16, the driving mechanism comprises a pair of V groove driving pulleys 19 and 20, preferably made from a tough resilient material such as tire tread rubber. The pulleys 19 and 20 are mounted axially on the shafts 21 and 22 which are journalled in suitable bearings 23, 24, 25, and 26 in the wall sections 27 and 28 of the housing. As shown, the wall sections 27 and 28 are spaced apart to form a central compartment 29 for the pulleys 19 and 20 and to provide on each side thereof the compartments 30 and 31.

Located in compartment 30 and mounted on the end of the pulley shaft 22, is the gear 32 which is in constant mesh with the idler gear 33 mounted on the shaft 34 which is journalled in the bearing 35 in the wall section 27 and the web member 36. Also in constant mesh with the idler gear 33 is the gear 37 which is mounted on the end of the pulley shaft 21 which has mounted on each end thereof the bevelled gears 38 and 39 which are in constant mesh with the bevel pinions 40 and 41 which are mounted on the shafts 42 and 43. The bevel pinion 40, which is mounted on the shaft 42, is located in compartment 30, one end of the shaft being journalled in the bearing 44 in the web 36 and the other end journalled in the bearing 45 in the frame 10. In a similar manner the bevel pinion 41 is mounted on the shaft 43 in the compartment 31, one end of which is journalled in the bearing 46 of the web 47 and the other journalled in the bearing 48 of the frame 10.



Located on each end of the shafts 42 and 43, which extend into the housing 12, are the pinion gears 49 and 50; these gears are in mesh with the segmental ring gear 51 which is secured to the drum 14 by bolts 52 and is provided with a radial slot 53 which is of substantially the same width as the passageway 11 in the drum member 14 and the opening 54 in the chassis 10 and housing 12, as shown in Figs. 6, 17 and 18. These openings are provided to permit the machine of this invention to be placed astride the strand 15 and the cable CA as shown in the various figures.

As shown in Figs. 3, 6, 17 and 18 and in more detail in Figs. 17 and 18, there is secured on the front face 55 of the drum 14, adjacent the outer periphery thereof, by bolts 56, a segmental flange or track member 57. This, like the ring gear 51 and the face 55, has a portion cut away to provide an opening therein which is in alignment with the opening 54 of the drum 14 and the passageway 11 in the chassis 10.

Mounted in the housing 12, in circumferential relation with respect to the ring gear 51, and rotatably supported on the walls thereof by suitable axles 58 are the guide rollers 59. These guide rollers are in engagement with the track member 57 and serve as the front end bearing for the drum 14.

The rear end of the drum 14, as shown in Figs. 6 and 20, is rotatably supported in the rear end housing 60 of the chassis of frame 10, by suitable rollers axially mounted on the wall of the housing. As shown in Fig. 20, two sets of rollers are provided; one set 61 is mounted in axial relation with respect to the drum 14 on suitable supports 62 and in contact with the segmental track 63. Another set of rollers 64 is mounted radially on the supports 65 with their axes at right angles with respect to the axes of rollers 62 and serve as an end or thrust bearing for the drum 14 by engagement with the outer end thereof. Thus, we have the drum 14 rotatably mounted on the rollers 61 and 64 in the rear end housing 60 and on the rollers 59 in the front end housing 12 and rotatably driven by the power transmitted by the frictional engagement of the V pulleys 19 and 20 with the strand 15, thus driving the gears 32 and 37 and the idler gear 33, which in turn transmits power to the bevelled gears 38 and 39 which drive the pinions 40 and 41 and through the shafts 42 and 43, drive the pinions 49 and 50 which are in engagement with the ring gear 51 mounted on the drum 14.

The pinion gears 49 and 50 are so located with respect to the slot 53 in the ring gear 51 that the power transmitted to the drum 14 through the ring gear and its associated gears, is constant, as long as the V pulleys 19 and 20 are in engagement with the strand and the machine is being towed therealong, since at no time is the ring gear 51 out of engagement with one or the other of the pinion gears 49 and 50.

As shown in Figs. 1, 2, 5, 8, 15 and 16 and more in detail in Figs. 8, 15 and 16, means are provided for forcing the strand 15 up into intimate engagement with the V pulleys 19 and 20. The means as shown comprises a vertical shaft 66 rotatably mounted in the guide bracket 67, which is secured in a recess in the wall 28 of the casting, which forms the compartment 29, as shown in Fig. 21, by the screws 68. The lower end of the

shaft 66, as shown in the various figures, and particularly in Figs. 8 and 15, is provided with an arm 69 which extends at right angles with respect to the shaft 66 and has rotatably mounted thereon a roller member 70 which is adapted to engage the strand 15, as shown in the various figures and with particular reference to Figs. 6 and 15, and force the strand 15 up into intimate engagement with the strand when the shaft 66 and its associated parts are moved upwardly. In its normal position, as shown in the dotted lines in Fig. 2, the roller 70 of the arm 69 bears against but does not exert any pressure against the strand. Since it is desirable that the strand 15 be forced upwardly into intimate engagement with the pulleys 19 and 20, only when the machine is in operation, means have been provided controlled by the forward tension on the tow line 16 which applies pressure on the roller 70 and the consequent forcing upwardly of the strand 15 into intimate engagement with the pulleys 19 and 20 to provide the necessary traction to drive the mechanism which wraps the wire WR around the strand 15 and the cable CA, as shown in Fig. 1.

As shown in the various figures, the means for forcing the roller 70 upwardly into intimate engagement with the pulleys 19 and 20, comprises a bracket member 71 which is secured to the outer face of the guide plate 17 by means of suitable rivets 72. The member 71 extends upwardly and has its extended portion in engagement with the shoulder 73 on the member 74 which is pivotally supported on the frame 10 by means of the bracket 75 and the pin 76.

The free end 77 of the member 74 has a tapered configuration and is bent at substantially right angles to provide the extending arm 78 which is adapted to engage the underside of the roller supporting arm 69 when the member 74 is forced upwardly by the bracket 71 when a force, in the direction indicated by the arrow in Fig. 18, is applied to the guide plate 17 by the tow line 16 and its associated attachment 18.

In order to maintain the roller 70 in engagement with the strand 15 and in such a manner that the force applied is not sufficient to cause the strand 15 to be intimately engaged with the pulleys 19 and 20, a coil spring 79 is positioned between the frame 10 and a protuberance on the member 74. This spring, since it is confined between the frame 10 and the member 74, forces the member 74 outwardly which, in turn, causes the extending arm portion 78 to engage the roller supporting arm 69 and maintain it in juxtaposition.

When the lashing machine is to be placed on or removed from the supporting strand 15, the arm 69 and its associated roller 70, as shown by the full lines in Fig. 21 is rotated approximately 90 degrees, as shown by the dot and dash lines in Fig. 21, by the knob 80 which is secured to the upper or extending end of the shaft 66. In order to rotate the shaft 66 and its associated arm 69 and roller 70, from its operating position, as shown by the full lines in Fig. 21, to the position shown by the dotted lines in the same figure, downward pressure is applied to the shaft 66 by the knob 80 against the tension of the spring 79. This causes the bifurcated portion of the arm 69 to become disengaged from the boss 81 on the plate 82 which is secured to the casting by means of the screws 83 and permits the free rotation of the shaft 66, its associated arm 69 and roller 70.

In the foregoing operation wherein the arm 69 and its associated roller are swung out of position to permit the strand to be placed in or removed from the machine, the knob 80 which is secured to the shaft 66 is depressed as shown in the dot and dash lines in Fig. 15 and is rotated in a clockwise direction approximately 90 degrees, thus causing the shaft 66 to travel downwardly and disengage the arm 78 from the boss 81 and move the roller 70 away from the strand 15, as shown in dot and dash lines in Fig. 21.

Hingedly mounted on the front face of the housing 12 on the bracket 84 is the yoke member 85 which has located on its lower end, and projecting at right angles therefrom, the pin 86, the function of which will hereinafter be described in detail.

Secured in the yoke member 85 and extending at right angles with respect thereto and spaced radially approximately 90 degrees with respect to the pin 86 is the shaft 87. The shaft 87 has pivotally mounted thereon the downwardly depending guide plate 17 which is bifurcated at its upper end to provide the two return bend portions 88 and 89, which form bearings for the shaft 87. Located between the bearings 88 and 89 and rotatably mounted on the shaft 87 is the roller 90 which serves as a support for the cable CA, in the event that the cable sags during installation.

The hinged shaft 87 with its roller 90 and associated guide plate 17, may be readily swung out of its locked position across the passageway 11, as shown in Fig. 10, and into position as shown in Fig. 11, to permit the machine to be placed over the cable CA and the strand 15, by operating the latch 91 against the tension of the spring 92 to cause the pin 93 mounted thereon to become disengaged from the catch 94 and permit the assembly to swing outwardly under the influence of the coil spring 95 located on the top portion of the hinge pin 96, as shown.

As the roller and guide plate assembly is swung open, as shown in Fig. 11, the pin 97 which is slidably mounted on the bearing 98, will under the influence of an internal spring SP, move inwardly and into engagement with the aperture 99 on the face 55 of the drum 14. The aperture 99 is so positioned on the drum 14, with respect to the pin 97, that when the pin is positioned in the aperture the passageway 11 will be in alignment with the opening 54 as shown in Fig. 14.

When the guide roller and guide plate assembly is in its operative or closed position, as shown in Figs. 1, 2, 3, 5, 8, 15 and 16, and more in detail in Fig. 10, the pin 97 will be held out of engagement with the aperture 99 in the face 55 of the drum 14 by means of the arm 100 secured to the top of the yoke 85, and will therefore permit the drum 14 to be readily rotated. However, when the roller and guide plate assembly is swung outwardly as shown in Fig. 11, the pin 97, under the influence of the internal spring SP, will bear against the face of the drum 55 and will enter the aperture 99 when the passageway 11 and the opening 54 are in alignment, thereby preventing the drum from rotating when the machine is being positioned on or being removed from the strand and cable.

As shown in Figs. 2, 5 and 8, and more in detail in Fig. 16, there is pivotally mounted on the outer side of the bracket 84, by means of the screw 101, and lever arm 102, the upper end 103 of the arm 102 is bent substantially at right angles and is in engagement with the under-

side of the offset arm 104 which extends upwardly and is pivotally supported by the screw 105 as shown in Figs. 2 and 5. The upper end 106 of the arm 104 is in engagement with a pin 107 on the arm 108 which is also pivoted on the screw 105.

The upper or free end of the arm 108 is provided with an aperture through which one end of the coil spring 109 passes, the other end being secured to the pin 110 located on the frame casting of the machine, thus biasing the arm 108 in the direction of the arm 104, and holding the pin 107 on the arm 108, in engagement with the end of the offset arm 104.

Located on the arm 108, as shown in Fig. 16, is an extending tooth member 111 which is adapted to engage the teeth 112 on the ratchet wheel 113, which is secured to the shaft 21 thus providing a ratchet device for the driving mechanism.

In its normal or operative position as shown in the various figures, the tooth 111, on the arm 108, will be in engagement with the teeth 112 on the wheel 113, and due to the spring 109 will be held in contact therewith and prevent counter-clockwise movement of the drive pulleys 19 and 20 and the subsequent riding backward on the strand 15 of the lashing machine, with the consequent releasing of the back tension on the lashing wire WR.

When the roller and guide plate assembly is opened, as shown in Fig. 11, preparatory to placing the machine on or removing it from the strand and cable, the pin 86 on the yoke 85 will engage the bottom portion of the arm 102 and will force it inwardly a slight distance and since the opposite end of the arm 102 is in engagement with the lower end portion of the offset arm 104 it will cause this arm to pivot on the screw 105, bear against the pin 110 and move the arm 108 inwardly, thus disengaging the tooth 111 from the teeth 112 on the ratchet wheel 113, thereby permitting the driving pulleys or wheels 19 and 20 to rotate either in a clockwise or counter-clockwise direction. This structure provides a positive automatic means for preventing the machine from sliding backward on the strand with the consequent loosening of the lashing wire, when forward tension on the tow line is released, but permits the driving mechanism to rotate freely when the roller and guide plate assembly is opened during placement or removal of the machine on the strand.

As shown in Figs. 6, 7, 17 and 18 and more particularly in Fig. 20, a guide pulley 114, in alignment with the V-pulleys 19 and 20, is located on the interior of the rear housing 60 for supporting the machine on the strand 15.

Located on the rear end housing 60 of the chassis 10, which contains the rollers for supporting the rear end of the drum 14, is means for forcing the cable CA upwardly into engagement with the strand 15 and maintains it in juxtaposition while the lashing wire WR is being served therearound as shown in Fig. 1. As shown particularly in Fig. 4, cable positioning guides are mounted on the face 115 of the rear housing 60 and are adjustable to accommodate various sizes of cable. Secured to the face 115 of the rear housing 60, above the passageway 11 screws 116 and 117, are the bracket members 118 and 119. These brackets are spaced apart and are provided with extending ear portions 120 and 121 which have journalled therein the ends of a horizontally extending threaded shaft 122 which has secured at its mid-portion a knurled knob 123. The shaft 122 is freely rotatable in the ears 120 and 121 and is provided on one side of the knob, at 124, with a left-hand thread, and on the other side, at 125, with a right-hand thread. Mounted on the shaft 122 and in threaded engagement therewith and positioned on each side of the knob 123 are the internally threaded downwardly depending L-shaped members 126 and 127. Pivotally secured to the members 126 and 127 by the studs 128 and 129 and the cotter pins 130 and 131, are the L-shaped members 132 and 133. The members 126 and 127 are secured in operative relation to the members 132 and 133 by flat spring members 134 and 135, which are located in aligned slots in the members, thereby providing a pair of hinged members which are maintained in juxtaposition but are free to flex either to the right or left.

Rotatably mounted on the shafts 136 and 137 which are secured in and downwardly depending from the members 132 and 133, are the vertical rollers 138 and 139. Secured to the ends of the shafts 136 and 137, are the members 140 and 141 which have projecting therefrom the guide arms 142 and 143 which serve to hold the shafts 136 and 137 and their associated rollers 138 and 139 in position.

It will thus be observed that upon rotation of the knob 123, either clockwise or counter-clockwise, the shaft 122 will be caused to rotate and since the members 126 and 127 and their associated members 132 and 133 with the rollers mounted thereon are operatively connected to the members 126 and 127, the rollers 138 and 139 will travel either toward or away from each other, thereby reducing or enlarging the space between the rollers 138 and 139, and since the connection between the two sets of L-shaped members is flexible, to a degree, the rollers will conform to any irregularities of the cable sheath while still confining the cable therebetween and preventing undue sideward movement.

Associated with the rear cable guiding means heretofore described, and positioned adjacent to it, is a means for lifting the cable CA into close proximity with the strand 15 just prior to the application of the lashing wire WR. The cable lifting means as shown in the various figures and with particular reference to Figs. 4, 6, 12 and 13, is mounted on the face 115 of the rear housing 60 by means of suitable brackets 144 and 145, which are secured on each side of the passageway 11 below the brackets 118 and 119, which support the guide rollers 138 and 139, by means of screws 146 and 147.

The brackets 144 and 145, as shown, are provided with spaced apart outwardly extending ears or lugs 148—148, and 149—149, in which the ends of the vertically extending threaded shafts 150 and 151 are mounted. The threaded shaft 151 is journalled in the ears 149—149, and is adapted to be rotated either clockwise or counter-clockwise by means of the knurled knob 152 located on the upper end of the shaft 151, and the shaft 150, which is flat on its rear side, is fixedly secured in the ears 148—148 by pins (not shown). Hingedly positioned on the shaft 151, between the ears 149—149, and in threaded engagement with the shaft is the internally threaded boss member 153 which is provided with a downwardly extending ear portion 154 in which there is secured the outboard shaft 155, which extends across the passageway 11 and has mounted thereon a roller 156. As shown, the free end of

the shaft 155 has secured thereto by means of the pin 157, a bifurcated sleeve member 158 having spaced apart extending arm portions 159 and 160. The member 158 has pivotally mounted in its bifurcated end portion, between the arms 158 and 159, by means of the spring 161, a spring biased latch or dog 162, the end portion of which is notched at 163 and is arranged to engage the flattened rear side of the shaft 150 as shown in Fig. 12 and lock the roller assembly closed with the internally threaded portion of the bifurcated end of the sleeve 158 in engagement with the threads on the shaft 150.

When it is desired to either raise or lower the roller 156, to accommodate cables of different sizes the latch member 162 is depressed, which causes the notched end 163 to become disengaged from the flattened rear portion of the shaft 150 thereby permitting the assembly to rotate on the shaft 151 and swing open, as shown in Fig. 13. After the assembly has assumed the position as shown in Fig. 13, it may be raised or lowered by the manipulation of the knob 152, thus when the assembly has been adjusted it may be returned to its normal or operative position and locked in place by the latch mechanism as heretofore explained.

The drum 14, as shown in various figures, and with particular reference to Fig. 7, is provided with diametrically opposed compartments 164 and 165 in which there is confined by means of the gates 166 and 167 the coils of lashing wire 168 and 169. The gates 166 and 167 are hingeably mounted on the ears 171 and 172 by suitable pins 173 and 174 on each side of the passageway mounted across the top compartment CP is the cross member 176 which provides a suitable handle for gripping the machine to place it in position on the strand 15. Locking means comprising the spring biased hinged bolts 175 and 176 and threaded wing nuts 177 and 178 securely hold the gates 166 and 167 in their closed position and confine the coils of lashing wire 168 and 169 between the protuberances 179 and 180 on the gates and the inner walls of the compartments 164 and 165. Journalled in the gates 166 and 167 are guide rollers 181 and 182. These rollers are located in suitable slots and are positioned over the protuberances 179 and 180 each of which are provided with circularly disposed apertures 183 and 184.

In order to facilitate the feeding of the lashing wire WR from the coils 168 and 169 and to reduce the friction as much as possible, the axes of the rollers 181 and 182 are disposed at an angle and are in alignment with suitable guide rollers 185 and 185' which are rotatably mounted in the rear of the drum 14 adjacent the end thereof. As shown the lashing wire WR, after leaving the coil 168, passes through the aperture 184, over the roller 181 one turn around the roller 185 over the roller 186 and thence around the strand 15 and the cable CA, as shown in Fig. 1.

A suitable cover 187 is provided on the forward end of the machine, over the driving mechanism and is held in position by means of suitable bolts 188, as shown in Fig. 9.

In the application of the lashing machine of this invention to the practice of securing aerial cable to a supporting strand by means of a wire lashed therearound, in place of the usual cable rings, the following sequence of operation is followed.

The coils of lashing wire 168 and 169 are placed in their respective compartments 164 and 165.



One coil, that is, the reserve coil 169 is left intact after it has been placed in position but the wire in the coil 168 is threaded through the aperture 183 over the pulleys or rollers 181, 185, and 186, and is pulled outwardly a sufficient amount to provide an adequate length of wire for securing it to the cable CA and the strand 15, prior to the operation of the lashing machine. After the coils of lashing wire 167 and 168 have been positioned in the compartments 164 and 165 in the drum 14, as heretofore described, the strand tensioning roller 70, mounted on the bracket 71 is swung open from its normal or operating position across the passageway 11. The next step is to swing the rear cable supporting roller 156 out of its position across the passageway 11 and adjust the vertical rollers 138 and 139 to the proper size of cable. The machine is then placed over the strand and cable with the strand 15 positioned in the grooves of the pulleys 19 and 20 and in the groove of the rear pulley or roller 114.

The strand tensioning roller 70 is then swung back into position across the passageway 11 and into contact with the strand 15 where it will later operate to force the strand up into intimate contact with the drive-pulleys 19 and 20 in the manner as heretofore described and as shown in Figs. 8 and 15. The strand tensioning roller 70 is swung back to its normal position, as above described, by means of the rotation of the knob 80, which is secured to the operating shaft 56. However, since no tension has been applied to the guide plate 18 by means of the tow rope 16 through the attachment 18, the lashing mechanism, as heretofore described, to prevent backward motion of the lashing machine on the cable, will be inoperative and will permit the ready placement of the machine on the cable.

The next step is to secure the free end of the lashing wire WR to the strand 15 after which the lashing of the cable CA to the strand 15 may proceed by towing the lashing machine along the strand by means of the tow rope 16 as heretofore referred to and as shown in Fig. 1.

While there has been shown herein and described a preferred embodiment of my invention, it will be understood that various modifications and changes may be made therein without departing from the scope and spirit of the invention.

What is claimed is:

1. A machine for securing a cable to a supporting strand which comprises a chassis having front and rear spaced apart housings, a guide plate hingedly secured to said chassis for attaching a tow line thereto, a drum rotatably supported between said housings, said drum and said housings having aligned central bores for the reception of the cable and the supporting strand, said housings and said drum having openings therein communicating with said bores to permit the machine to be placed in operative position on the supporting strand, a coil of lashing wire carried by said drum, driving wheels each mounted on an axis, in the front housing one ahead of the other and in space relation for engaging the same side of the supporting strand, an arm pivotally mounted on the chassis, means operatively associated with said arm and said guide plate for forcing said arm upwardly against said strand to cause intimate contact between said strand and said driving wheels when forward tension is applied to said guide plate, means in said front housing operatively connected to

said drum and to said driving wheels for causing the rotation of said drum as said driving wheels are operated by the forward motion of the machine to cause the lashing wire carried by said drum to be wrapped around the strand and cable, means for preventing rearward movement of the machine when forward tension is released comprising a ratchet wheel operatively connected to one of said driving wheels and a dog member normally held in engagement with the teeth on said ratchet wheel, and means on said chassis operatively connected to said guide plate for disengaging said dog from said ratchet wheel when said guide plate is moved from its normal operating position.

2. A machine for securing a cable to a supporting strand which comprises a chassis having front and rear spaced apart housings, a guide plate having a roller thereon hingedly secured to said chassis for attaching a tow line thereto, a drum rotatably supported between said housings, said drum and said housings having aligned central bores for the reception of the cable and the supporting strand, said housings and said drums having openings therein communicating with said bores to permit the machine to be placed in operative position on the supporting strand, a pair of preformed coils of lashing wire carried by said drum on opposite sides thereof, a pair of driving wheels each mounted on an axis in the front housing one ahead of the other and in space relation for engaging the same side of the supporting strand, an arm having a roller mounted thereon, pivotally mounted on the opposite side thereof between said wheels, means operatively associated with said arm, roller, and guide plate, for forcing said arm and roller upwardly against said strand to cause intimate contact between said strand and said driving wheels when forward tension is applied to said guide plate, means in said front housing operatively connected to said drum for causing the rotation thereof as the driving wheels are operated by the forward movement of the machine to cause the lashing wire carried by said drum to be wrapped around the strand and cable, means for preventing rearward movement of the machine when forward tension is released comprising a ratchet wheel operatively connected to one of said driving wheels, and a dog member normally held in engagement with the teeth on said ratchet wheel, and means on said chassis operatively connected to said guide plate for disengaging said dog from said ratchet wheel when said guide plate is moved from its normal operating position.

3. A machine for securing a cable to a supporting strand which comprises a chassis having front and rear spaced apart housings, a guide plate hingedly secured to said chassis for attaching a tow line thereto, a drum rotatably supported between said housings, said drum and said housings having aligned central bores for the reception of the cable and the supporting strand, said housings and said drum having openings therein communicating with said bores to permit the machine to be placed in operative position on the supporting strand, a pair of preformed coils of lashing wire carried by said drum on opposite sides thereof, a pair of driving wheels each mounted on an axis, in the front housing one ahead of the other and in space relation for engaging the same side of the supporting strand, an arm pivotally mounted on the opposite side thereof, between said wheels, means operatively associated with said arm and said guide plate for forcing said arm upwardly against said strand to cause intimate contact between said strand and said driving wheels when forward tension is applied to said guide plate, means in said front housing operatively connected to said drum and to said driving wheels to cause the rotation of said drum as said driving wheels are operated by the forward motion of the machine to cause the lashing wire carried by said drum to be wrapped around the strand and cable, means for preventing rearward movement of the machine when forward tension is released comprising a ratchet wheel operatively connected to one of said driving wheels, a lever arm pivotally mounted adjacent said ratchet wheel and having a projecting tooth thereon, means for holding said tooth in engagement with said ratchet wheel, a second lever arm operatively connected to said first arm and to said guide plate for disengaging said tooth from said ratchet wheel when said guide plate is moved from its normal operating position.

4. A machine for securing a cable to a supporting strand which comprises a chassis having front and rear spaced apart housings, a guide plate having a roller thereon hingedly secured to said chassis for attaching a tow line thereto, a drum rotatably supported between said housings, said drum and said housings having aligned central bores for the reception of the cable and the supporting strand, said housings and said drums having openings therein communicating with said bores to permit the machine to be placed in operative position on the supporting stand, a pair of preformed coils of lashing wire carried by said drum on opposite sides thereof, a pair of driving wheels each mounted on an axis in the front housing one ahead of the other and in space relation for engaging the same side of the supporting strand, an arm having a roller mounted thereon, pivotally mounted on the opposite side thereof between said wheels, means operatively associated with said arm, roller, and guide plate, for forcing said arm and roller upwardly against said strand to cause intimate contact between said strand and said driving wheels when forward tension is applied to said guide plate, means in said front housing operatively connected to said drum to cause the rotation thereof as the driving wheels are operated by the forward movement of the machine to cause the lashing wire carried by said drum to be wrapped around the strand and cable, means for preventing rearward movement of the machine when forward tension is released comprising a ratchet wheel operatively connected to one of said driving wheels, a lever arm, pivotally mounted adjacent said ratchet wheel, and having a projecting tooth thereon, means for holding said tooth in engagement with said ratchet wheel, a second lever arm operatively connected to said first arm and to said guide plate for disengaging said tooth from said ratchet wheel when said guide plate is moved from its normal operating position.

5. A machine for securing a cable to a supporting strand which comprises a chassis having front and rear spaced apart housings, a guide plate hingedly secured to said chassis for attaching a tow line thereto, a drum rotatably supported between said housings, said drum and said housings having aligned central bores for the reception of the cable and the supporting strand, said housings and said drum having openings therein communicating with said bores to permit the machine to be placed in operative

position on the supporting strand, a pair of preformed coils of lashing wire carried by said drum on opposite sides thereof, a pair of driving wheels each mounted on an axis, in the front housing one ahead of the other and in space relation for engaging the same side of the supporting strand, an arm pivotally mounted on the opposite side thereof, between said wheels, means operatively associated with said arm and said guide plate for forcing said arm upwardly against said strand to cause intimate contact between said strand and said driving wheels when forward tension is applied to said guide plate, means in said front housing operatively connected to said drum and to said driving wheels to cause the rotation of said drum as said driving wheels are operated by the forward motion of the machine to cause the lashing wire carried by said drum to be wrapped around the strand and cable, means for preventing rearward movement of the machine when forward tension is released comprising a ratchet wheel operatively connected to one of said driving wheels, a lever arm pivotally mounted adjacent said ratchet wheel and having a projecting tooth thereon, means for holding said tooth in engagement with said ratchet wheel, a second lever arm operatively connected to said first arm and to said guide plate for disengaging said tooth from said ratchet wheel when said guide plate is moved from its normal operating position, and an adjustable cable guide comprising a pair of vertically disposed rollers and a horizontal roller mounted in operative relation on the face of said rear housing, said vertical rollers yieldingly mounted and adjustable simultaneously and cooperating with said adjustable horizontal roller to vary the opening therebetween.

6. A machine for securing a cable to a supporting strand which comprises a chassis having front and rear spaced apart housings, a guide plate having a roller thereon hingedly secured to said chassis for attaching a tow line thereto, a drum rotatably supported between said housings, said drum and said housings having aligned central bores for the reception of the cable and the supporting strand, said housings and said drums having openings therein communicating with said bores to permit the machine to be placed in operative position on the supporting strand, a pair of preformed coils of lashing wire carried by said drum on opposite sides thereof, a pair of driving wheels each mounted on an axis in the front housing one ahead of the other and in space relation for engaging the same side of the supporting strand, an arm having a roller mounted thereon, pivotally mounted on the opposite side thereof between said wheels, means operatively associated with said arm, roller, and guide plate, for forcing said arm and roller upwardly against said strand to cause intimate contact between said strand and said driving wheels when forward tension is applied to said guide plate, means in said front housing operatively connected to said drum to cause the rotation thereof as the driving wheels are operated by the forward movement of the machine to cause the lashing wire carried by said drum to be wrapped around the strand and cable, means for preventing rearward movement of the machine when forward tension is released comprising a ratchet wheel operatively connected to one of said driving wheels, a lever arm, pivotally mounted adjacent said ratchet wheel, and having a projecting tooth thereon, means for holding said tooth in engagement with said ratchet wheel, a second lever arm operatively connected to said first arm and to said guide plate for disengaging said tooth from said ratchet wheel when said guide plate is moved from its normal operating position, and an adjustable cable guide comprising a pair of vertically disposed rollers and a horizontal roller mounted in operative relation on the face of said rear housing, said vertical rollers yieldingly mounted and adjustable simultaneously and cooperating with said adjustable horizontal roller to vary the opening therebetween.

7. A machine for securing a cable to a supporting strand which comprises a chassis having front and rear spaced apart housings, a guide plate hingedly secured to said chassis for attaching a tow line thereto, a drum rotatably supported between said housings, said drum and said housings having aligned central bores for the reception of the cable and the supporting strand, said housings and said drum having openings therein communicating with said bores to permit the machine to be placed in operative position on the supporting strand, a pair of coils of lashing wire carried by said drum, on opposite sides thereof, a pair of drive wheels each mounted on an axis, in the front housing one ahead of the other and in space relation for engaging the same side of the supporting strand and an arm pivotally mounted on the opposite side thereof, between said wheels, means operatively associated with said arm and said guide plate for forcing said arm upwardly against said strand to cause intimate contact between said strand and said drive wheels when forward tension is applied to said guide plate, said wheels having driving shafts operatively connected thereto, gears on said driving shaft, an idler gear in mesh with said gears, one of said driving shafts having a gear mounted on each end thereof, a pair of driven shafts operatively connected to said driving shaft and to said drum to cause the rotation thereof as the driving wheels are operated by the forward movement of the machine to cause the lashing wire carried by said drum to be wrapped around the strand and cable, means for preventing rearward movement of the machine when forward tension is released comprising a ratchet wheel operatively connected to one of said driving wheels and a dog member normally held in engagement with the teeth on said ratchet wheel, and means on said chassis operatively connected to said guide plate for disengaging said dog from said ratchet wheel when said guide plate is moved from its normal operating position.

8. A machine for securing a cable to a supporting strand which comprises a chassis having front and rear spaced apart housings, a guide plate having a roller thereon hingedly secured to said chassis for attaching a tow line thereto, a drum rotatably supported between said housings, said drum and said housings having aligned central bores for the reception of the cable and the supporting strand, said housings and said drums having openings therein communicating with said bores to permit the machine to be placed in operative position on the supporting strand, a pair of preformed coils of lashing wire carried in oppositely disposed compartments on said drum, a pair of driving wheels each mounted on an axis, in the front housing one ahead of the other and in space relation for engaging the same side of the supporting strand, an arm, having a roller mount-

ed thereon pivotally supported on the opposite side thereof, between said wheels, means operatively associated with said arm, roller and guide plate, for forcing said arm and roller upwardly against said strand to cause intimate contact between said strand and said drive wheels when forward tension is applied to said guide plate, driving gears operatively connected to said wheels, driven shafts having gears thereon in engagement with said driving gears, gears on said driven shafts in engagement with the gear on said drum to cause the rotation thereof as the driving wheels are operated by the forward movement of the machine to cause the lashing wire carried by said drum to be wrapped around the strand and cable, means for preventing rearward movement of the machine, when forward tension is released, comprising a ratchet wheel operatively connected to one of said driving wheels and a dog member normally held in engagement with the teeth on said ratchet wheel, and means of said chassis operatively connected to said guide plate for disengaging said dog from said ratchet wheel when said guide plate is moved from its normal operating position.

9. A machine for securing a cable to a supporting strand which comprises a chassis having front and rear spaced apart housings, a guide plate hingedly secured to said chassis for attaching a tow line thereto, a drum rotatably supported between said housings, said drum and said housings having aligned central bores for the reception of the cable and the supporting strand, said housings and said drum having openings therein communicating with said bores to permit the machine to be placed in operative position on the supporting strand, preformed coils of lashing wire carried by said drum on opposite sides thereof, a pair of driving wheels, each mounted on an axis in the front housing one ahead of the other in space relation for engaging the same side of the supporting strand, an arm pivotally mounted on the opposite side thereof, between said wheels, means operatively associated with said arm and guide plate for forcing said arm upwardly against said strand to cause intimate contact between said strand and drive wheels when forward tension is applied to said guide plate, said wheels having driving shafts operatively connected thereto, gears on said driving shafts, an idler gear in mesh with said gears, one of said driving shafts having gears mounted on each end thereof, a pair of driven shafts operatively connected to said driving shaft and to said drum to cause the rotation thereof as the driving wheels are operated by the forward movement of the machine to cause the lashing wire, carried by said drum, to be wrapped around the strand and cable, means for preventing rearward movement of the machine, when forward tension is released, comprising a ratchet wheel operatively connected to one of said driving wheels, a lever arm pivotally mounted adjacent said ratchet wheel, and having a projecting tooth thereon, means for holding said tooth in engagement with said ratchet wheel, a second lever arm operatively connected to said first arm and to said guide plate for disengaging said tooth from said ratchet wheel when said guide plate is moved from its normal operating position.

10. A machine for securing a cable to a supporting strand which comprises a chassis having front and rear spaced apart housings, a guide plate having a roller thereon hingedly secured to said chassis for attaching a tow line thereto, a drum rotatably supported between said housings, said drum and said housings having aligned central bores for the reception of the cable and the supporting strand, said housings and said drums having openings therein communicating with said bores to permit the machine to be placed in operative position on the supporting strand, a pair of preformed coils of lashing wire carried in oppositely disposed compartments on said drum, a pair of driving wheels each mounted on an axis, in the front housing one ahead of the other and in space relation for engaging the same side of the supporting strand, an arm, having a roller mounted thereon, pivotally supported on the opposite side thereof, between said wheels, means operatively associated with said arm, roller and guide plate, for forcing said arm and roller upwardly against said strand to cause intimate contact between said strand and said drive wheels when forward tension is applied to said guide plate, driving gears operatively connected to said wheels, driven shafts having gears thereon in engagement with said driving gears, gears on said driven shafts in engagement with the gear on said drum to cause the rotation thereof as the driving wheels are operated by the forward movement of the machine to cause the lashing wire carried by said drum to be wrapped around the strand and cable, means for preventing rearward movement of the machine, when forward tension is released, comprising a ratchet wheel operatively connected to one of said driving wheels, a lever arm pivotally mounted adjacent said ratchet wheel, and having a projecting tooth thereon, means for holding said tooth in engagement with said ratchet wheel, a second lever arm operatively connected to said first arm and to said guide plate for disengaging said tooth from said ratchet wheel when said guide plate is moved from its normal operating position.

11. A machine for securing a cable to a supporting strand which comprises a chassis having front and rear spaced apart housings, a guide plate hingedly secured to said chassis for attaching a tow line thereto, a drum rotatably supported between said housings, said drum and said housings having aligned central bores for the reception of the cable and the supporting strand, said housings and said drums having openings therein communicating with said bores to permit the machine to be placed in operative position on the supporting strand, a pair of preformed coils of lashing wire carried by said drum, on opposite sides thereof, a pair of drive wheels each mounted on an axis, in the front housing one ahead of the other and in space relation for engaging the same side of the supporting strand and an arm pivotally mounted on the opposite side thereof, between said wheels, means operatively associated with said arm and said guide plate for forcing said arm upwardly against said strand to cause intimate contact between said strand and said drive wheels when forward tension is applied to said guide plate, said wheels having driving shafts operatively connected thereto, gears on said driving shafts, an idler gear in mesh with said gears, one of said driving shafts having a gear mounted on each end thereof, a pair of driven shafts operatively connected to said driving shaft and to said drum to cause the rotation thereof as the driving wheels are operated by the forward movement of the machine to cause the lashing wire carried by said drum to be wrapped around the strand and cable, means for preventing rearward movement of the machine when