April 28, 1959 J. L. SHANNON 2,883,813

MACHINE FOR SLEEVING WIRE BUNDLES, AND THE LIKE

Filed March 15, 1955

3 Sheets-Sheet 1

FIG. 1

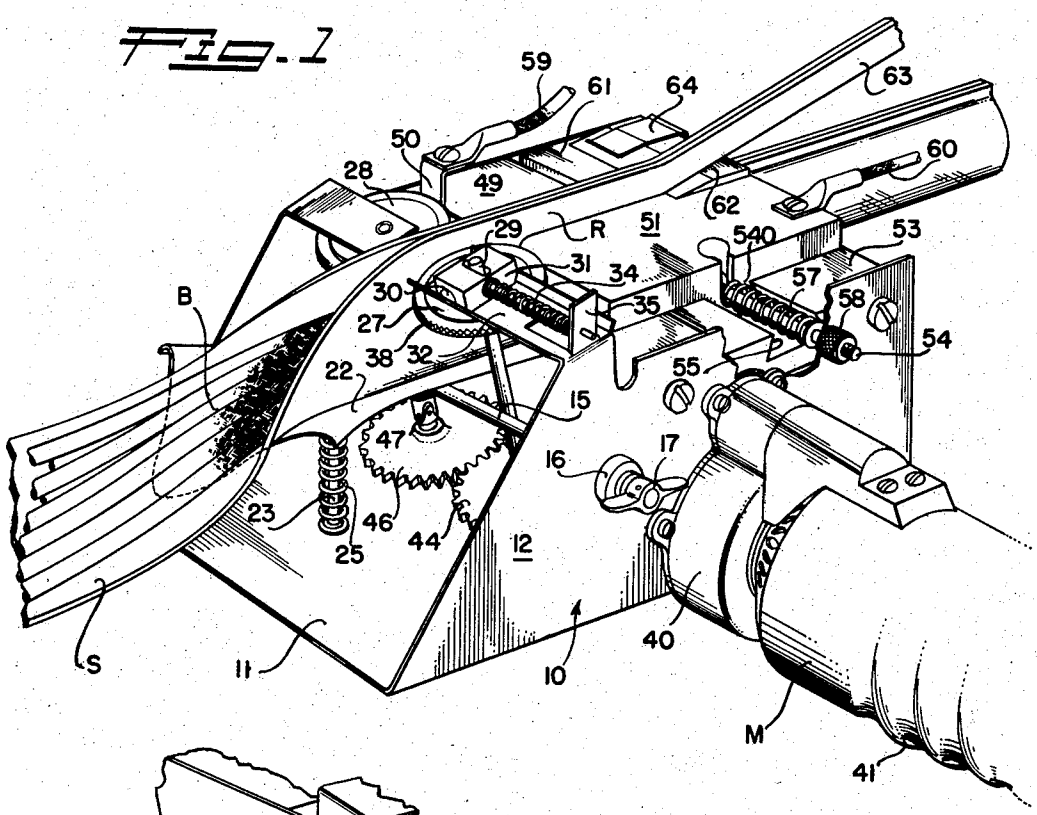


FIG. 7

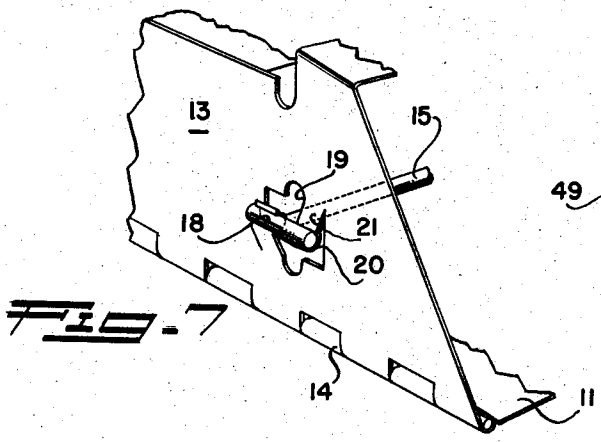


FIG. 6

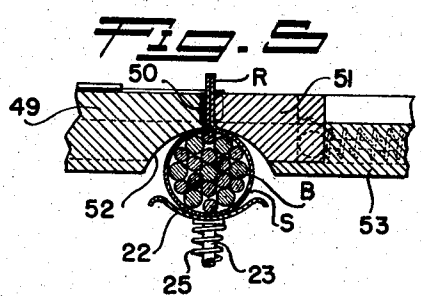
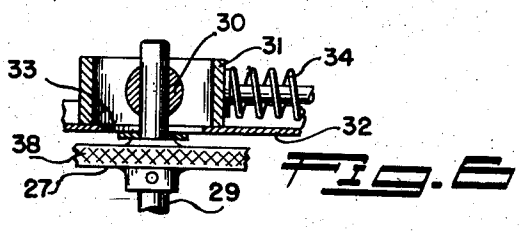


FIG. 5



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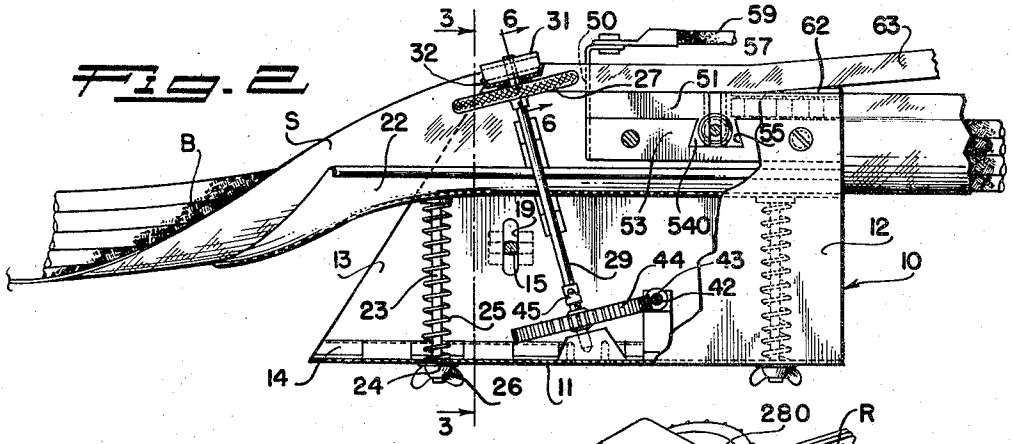
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MACHINE FOR SLEEVING WIRE BUNDLES, AND THE LIKE

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FIG. 2



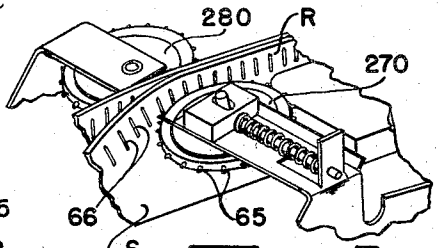
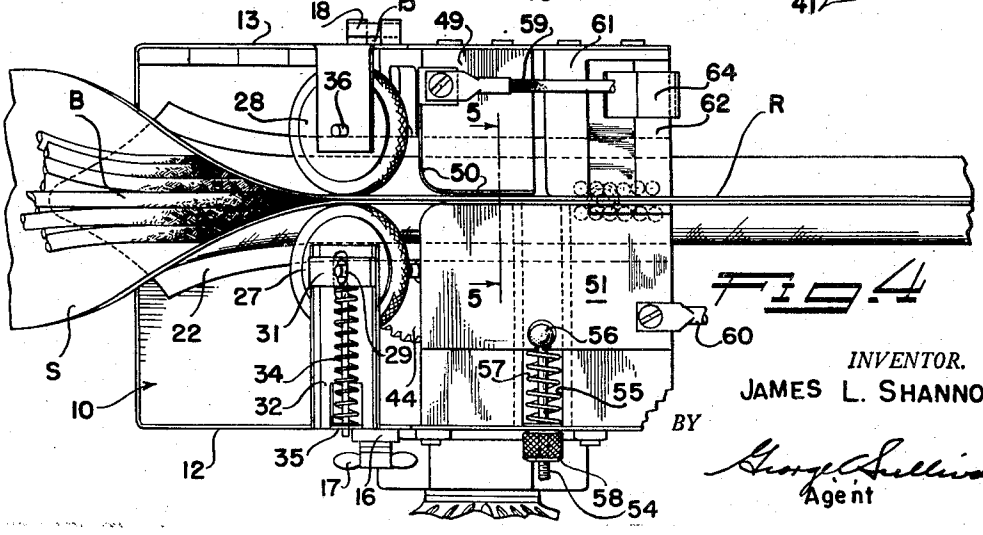


FIG. 3

FIG. 4



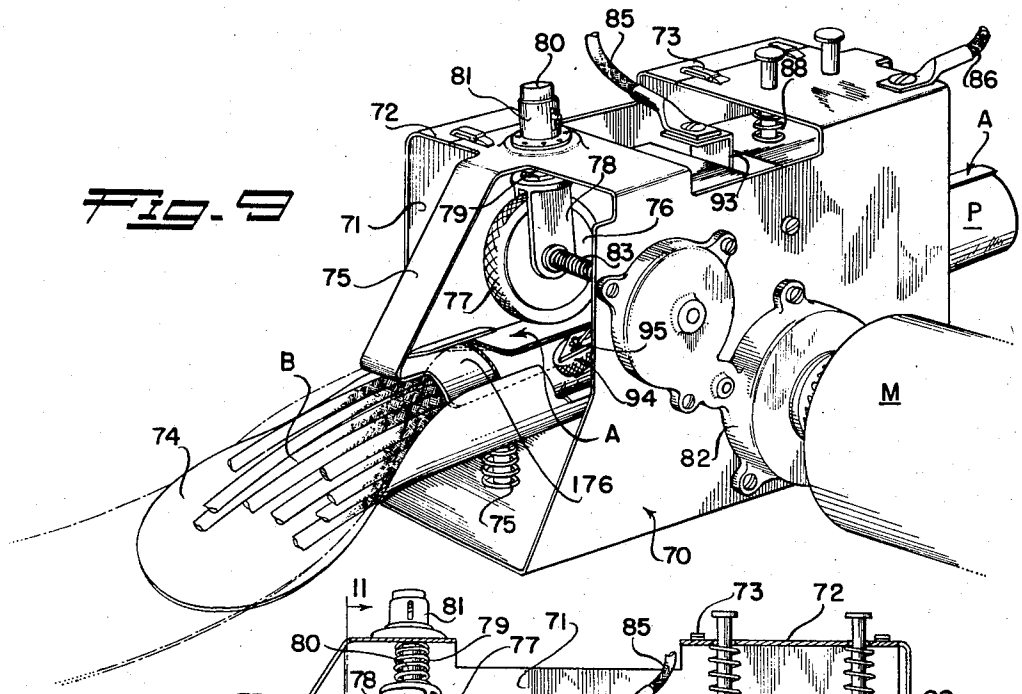
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MACHINE FOR SLEEVING WIRE BUNDLES, AND THE LIKE

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Fig. 9



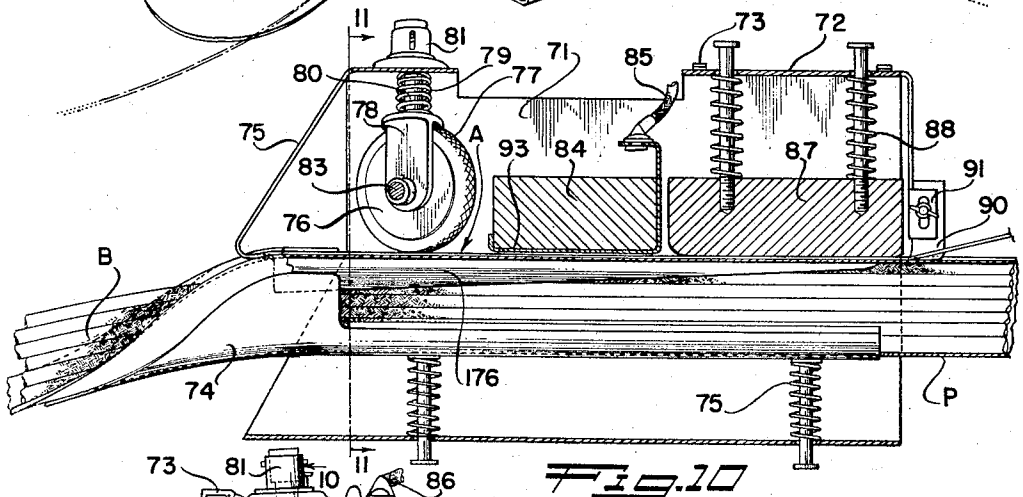


Fig. 10

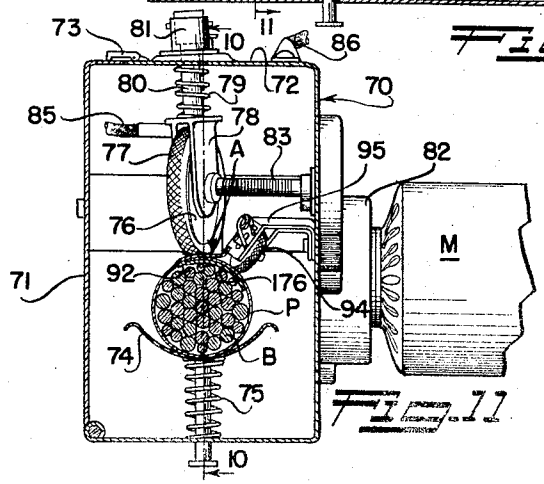


Fig. 11

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United States Patent Office 2,883,813
Patented Apr. 28, 1959

2,883,813

MACHINE FOR SLEEVING WIRE BUNDLES, AND THE LIKE

James L. Shannon, North Hollywood, Calif., assignor to Lockheed Aircraft Corporation, Burbank, Calif.

Application March 15, 1955, Serial No. 494,519

7 Claims. (Cl. 53—180)

This invention relates to apparatus or machines for forming coverings or sleeves around elongate members and assemblies and relates more particularly to machines for forming plastic-material sleeves or tubes on wire bundles, wire harnesses, tubes, pipes, rods, etc.

The devices or machines of this invention are adapted for use in various industries and situations where it is desired to cover, enclose and protect elongate parts, units, and assemblies. For example, they are useful in providing or forming plastic sleeves around or on the wire harnesses of automobiles, trucks, and the like, and on the wire harnesses used extensively in the electronic industry. The devices are also operable to make or provide abrasion resistant liquid tight dielectric sleeves or covers on pipe, tubing, rods, bars, and similar objects.

I will disclose herein typical preferred embodiments of the invention as used to form and secure plastic material sleeves on wire bundles such as incorporated in the electrical systems of airplanes, it being understood that this is merely one typical application of the invention. Heretofore it has been the practice to assemble the plurality of wires of such a bundle and then manually tie the bundle with cord or string ties at rather closely spaced points. Following this, the bundles have been drawn through pre-manufactured vinyl plastic tubing, or the like. The manual tying of the bundles and, particularly, the threading or drawing of the bundles through the flexible plastic tubing are tedious, time consuming, and, therefore, costly operations. It is, of course, important or at least desirable to have the plastic sleeves tight on the bundles of wires and various expediencies have been resorted to to force or pull the bundles through the limp plastic tubes which are proportioned to ultimately tightly grip or engage about the bundles. The machines of the invention serve to form or shape a strip or sheet of plastic around the wire bundle in tube form and to heat-seal or bond the sheet in this tube form so as to closely fit around the bundle, thus "manufacturing" the plastic tube on the bundle instead of laboriously feeding the wires through a preformed tube thereby avoiding the delay and expense heretofore encountered in sleeving the bundles.

It is an object of this invention to provide a simple, practical and effective machine of the character referred to.

Another object of the invention is to provide a machine of this kind that may either be fed or moved along the bundle through its own power or aided by other force, or that can be used while stationary with the bundle and plastic strip fed through it, serving in either mode of operation to simultaneously shape and bond together a continuous plastic tube or sleeve on the bundle.

Another object of the invention is to provide a machine of the class referred to that shapes and bonds the plastic strip to conform to and tightly grip and confine the bundle and that is capable of performing these functions on bundles and like objects of different sizes or diameters.

It is another object of the invention to provide a sleeving machine of this character that is adapted to handle or employ plastic sheets or strips of a substantial range of standard or typical gages or thicknesses.

It is another object of the invention to provide a machine of this kind that may be embodied in a small, compact, lightweight unit for easy manual manipulation or use.

It is a further object of the invention to provide a machine of this type adapted to form either a radially disposed lap joint or seam at the edges of the tube-formed plastic sheet or a circumferential lap joint at the plastic sheet edges and, in either case, may, where desired, employ a cutter to simultaneously cut off excess material at the joint.

A still further object of the invention is to provide a plastic sleeving machine embodying novel means for shaping the plastic sheet into tube form, for bonding the same and preserving the faying surfaces in effective engagement until the weld has set, while offering a minimum of frictional resistance to advancement, and a simple unique means for tightly wrapping or drawing the sleeve on the bundle while simultaneously forcing or advancing the machine, or the bundle, and its sleeve.

Other objectives and features of the invention will be readily understood from the following detailed description of the typical preferred embodiments illustrated in the accompanying drawings in which:

Figure 1 is a perspective view of one form of the invention in use in forming and bonding a sleeve on a bundle of wires;

Figure 2 is a side elevation of the machine shown in Figure 1 with a portion of one wall broken away to show some of the internal parts;

Figure 3 is a vertical detailed sectional view taken as indicated by line 3—3 on Figure 2;

Figure 4 is a top or plan view of the machine of Figure 1;

Figure 5 is a fragmentary vertical sectional view taken substantially as indicated by line 5—5 on Figure 4;

Figure 6 is an enlarged fragmentary sectional view taken substantially as indicated by line 6—6 on Figure 2;

Figure 7 is a fragmentary perspective view of the inner or rear side of the machine case showing the hinge and the releasable tie-bar mounting;

Figure 8 is a fragmentary perspective view of a machine such as shown in Figure 1 employing sprocket-like wheel means cooperating with perforations in the plastic sheet;

Figure 9 is a perspective view of another embodiment of the invention as used in providing a plastic material sleeve on a wire bundle;

Figure 10 is a vertical sectional view of the machine of Figure 9 taken on line 10—10 on Figure 11; and

Figure 11 is a transverse vertical sectional view taken as indicated by line 11—11 on Figure 10.

The machine of Figures 1 to 7 inclusive includes a frame or case 10 for supporting the various other elements. In the simple construction illustrated the case 10 has a substantially horizontal bottom 11, a substantially vertical side or front wall 12 rising from the bottom and an inner or rear wall 13 hinged to the bottom. Appropriate piano hinge means 14 may secure the lower edge of the rear wall 13 to the bottom 11 so the wall may be swung from its normally substantially vertical position. One or more releasable tie-rods 15 extend between the front and rear walls 12 and 13 to hold the wall 13 in its normal upright position. The rod 15 illustrated is substantially horizontal and is rotatably supported against endwise movement in collars 16 on the front wall 12. A handle 17 on the forward end of the

rod 15 is accessible at the front of the machine to facilitate manual turning of the rod. The aft or inner end of the rod 15 has a cross-head 18 adapted to pass through a specially shaped opening 19 in the rear wall 13 and to cooperate with concave seats 20 at the upper ends of inclined cam faces 21. When the rear wall 13 is raised to its normal vertical position the rod 15 is in the angular position where its cross-head 18 freely passes through the opening 19 to the back side of the wall 13 whereupon the operator turns the handle 17 approximately 90° to move the cross-head up the cam faces 21 to latch or snap into the seats 20 thereby retaining the rear wall 13 in its vertical operative position and releasably holding the rod 15 against unwanted turning movement.

The plastic sheet or strip S as supplied for use with the machine is preferably an elongate ribbon of any heat sealable vinyl plastic or similar dielectric plastic sheeting having parallel longitudinal edges and the machine includes a guide or horn 22 for shaping or rolling this strip into tube form. The horn 22 is a trough-like part arranged longitudinally in the upper portion of the case 10 to present its concave side upwardly. The entering end of the horn 22, that is the end that receives the strip S, is deepened, flaring or curving downwardly and outwardly in both directions. This entering end of the horn 22 may be quite deep, as shown in Figure 1, and the horn gradually diminishes in depth and its rear or exit portion is preferably substantially horizontal. This configuration of the horn 22 is clearly illustrated in Figures 1 and 2 of the drawings. While the horn 22 may be rigidly mounted in the case 10, it is usually preferred to support the same under a spring load whereby the machine may more readily adapt itself to handle wire bundles B, and the like, of different diameters. Thus rods 23 may project downwardly from the underside of the trough or horn 22 and slidably pass through openings 24 in the bottom 11 of the case 10 to guide or retain compression springs 25. The springs 25 are engaged under compression between the bottom 11 and the underside of the trough or horn 22 to yieldingly urge the horn upwardly against the sheet S which, in turn, bears against the underside and, in fact, around the bundle B. Wing nuts 26, or the equivalent, may be screw threaded on the lower ends of the rods 23 to adjust the spring loading of the horn 22. As shown in Figures 1, 2 and 4, it is preferred to have the flaring receiving end of the horn 22 protrude some distance beyond or ahead of the machine to receive the strip S and initiate the forming of the same into tube shape before the strip enters the machine proper.

The machine further includes wheels 27 and 28 for cooperating with the marginal regions R of the strip S to tightly draw the strip about the bundle B and to feed or assist in feeding the bundle and strip longitudinally with reference to the machine. The wheels 27 and 28 are in the upper portion of the machine, the wheel 27 being associated with the fixed bottom 11 and front 12 of the case 10 and the wheel 28 being carried by the hinged rear wall 13. The wheel 27 is secured on a shaft 29 which slidably passes through and is journaled in a transverse gimbal 30. The gimbal 30, in turn, is supported for angular movement in a block 31. The block 31 is supported in a track or way 32 for movement toward and away from the marginal regions R of the strip S. As shown in Figure 6, the way 32 and block 31 are slotted at 33 to permit movement of the shaft 29 and its wheel 27 toward and away from the regions R. The way 32 projects inwardly from the upper edge of the wall 11 and a spring 34 is arranged under compression between the block 31 and a tab 35 to yieldingly urge the wheel 27 inwardly against the adjacent strip region R. The wheel 27 is arranged under and adjacent the way 32 and, as illustrated in Figure 2, the shaft 29, the wheel 27, the way 32, etc. are pitched with respect to the vertical, the shaft 29 extending upwardly and forwardly or toward the entering end of the machine whereby the plane of the wheel 27 slopes upwardly and toward the exit end of the machine. As will be later described the wheel 28 is correspondingly pitched and cooperates with the opposite marginal region R of the strip S so that the two pitched rotating wheels urge or draw the flexible plastic strip S upwardly and inwardly around the bundle B to complete the tube-form thereof, to tighten the tubular plastic strip on the bundle B and to urge the assembly of the strip and bundle through the machine.

The wheel 28 is fixed on a shaft 36 rotatably journaled in a bracket 37 on the inner side of the rear wall 13. As just described the wheel 28 lies in the same inclined plane as the wheel 27 and is arranged to bear on the inner or rear marginal region R of the strip S. The wheels 27 and 28 are preferably provided with roughened or knurled peripheries or with tires 38 of friction material or traction patterned rubber to have effective feeding engagement with the strip S. In this connection it will be observed that the spring 34 urges the wheel 27 toward the wheel 28 whereby the regions R are gripped between the wheels under substantial pressure and, as will be seen from an inspection of Figure 3, the inclination of the two wheels causes the strip to be tightly drawn about the bundle B. The spring loading of the wheel 27 and the gimbal mounting of the wheel shaft 29 above described adapts the machine to handle strips S having a wide range of thicknesses.

The wheels 27 and 28 (or at least one of them) are preferably power driven and I have shown a suitable electric motor M for this purpose mounted on the front wall 12 of the case 10 through the medium of a speed reducing gear box 40. The motor M may be employed as a handle and I have shown hand grips 41 thereon to facilitate manual manipulation of the machine. The driven shaft 42 from the gear box 40 extends into the case 10 and a worm 43 is fixed on the shaft. The worm 43 meshes with a worm wheel 44 connected with the shaft 29 of wheel 27 through a universal joint 45, see Figure 3. The wheel 44 in turn meshes with a similar wheel 46 connected with the lower end of the shaft 36 by flexible shafting 47. From the foregoing it will be seen how the motor M is operable to simultaneously drive the two wheels 27 and 28 to draw the strip S into a tight tube closely fitting about the bundle B and to feed or advance the machine along the bundle or to feed or advance the bundle and strip S through the machine. While I have shown both wheels 27 and 28 positively driven, the gear 46 and shafting 47 may be omitted if desired.

The invention provides means for "welding" or fusing together the marginal regions R of the strip S adjacent the wheels 27 and 28 and immediately after they have passed between the tensioning and feeding wheels. In accordance with the broader aspects of the invention any suitable form or type of bonding or welding means may be employed. I have found it practical to fuse or bond together the faying surfaces of the strip regions by RF or high frequency heating since this results in the effective heating of these surface areas without the necessity of actually employing heated parts or devices on the machine itself. Where the plastic sheet S is an effective dielectric, it is well suited for fusion or bonding by this well known form of plastic heating. In the particular machine being described, there is a positive electrode block 49 in the form of a block of phenolic resin or like dielectric secured to the rear wall 13 of the case 10 adjacent the wheel 28. A metallic electrode 50 is secured to the front edge and inner face of the block 49 to be engaged by one of the strip regions R immediately after leaving the wheel 28. A negative

electrode block 51 of a selected effective conductive metal is arranged to be contacted by the other strip region R immediately after it leaves the wheel 27. The corners of the electrodes 50 and 51 are rounded off to facilitate entrance of the joint regions R between them and the active faces of the electrodes are preferably flat and vertical to evenly bear against the regions R. This is best shown in Figures 4 and 5 where it will be seen that the under sides of the block 49 and the negative electrode 51 are recessed at 52 to receive the upper portion of the bundle B and the tubular plastic sleeve thereon.

It is preferred to support at least one of the electrodes for movement whereby it may be yieldingly urged against the joint regions R of the plastic sleeve S and whereby the machine may be adapted to properly employ plastic sheet materials of different thicknesses and may adapt itself to variations in the plastic sheeting. In the construction illustrated the negative electrode 51 is slidably or movably supported on the upper surface of a horizontal shelf 53 secured to the front wall 12. The electrode 51 has one or more dove-tailed tongues 540 slidable in correspondingly shaped grooves 55 in the shelf 53 to be guided for movement normal to the strip regions R. The means to yieldingly urge the electrode 51 inwardly against the sheet regions R, to insure direct physical contact of the electrodes with the regions and to hold the faying surfaces of the regions together, includes a rod 54 having a head 56 seated in a socket in the electrode 51 and the rod passes outwardly to extend through the wall 12, see Figures 1 and 4. A spring 57 surrounds the rod 54 and is under compression between the wall 12 and the rear side of the electrode 51 to urge the electrode inwardly against the plastic sheet regions R. A thumbnut 58 is threaded on the outer end of the rod 54 and is engageable with the outer face of the wall 12. The nut 58 may be employed to adjust the spring 57 in order to regulate the spring pressure on the electrode 51. It is to be understood that it is preferred to have the electrodes 50 and 51 only lightly engage or press on the sheet regions R to hold the frictional resistance to movement or travel of the bundle and sleeve to a minimum, the wheels 27 and 28 serving to maintain the proper circumferential tension on the sheet S and to effectively feed the sheet and bundle B. The electrodes 50 and 51 have terminals for the wires or leads 59 and 60 respectively which extend to the source of high frequency electrical energy, not shown.

It is preferred to provide means for holding or urging the seam or joint regions R of the plastic strip S together after they leave the welding area at the electrodes 50 and 51 to allow the liquified or fused plastic at the seam to set before the holding engagement or pressure on the regions is relieved. To this end I have provided a pressure block 61 secured to the rear wall 13 of the case 10 to oppose the spring urged electrode block 51. The pressure block 61 is spaced from the positive electrode block 49 and directly opposes the rear or exit portion of the negative electrode 51. The pressure block 61 presents a flat, vertical surface of substantial extent to back up a considerable region of the welded together block 51.

The invention includes means for trimming excess plastic sheet material from the finished or completed sleeve seam. A cutting blade 62 is horizontally arranged on the upper side of the block 61 to have its sharp cutting edge face toward the horn 22 and to overlap the adjoining region of the electrode 51. The blade 62 arranged in this manner operates to cut off the execess or unwanted margins 63 of the sealed or bonded regions R. The action of the blade 62 is illustrated in Figure 1 where it will be observed that the excess material 63 is automatically cut off as the bundle B and its plastic sleeve move through the machine. The blade 62 is removably held in the operative position by one or more spring clips 64. For some installations or applications of the sleeved bundle B it may be desired to leave a joint or seam region R of substantial width, in which case the cutting blade 62 is removed. The wide seam region R thus allowed to remain may be utilized to mount or secure the sleeved bundle B on its supporting structure.

Figure 8 illustrates a machine of the invention wherein one or both of the wheels 270 and 280, corresponding to the above described wheels 27 and 28, have cogs or teeth 65 on their peripheries. These teeth 65 are equally circumferentially spaced and enter or mesh with longitudinally spaced openings 66 provided in the marginal regions R of the strip S of plastic material. The openings 66 are preferably elongated transversely of the strip S so as to adapt the strip for use on wire bundles, and the like, of a substantial range of diameters. It will be seen how the power driven wheels 270 and 280, having their teeth 65 in meshing engagement with the openings 66, positively feed or advance the bundle B with its sleeve S. The machine of Figure 8 may be the same as that illustrated in Figures 1 to 7 inclusive except for the wheels 270 and 280 just described, it being apparent that these wheels may be substituted for the wheels 27 and 28 to adapt the machine for use with longitudinally perforated plastic strips and the like.

The machine of the invention shown in Figures 9, 10 and 11 operates to shape or form a plastic material sleeve on a wire bundle B, or the like, to have a circumferentially overlapped joint or seam. This machine includes a generally rectangular hollow case 70 having a rear wall 71 hinged at its lower edge and connected with the top wall 72 by releasable latches 73. The wall 71 may be swung downwardly to give access to the interior of the machine and to facilitate the entry and removal of the bundle B and plastic strip P. The guide horn 74, for guiding the bundle B and the strip P and for shaping the strip into tube form extends longitudinally through the case 70, being supported therein and yieldingly urged upwardly against the bundle by spaced compression springs 75. The forward or entry end of the horn 74 is broad and flaring and the horn tapers and curves upwardly and rearwardly to a partial tube shape to form the strip around the bundle B. Functionally associated with the horn 74 and in order to cause the marginal regions A of the strip P to overlap in the peripheral direction, I provide what will be termed a tongue 176, extending horizontally in the case 70 and spaced within the upper part of the horn. This tongue 176 is an elongate member transversely curved to present a concave under side and a convex upper side and is received between the wire bundle B and the underlying margin of the strip P at the overlapping marginal regions A. This relationship of the tongue 176 and the bundle B and strip P is shown in Figures 9 and 11. The tongue 176, or at least the forward portion thereof is quite broad and has its long axis offset toward the front wall of the case 70. A longitudinal step or stop shoulder 92 is provided on the concave side of the tongue 176 and is engageable by the edge of the underlying strip region A to limit the inward curling of this region A. The tongue 176, which serves as the negative electrode and also as a backing element, may be suspended from the top wall 72 of the case 70 by an arm 75.

The machine of Figures 9, 10 and 11 further includes at least one power driven wheel 76 cooperating with the overlapping marginal regions A to tension the plastic strip P around the bundle B and to feed or advance the bundle through the machine. The wheel 76, which is preferably equipped with a suitable tire 77, constructed to have appropriate frictional engagement with the upper or outer marginal portion A, is supported in a fork 78 for limited vertical movement. As illustrated, the wheel 76 is pitched or canted to assist in drawing and tensioning the strip P on the bundle B. The fork 78 is urged downwardly by a spring 79 arranged under compression between the upper end of the fork and the top wall 72 of the case 70 and the fork is guided for generally vertical

movement by a king pin 80 slidably and non-rotatably guided in a collar or boss 81 on the top wall 72. An electric motor M is mounted on the front of the case 70 and has associated therewith a speed reducing mechanism or gear box 82. The motor M serves to drive a shaft 83 through the medium of the gear box 82, the shaft being operatively connected with the wheel 76 to rotate the same. The shaft 83, or a portion thereof, is flexible to permit vertical movement of the wheel in order to conform with bundles B of different sizes and to accommodate plastic strips P of a wide range of thicknesses. A second wheel 94 is rotatably mounted at the underside of a mounting arm 95 to engage the lower or under marginal region A. This wheel 94 which, need not be power driven, is also pitched to assist in drawing the strip P onto the bundle B, being rotatable about a downwardly and forwardly inclined axis. The arm 95 may assist in guiding the upper or outer marginal portion A away from the wheel 94. It will be seen how the wheels 76 and 94 cooperating with the margin regions A in the manner illustrated serve to tighten the plastic strip P about the bundle B and to feed and advance the bundle and strip through the machine.

The means of effecting fusion or welding of the marginal regions A of the strip P includes a positive electrode 93 secured on the underside of a dielectric block 84 to engage or cooperate with the upper side of the overlapping regions A. The block 84 is suitably secured to the front wall of the case 70 and the active area of the electrode 93 is substantially horizontal and is spaced above the above described tongue 176 by the intervening overlapping regions A of the plastic strip. The wires or leads 85 and 86, extending from the high frequency or RF generator or source, are suitably connected with the electrode 93 and the case 70 whereby the high frequency energy at the faying surfaces of the marginal regions A effects heating of the dielectric plastic at these surfaces to fuse or liquify the same for welding.

In order to insure retention of the bond or weld between the overlapping regions A until the material has set, I provide a pressure block 87 adjacent the electrode block 84 and urged downwardly against the regions A by spaced light compression springs 88. The wire bundle B may be depended upon to back up or support the regional margins A opposite the pressure block 87, or, as illustrated, the tongue 176 may also extend under the regions A in the area opposite the pressure block 87.

A curved knife or blade 90 may be secured on the exit end of the case 70 to cut off the excess plastic sheet material of the overlapping margin as the bundle B moves from the machine. The cutter 90 may be carried by a bracket 91 for vertical adjustment and for detachment.

It is believed that the operation of the machines of this invention will be apparent from the foregoing detailed description. In preparing the machine of Figures 1 to 7 inclusive for use, the rear wall 13 may be hinged to the opened position to permit the easy insertion of the wire bundle B with its plastic strip S and then returned to the closed position so that the wheels 27 and 28 properly engage the marginal regions R of the strip. With the electrodes 50 and 51 electrically connected with the source of high frequency electrical energy the motor M is energized to drive the wheels 27 and 28. As above described the pitched power driven wheels 27 and 28 not only serve to drive or advance the bundle B and strip S through the machine but also operate to tighten or tension the strip on the bundle. The horn 22 initiates the shaping of the strip S into the tube form for reception between the wheels 27 and 28. As the bundle B and strip S move through the machine the field of high frequency between the electrodes 50 and 51 liquifies or fuses the material of the strip S at the faying surfaces of the regions R to effect the welding together of the same. As the welded area moves along the faying surfaces are held

in contact by the action of the block 61 and spring loaded block or electrode 51 to assure the proper setting of the weld. The blade 62 serves to cut off or remove the excess material 63 from the lapped joint or weld of the plastic sleeve. The machine of Figures 9, 10 and 11 operates in a similar manner however in this case the plastic sheet P is shaped by the horn 74 and tongue 176 to constitute a tubular sleeve around the bundle B and to have its marginal regions A overlap circumferentially. The pitched driven wheel 76 assisted by the wheel 94 tightens or tensions the plastic sheet P around the bundle B and feeds or advances the bundle assembly through the machine. The faying surfaces of the marginal regions A are fused or bonded together by the RF field produced between the electrode 93 and the tongue 176. The block 87, together with the tongue 176 and/or the wire bundle, holds the bonded faying surfaces in contact until the weld has set as the bundle continuously moves through the machine. The blade 90 may be employed to remove excess plastic sheet material from the outermost overlapping marginal region A. As above noted, the machines are adapted to handle wire bundles and similar objects and assemblies, varying considerably in diameter and configuration and are capable of welding plastic sleeves of different dielectric plastic materials of a considerable range in thicknesses on such bundles and objects.

Having described only typical forms of the invention I do not wish to be limited to the specific details herein set forth, but wish to reserve to myself any variations or modifications that may appear to those skilled in the art and fall within the scope of the following claims.

I claim:

1. A machine for forming and securing plastic sleeving on an elongate object comprising a supporting structure, a guide horn on the structure for shaping a plastic material strip in tube form around the object, the strip as thus formed having lapped marginal regions, at least one wheel carried by said structure and acting on said regions to press the same together and rotatable on an axis pitched with respect to the longitudinal axis of said object to draw or tighten the strip on the object, spring means acting between said structure and horn and resiliently supporting said horn for movement relative to said wheel for accommodating elongate objects of different diameter therebetween, and means on said structure adjacent said wheel for heat bonding said regions together including positive and negative high frequency electrodes engaging the opposite sides of said regions.

2. A machine for forming and securing plastic sleeving on an elongate object comprising a supporting structure, a guide horn on the structure for shaping a plastic material strip in tube form around the object, the strip as thus formed having lapped marginal regions, wheels carried by said structure to engage the opposite sides of said regions to press the regions together and rotatable about axes pitched with respect to the long axis of said object to tighten the strip on the object, spring means acting between said structure and horn and resiliently supporting said horn for movement relative to said wheels for accommodating elongate objects of different diameter therebetween, and means carried by said structure for heat fusing said regions together as thus pressed together.

3. A machine for forming and securing plastic sleeving on an elongate object comprising a supporting structure, a guide horn on the structure for shaping a plastic material strip in tube form around the object, the strip as thus formed having lapped marginal regions, wheels carried by said structure to engage the opposite sides of said regions to press the regions together and rotatable about axes pitched with respect to the long axis of said object to tighten the strip on the object, power means on said structure for rotating at least one of said wheels to produce relative longitudinal movement between the object carrying the strip and said structure, said horn forming a

trough beneath said wheels and guiding the object as it is moved through the machine, spring means acting between said structure and horn and resiliently supporting said horn for movement relative to said wheels for accommodating elongate objects of different diameter therebetween, and means carried by said structure for heat bonding said regions together as thus pressed together.

4. A machine for shaping and securing plastic material sleeving on an elongate object comprising a supporting structure, guiding and shaping means in said structure for receiving said object and a plastic material strip and shaping the strip in tube form around the object to have lapped marginal regions, wheels engaging the opposite sides of said regions, means mounting the wheels on said structure to rotate about axes pitched with respect to the long axis of the object, means on said structure for rotating the pitched wheels to tighten the strip on the object and to produce relative longitudinal movement between the object carrying the strip and said structure, high frequency block electrodes engaging said regions adjacent the wheels to produce heat bonding of the faying surfaces of said regions, spring means urging said electrodes together, one of said electrodes extending longitudinally beyond the other electrode and serving as a guide for the object and strip after bonding, and pressure block means mating with the guide portions of said one electrode for holding said surfaces together following said bonding.

5. A machine for shaping and securing plastic material sleeving on an elongate object comprising a supporting structure, guiding and shaping means in said structure for receiving said object and a plastic material strip and shaping the strip in tube form around the object to have lapped marginal regions, wheels engaging the opposite sides of said regions, means mounting the wheels on said structure to rotate about axes pitched with respect to the long axis of the object, means on said structure for rotating one of the pitched wheels to tighten the strip on the object and to produce relative longitudinal movement between the object and structure, spring means urging a wheel against said regions whereby the wheels press said regions together, high frequency block electrodes engaging said regions adjacent the wheels to produce heat bonding of the faying surfaces of said regions, spring means urging said electrodes together, one of said electrodes extending longitudinally beyond the other electrode and serving as a guide for the object and strip after bonding, and pressure block means mating with the guide portion of said one electrode for holding said surfaces together following said bonding.

6. A machine for shaping and securing plastic material sleeving on an elongate object comprising a supporting structure, guiding and shaping means in said structure for receiving said object and a plastic material strip and shaping the strip in tube form around the object to have lapped marginal regions, wheels engaging the opposite sides of said regions, means mounting the wheels on said structure to rotate about axes pitched with respect to the long axis of the object, means on said structure for rotating a pitched wheel to tighten the strip on the object and to produce relative longitudinal movement between the object and structure, high frequency block electrodes engaging said regions adjacent the wheels to produce heat bonding of the faying surfaces of said regions, spring means urging said electrodes together, one of said electrodes extending longitudinally beyond the other electrode and serving as a guide for the object and strip after bonding, and pressure block means mating with the guide portion of said one electrode for holding said surfaces together following said bonding.

7. A machine for forming and securing plastic sleeving on an elongate object such as a bundle of wires or the like comprising, a base, a front wall rigid with said base and extending generally normal thereto, a rear wall spaced from said front wall and swingably carried by said base about an axis generally parallel with said front wall, latch means releasably securing said rear wall in a predetermined position generally parallel with said front wall, a guide horn carried by said base for shaping a plastic material strip in tube form around the object, the strip as thus formed having lapped marginal regions, a pair of wheels arranged to engage the opposite sides of said marginal regions, means mounting one of said wheels on said front wall and the other of said wheels on said rear wall to rotate about axes pitched with respect to the long axis of the object to tighten the strip on the object, drive means engaging at least one of said wheels to produce relative longitudinal movement between the guide horn and the object carrying the strip, said horn forming a trough beneath said wheels and guiding the object as it is moved along by rotation of the wheels, spring means acting between said base and horn and providing limited movement of the horn relative to the wheels for accommodating objects of different diameter therebetween, high frequency block electrodes, one carried by each wall and engaging said regions adjacent the wheels to produce heat bonding of the faying surfaces of said regions, spring means urging said electrodes together, one of said electrodes extending longitudinally beyond the other electrode and serving as a guide for the bonded strip and object, and pressure block means mating with the guide portion of said one electrode for holding said surfaces together following said bonding.

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