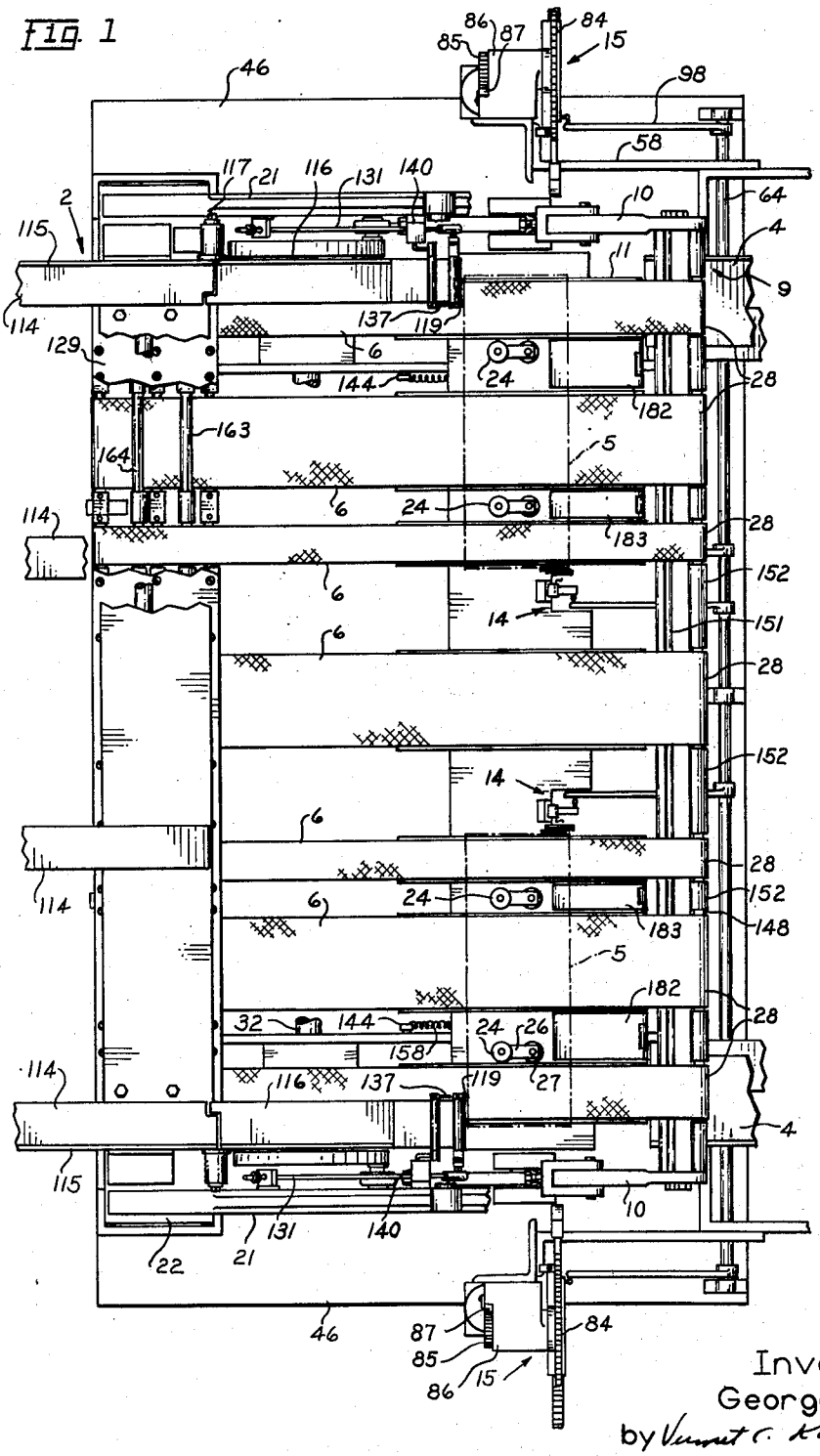
June 11, 1957 G. E. OTT 2,795,093

FLUORESCENT LAMP WRAPPING MACHINE

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Fig. 1



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FLUORESCENT LAMP WRAPPING MACHINE

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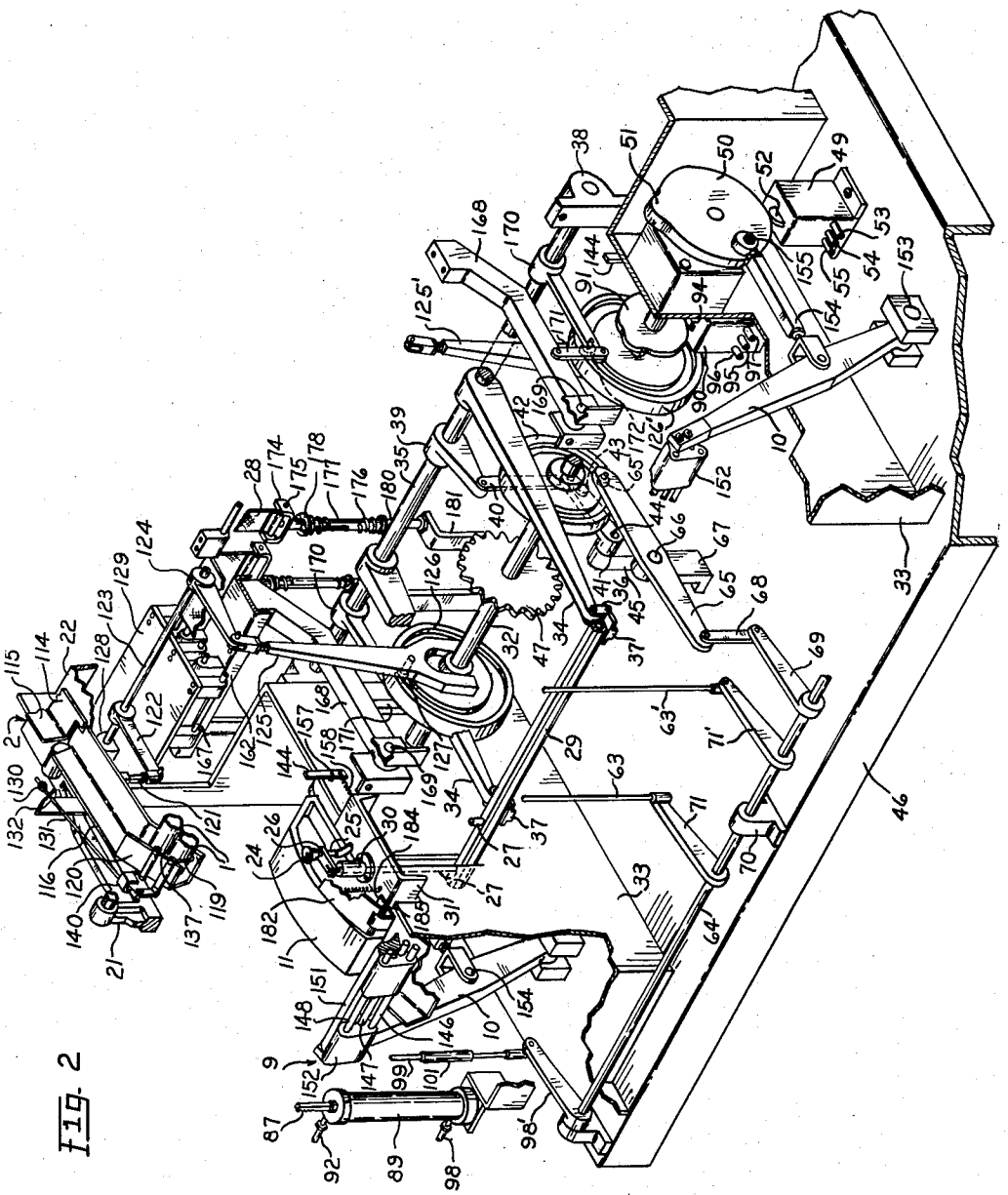


Fig. 2

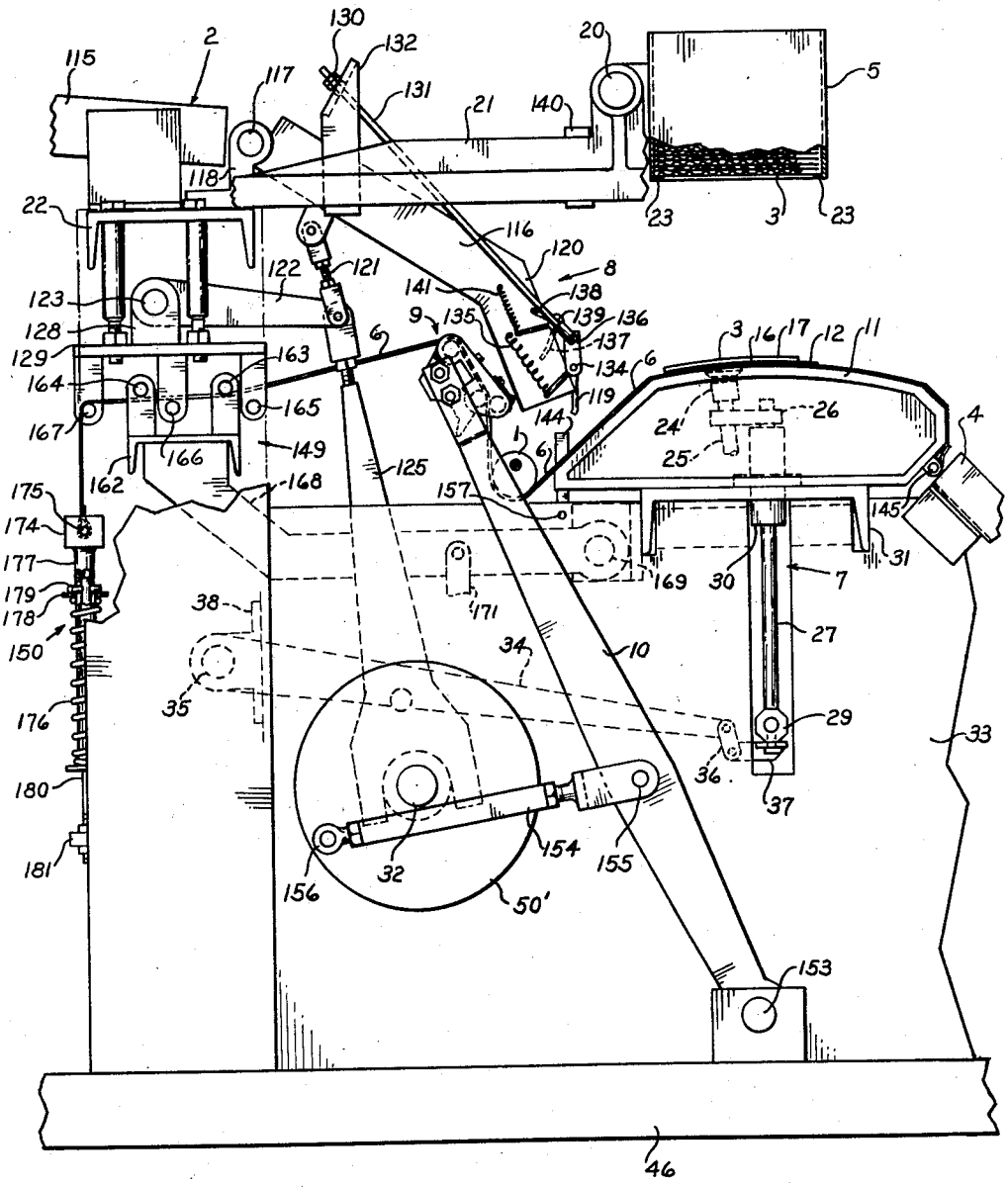
Inventor:
George E. Ott,
by Vernet C. Kaufman
His Attorney

June 11, 1957 G. E. OTT 2,795,093

FLUORESCENT LAMP WRAPPING MACHINE

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Fig. 3



Inventor:
George E. Ott,
by Vernon C. Kaufman
His Attorney

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FLUORESCENT LAMP WRAPPING MACHINE

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Fig. 6

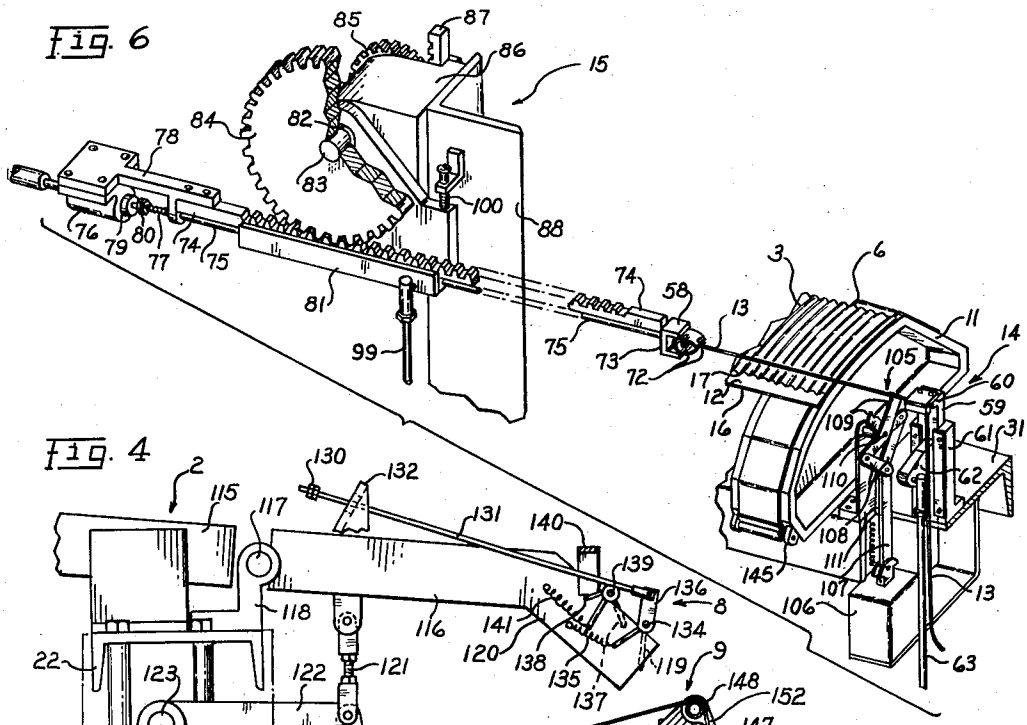


Fig. 4

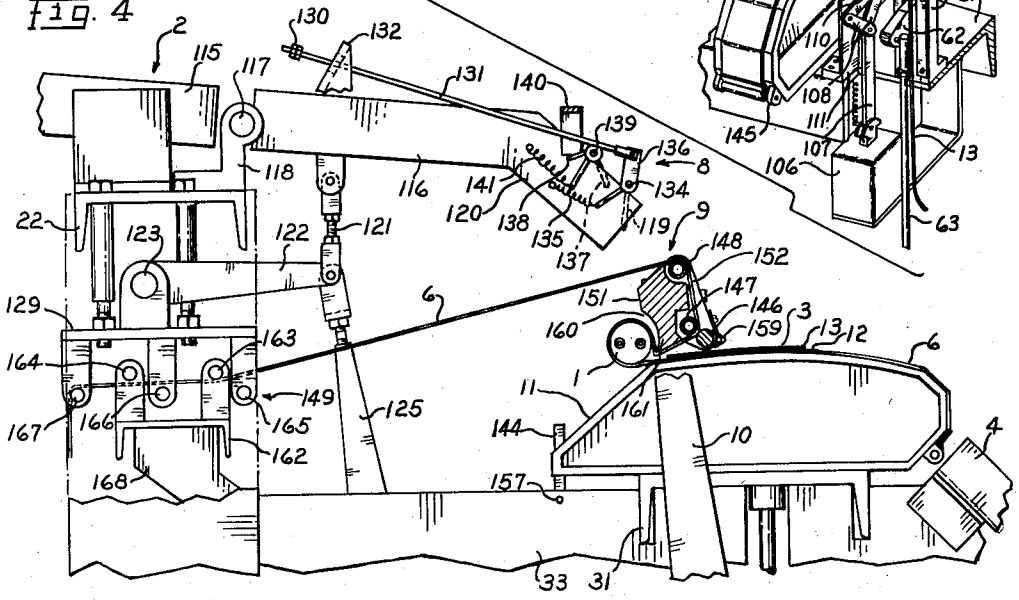
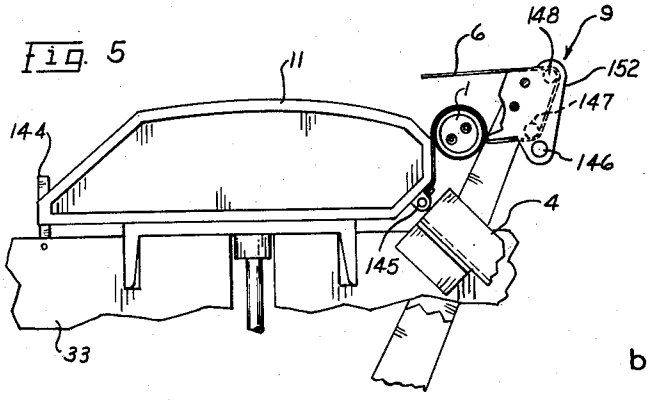


Fig. 5



Inventor:
George E. Ott,
by Vernet C. Kauffman
His Attorney

United States Patent Office 2,795,093 Patented June 11, 1957

2,795,093

FLUORESCENT LAMP WRAPPING MACHINE

George E. Ott, Willoughby, Ohio, assignor to General Electric Company, a corporation of New York

Application September 4, 1953, Serial No. 378,616

10 Claims. (Cl. 53—215)

My invention relates to apparatus for automatically applying protective paper wrappers to long tubular lamps, and more particularly to a machine for automatically forming sleeve type wrappers about long tubular lamps by rolling flat blanks about individual lamps.

One object of my invention is to provide an automatically operated machine for applying protective paper wrappers to long tubular lamps, said machine being adapted to roll the lamps separately into flat blanks of the wrappers and to press overlapping longitudinal edge portions together to fix said wrappers in place.

Another object of my invention is to provide a tubular lamp wrapping machine adapted to automatic operation as an integral unit of mass production type lamp making apparatus. Means are provided in the wrapping machine for automatically effecting the synchronized feeding of lamps and paper blanks to the wrapping positions therein and the wrapping of the paper blanks about the lamps.

Another object of my invention is to provide a machine for rolling a flat blank of corrugated paper about a long tubular lamp to form a sleeve type wrapper and, in the course thereof, to incorporate a rip cord into the wrapper. By virtue of such a construction the wrapper may be allowed to remain upon the lamp while it is being inserted into the sockets of a lighting fixture and can be split for removal by pulling the rip cord.

Still another object of my invention is to provide a tubular lamp wrapping machine wherein a pair of corrugated paper blanks are placed upon a wrapping bed at positions to be engaged by end portions of a lamp, a length of rip cord is placed upon a plane paper lip along one longitudinal edge of each blank, a lamp is rolled along the wrapping bed to a position over the blanks which are then rolled about said lamp during further movement thereof across the wrapping bed.

Further objects and features of the invention will appear from the following description of a species thereof and from the drawing.

In the drawing,

Fig. 1 is a plan view of a lamp wrapping machine comprising my invention, the view being modified by having portions of the machine broken therefrom and the position of the wrapper holding hoppers indicated by dot-dash lines.

Fig. 2 is a somewhat diagrammatic perspective view of the operating mechanisms and associated portions of the machine.

Fig. 3 is a side elevation of the machine with the rip cord inserting mechanism removed therefrom, and with the parts thereof shown in the positions occupied thereby at the start of the wrapping operation.

Fig. 4 is a side elevation of the essential elements of the lamp feeding and wrapping portions of the machine shown at a moment midway in the wrapping operation.

Fig. 5 is a side elevation of the wrapping bed and the wrapping head at the moment the wrapping operation is completed.

Fig. 6 is a perspective view of one of the two rip cord

inserting mechanisms of the machine, said mechanism being shown midway in the operation of pulling a rip cord over the paper blank associated therewith.

The machine shown in the drawing automatically receives long tubular fluorescent lamps **1** from the end of the feed chute **2** (Fig. 3) and, in the course of operation, rolls blanks **3** of corrugated paper about said lamps **1** and then deposits the wrapped lamps in the end of the discharge chute **4**. Single lamps **1** are handled in each cycle of operation of the machine which is in a form adapted to make the wrapper from a pair of blanks **3**, each about one-third the length of the lamp **1**, and to wrap said blanks **3** about end portions of the lamps **1**. The cycle of operation is started by single blanks **3** being fed downwardly from the bottom of storage hoppers **5** located over opposite edges of a multi-section flexible apron **6**, as indicated in Fig. 1, by feeding means **7** moving vertically between sections of the apron **6** and through openings in the bottom of the hoppers **5**. The machine also provides a feeding mechanism **8** for advancing single lamps **1** during the initial moments of each cycle to a depression formed by a sagging portion of the apron **6** located to one side of the wrapping position.

The wrapping operation of the machine occurs when the wrapping head **9** is advanced over the lamp **1** and toward the discharge end of the machine and in so doing, first causes said lamp **1** to be trapped in a pocket of the apron **6** and then to be rolled over onto the blanks **3** of the wrapper. The movement of the wrapping head **9**, which has the apron **6** interlaced about portions thereof, is produced by arms **10** engaging the ends thereof beyond the edges of the apron **6** and swinging about pivots located directly below the wrapping bed **11** at the wrapping position. The motion first carries the wrapping head **9** over the lamp **1** as shown in Fig. 4 so that it is trapped in the sagging or folded portion of the apron **6** adjacent the wrapping bed **11**. Further motion of the wrapping head **9** shifts the pocket containing the lamp **1** along the apron **6**, inasmuch as the apron **6** slides through the wrapping head **9** during this interval, and then causes the lamp **1** to be rolled up the incline on the adjacent edge of the wrapping bed **11**, so that the lamp is effectively encircled by the apron **6** (Fig. 4). Motion of the wrapping head **9** across the essentially horizontal remainder of the wrapping bed **11** rolls the lamp **1** onto the blanks **3** and then wraps the blanks up and over the lamp. Finally, the wrapping head **9** moves beyond the wrapping bed **11** and the fastening or anchor means at the end of the apron **6** (Fig. 5) so that the pocket opens at the bottom and the lamp **1** drops into the discharge chute **4**. The wrapper remains in place upon the lamp **1** at such times because a flap or lip **12** along one longitudinal edge of each blank **3** overlaps the corrugated section thereof and is caused to adhere thereto by an adhesive on one or both of the overlapping edges. The adhesive is preferably applied to the blanks **3** prior to their insertion in the wrapping machine or, if desired, by means (not shown) in combination therewith.

Mechanisms are also incorporated in the machine for introducing a length of rip cord **13** (Fig. 4) into the overlap of each of the blanks **3** of the wrapper during the course of their application to the lamp **1**. The rip cords **13** are laid upon the lips **12** of the blanks **3** during the interval they remain at the wrapping position upon the apron **6**. The rip cord is placed along the lip **12** of each blank **3** by the cooperative operations of a cord supplying unit **14** mounted between sections of the apron **6** and the wrapping bed **11** within the center portion of the machine and a cord advancing unit **15** which is movable back and forth across the blank **3** from a position beyond the edge of the apron **6**. Vertical movements of the supply and advancing units **14** and **15**, respectively, cause

the rip cord 13 to be lowered to the proper position upon the lip 12 of the blank 3.

Reference will now be made in greater detail to the operations of the wrapping machine and, in particular, to the starting operation in the cycle wherein the two corrugated paper blanks 3 to be wrapped about one lamp are fed from the hoppers 5 to the wrapping positions upon the apron 6. The blanks 3 (Figs. 3 and 6) are comprised of corrugated paper sections, each having a length approximately one-third the length of the lamp 1 and having a width sufficient to encircle the girth of said lamp. They include a flat sheet of backing paper 16, which makes up the outside of the wrapper, and having attached thereto a corrugated sheet 17 with the corrugations running across the narrow dimension thereof. This corrugated sheet 17, which will finally appear as the inside of the wrapper, covers all of the backing sheet 16 except an edge portion along one of the longer sides which forms the lip 12. A strip of a self-sealing adhesive covers the inside face of the lip 12 and a limited area along the opposite edge of the back face of the backing sheet 16. The adhesive is a type that does not readily adhere to other differently constituted materials when dry and does not prevent the blanks 3 from being piled one upon the other and being handled very much as if they were not coated.

As indicated in Fig. 1, the two hoppers 5 which hold the blanks 3 are arranged above edge portions of the apron 6 at positions directly over the wrapping positions said blanks 3 must occupy thereon and, as shown in Fig. 3, are mounted upon a bar 20 retained by brackets 21 extending over the apron 6 from a portion of the frame 22 of the machine. The blanks 3 are stacked one upon the other in each of the open-topped hoppers 5 with the flat backing sheet 16 lowermost and with the lip 12 of each blank located toward or most nearly adjacent the discharge end of the machine. Relatively narrow lips 23 along the lower edges of the hoppers 5 prevent the blanks 3 from falling through the otherwise open bottoms thereof and give the feeding means free access to the lowermost blank 3 in each hopper 5. A blank 3 is removed from each hopper 5 by the movement of a pair of rubber suction cups 24 up against spaced center portions of the relatively flat backing sheet 16 and then downward therefrom. The suction cups 24 are mounted upon the upper end of hollow spindles 25 carried in laterally extending arms 26 on the upper ends of push rods 27 and, until their movement upward into engagement with the blanks 3, are located in the spaces between the several sections of the wrapping bed 11, which sections cooperate with a like number of strips 28 comprising the apron 6. Upward motion of the suction cups 24 comprising the feeding means for both blanks 3 occurs when the four push rods 27 which are mounted on a hollow bar 29 of the operating means of the machine, are slid upward in the guides 30 on the crossbar support 31 for the wrapping bed sections, and is timed with the cycle of operation of the machine since said operating means, like all other such means in the machine, is actuated from a main drive shaft 32 extending between lower frame portions 33 of said machine. The operating means associated with push rods 27 engages spaced portions (Fig. 2) of the hollow support bar 29 thereof through arms 34 extending from an intermediate operating shaft 35 and connected through pairs of links 36 to fastenings 37 on the lower surface of said support bar 29. The intermediate operating shaft 35, in turn, is rotated in bearing blocks 38 attached to the lower frame portions 33 at the sides of the machine. Said shaft 35 is rotated through the interconnected arm 39, the bar 40 and the cam follower lever 41 which engages a track in the opposite face of the cam 42 from that shown in Fig. 2 through a roller 43. The cam follower arm lever 41 oscillates about a pin 44 in a bracket 45 attached to the bed 46 of the machine. Drive shaft 32 supporting the cam 42 makes one revolution during each cycle and is driven by a suitable driving means (not shown) which engages the sprocket 47.

The suction cups 24 of the blank feeding means 7, when raised into operative positions with reference to the hoppers 5, engage the lowermost blanks 3 in the hoppers 5. At that particular moment, a valve 49 in the association with a cam 50 of the main drive shaft 32 and connected to the lower ends of the hollow spindles 25 through flexible hose (not shown) causes a source of vacuum to draw upon the suction cups 24. The vacuum connection is made through the valve 49 when the outwardly projecting hump 51 forces the control slide 52 thereof further into the body of the valve 49 and by so doing causes the line source of vacuum at the outlet 53 thereof to be in communication with the outlet 54 connected to the spindles 25. The vacuum connection is maintained to the suction cups 24 for the interval in which they are lowered to positions below the apron 6 and the top surface of the wrapping bed 11 and in the course of said movement pull the lowermost blanks 3 from the hoppers 5 and deposit them at wrapping positions upon the apron 6, as shown in Fig. 3. At such times, the vacuum connection to the cups 24 is disconnected and the hose (not shown) connected thereto is vented to the atmosphere so that the blanks 3 are released by the feeding means. The cam 50 brings about these conditions by shifting the control slide 52 of the valve 49 so as to cause the connection between outlets 53 and 54 to be broken and a connection to be made between the outlet 54 and the outlet 55, which is open to the atmosphere.

The blank feeding operation is followed, in the instance shown, by operations of the machine which cause sections of rip cord 13 to be laid along the lips 12 of the positioned blanks 3 by inserting mechanisms, each having cord supplying and advancing units 14 and 15, respectively, opposite the ends of the blank 3. Each rip cord inserting mechanism, as shown for the most part in Figs. 1 and 6, raises the free end of a main supply (not shown) of cord 13 to a position above the apron 6 and the blank 3 through the operations of the supplying unit 14 and, at the same time, projects the cord gripping head 58 of the advancing unit 15 across the apron 6 to a position to pick up said free end. The free end of the cord 13 extends from a spooled supply (not shown) below the supply unit 14 to the offset upper end of the slide 59 where it enters a vertical slit therein and then runs horizontally between said offset slide end and a leaf spring 60 attached thereto and to an exposed position therebeyond. A vertical motion of the slide 59 within the ways of the bracket 61 on the crossbar support 31 of the frame raises the exposed end of the cord 13 and in so doing arranges said end at the initial elevation of the head 58 of the cord advancing unit 15. This vertical motion originates in operating means engaging the projection 62 upon the face of the slide 59 through the vertical push rod 63 and, as shown in Fig. 2, is comprised essentially of a lay shaft 64 and a cam follower lever 65. A roller 65' on one end of the follower lever 65 engages a track in the near face (Fig. 2) of the cam 42 and, in accordance with deviations in the track, causes the follower lever 65 to turn about the pivot pin 66 in the bracket 67 so as to cause motion to be transferred to the lay shaft 64 through the connecting link 68 and the arm 69. The lay shaft 64, in turn, is mounted for rotation in bearing blocks 70 upon the bed 46 of the machine and transfers its motion to the vertical push rod 63 by means of an arm 71. The corresponding cord supplying unit 14 at the other side of the machine and in association with the other blank 3 of the wrapper in also operated by the lay shaft 64 through the arm 71' and the push rod 63'.

The next step in the operation of the cord inserting mechanism occurs when the head 58 of the advancing unit 15 has been moved across the apron 6 to a position where the tips of the then open jaws 72 thereof are opposite the point of emergence of the cord 13 and are capable

of being closed upon said cord 13. The jaws 72 are comprised of a single U-shaped piece of spring steel arranged within the open mouth of the yoke 73 upon the end of a bar 74 and are, in part, maintained in position in the yoke 73 by the head end of a rod 75 extending through an opening at the center of said piece and the yoke 73. Relative longitudinal movements of the rod 75 with respect to the bar 74 control the normal spreading tendency of the U-shaped piece and, when relaxed, permit said piece to move outward from the yoke 73 and the jaws 72 to separate.

The jaws 72 are closed upon the cord 13 by motion of the rod 75 pulling the U-shaped piece back into the yoke 73, and effect their closing motion when compressed air is vented from the actuating cylinder 76 located in butting relation to the opposite end of the rod 75 and when the expansion force of a helical spring 77 about said end shifts said rod 75. The cylinder 76, which is mounted at a fixed position upon a bracket 78 attached to the bar 74, is only effective when the pressure of air introduced therein under control of a valve and cam (not shown) in association with the main cam shaft 32 of the machine causes the piston pin 79 to bear against the rod 75 and counteract the pressure of the spring 77 against the nuts 80 on said rod 75. This manner of constructing the cord advancing unit 15 permits an alternative mode of operation applicable where the cord 13 is so limp as to be difficult to engage by the jaws 72 at their described position adjacent the edge of the slide 59. In the alternative operation of the advancing unit 15, the head 58 is advanced farther toward the supplying unit 14 in a manner to cause the jaws 72 to close upon the offset upper end of the slide 59 and spring 60 and are, therefore, certain to wipe over and close upon the end of the cord 13 when the head 58 is retracted. The resiliency of the jaws 72 and the spring 77 automatically maintains the closing force upon the jaws 72 during their interval of contact with the slide 59 and then with the cord 13.

The necessary length of cord 13 to be laid along the lip 12 of the blank 3 is now pulled from the supply unit 14 by a retraction of the head 58 away therefrom, a movement which has the effect of arranging said length of cord 13 directly above said lip 12. The retraction of the head 58 occurs when the support rod 74, which rests in a saddle 81 hanging from one end of a bearing sleeve 82 surrounding the shank of shaft 83, is slid back in said saddle 81 by the rotation of a gear 84 meshing with the gear rack in the upper surface of said rod 74. The gear 84, in turn, is fastened to the end of the shaft 83 which extends to a second gear 85 upon the opposite side of a stationary support bearing 86 and is timed in its operation by vertical movements of a rack 87 meshing with said second gear 85 and actuated by the operating means of the unit 15. The rack 87 is slid vertically in ways of a bearing bracket 86 attached to the upstanding frame portion 88 by the operating means when compressed air is directed to the actuating cylinder 89 (Fig. 2) by the operation of a valve 90 opposite the cam 91 on the cam shaft 32, and its presently described downward motion had been initiated by the passage of compressed air into the upper connection 92 on said cylinder 89 when the hump on said cam 91 was moved away from engagement with the control slide 94 of the valve 90. At this time, the air supply connection 95 on the valve 90 is in communication with the outlet 96 leading to the connection 92 on the cylinder 89, while the outlet 97 on the valve 90 leading to the lower connection 98 on the cylinder 89 is vented through the valve 90 to the atmosphere. The limit of movement of the head 58 is reached when the tips of the jaws 72 are beyond the end of the lip 12 and the edge of the apron 6.

Following the arrangement of the cord 13 over the lip 12 of the blank 3, downward movements are brought about in both units 14 and 15 of the cord inserting mechanism to cause said cord 13 to be laid upon the lip 12 and fixed in the adhesive thereon. These downward motions are effected simultaneously in both units 14 and 15 by the previously described operating means associated with the slide 59 of the supply unit 14 and occur when the cam 42 causes the slide 59 to be lowered. The lay shaft 64 of the operating means is turned in the course of this operation and is responsible for a corresponding lowering movement of the head 58 of the cord advancing unit 15, in that it turns the support saddle 81 about the axis of shaft 83 by means of the interconnection formed therebetween by the arm 98' and push rod 99. The motion results in the saddle 81 being moved away from the stop screw 100 in the frame portion 88 which has maintained the head 58 in alignment with the upper end of the slide 59 and finally produces substantially the same motion in the head 58 as occurs in the slide 59, since the excess motion of the arm 98' is taken up in expanding the spring cushioned coupling 101 in the push rod 99.

The next operations of the cord inserting mechanism close the shears 105 associated with the supply unit 14 thereof so that the length of cord 13 resting upon the lip 12 of the blank 3 is severed from the main supply, and open the jaws 72 of the advancing unit 15 so that said length of cord is left free of all portions of said mechanism. The shears 105 are operated electrically by a solenoid 106 in engagement with an operating rod 107 connected by links 108, 108 to the blades 109, 109 thereof and which momentarily turns the blades 109, 109 about the pivot pin 110 on the bracket 111 to close them upon the cord 13 when a cam actuated switch (not shown) in combination with the cam shaft 32 connects said solenoid 106 to a source of electric current. The jaws 72 are opened by longitudinal motion of the control rod 75 effected by entrance of air into the actuating cylinder 76 which, as previously explained, is connected to cam actuated valving means (not shown) in combination with the cam shaft 32.

Further downward movements of the slide 59 and the head 58 and a further retraction movement of said head 58 by the various portions of the operating means of the machine carry the cord supplying and advancing units 14 and 15, respectively, to rest positions which they maintain throughout the remainder of the operating cycle of the machine.

The feeding of the blanks 3 to the wrapping positions upon the apron 6 and the insertion of the cords 13 in said blanks 3 occur simultaneously with the feeding and placement of a lamp 1 onto the depression in the apron 6 by the lamp feeding mechanism 8, as shown in Fig. 3. In the normal periods of operation of the wrapping machine, a succession of lamps 1 roll one after another to said machine through the feed chute 2 comprised of inclined bars 114 and the upstanding rails 115 on the outside bars 114 of the chute 2 and in the course of their motion pass onto the similarly constructed hinged chute portion 116 of the feeding mechanism 8.

The cycle of operation of the machine starts with the hinged chute portion 116, which is pivoted upon pins 117 extending from brackets 118 mounted upon the frame cross member 22, at a raised position (Fig. 4) in substantial alignment with the feed chute 2, and with the succession of lamps 1 advanced against feed control fingers 119 located on the downwardly directed end sections 120 of the side rails of the hinged chute portion 116. Subsequent operations of the wrapping machine cause the hinged chute portion 116 to be lowered by the operating means so that the end of the hinged chute portion 116 is over the depression in the apron 6 and will cause a lamp 1 released therefrom to fall onto the apron 6 at that point. The movement is effected in each of the side rails of the hinged chute portion 116 separately by corresponding operating means at each side of the machine and comprised in each instance (although shown only in one instance in Figs. 2 and 3)

of an interconnected adjustable tie rod 121, arm 122, intermediate shaft 123, arm 124 and a vertically moved cam follower 125. A track in one face of a cam 126 upon the cam shaft 32 is engaged by a roller 127 upon the follower 125 which moves the arm 124 to effect rotation of the intermediate shaft 123 in spaced bearing blocks 128 upon the stationary plate 129 of the frame. The motion of the shaft 123, in turn, is transferred through the arm 122 and the tie rod 121 to the side rail of the hinged chute portion 116. The corresponding cam follower 125' and the particular actuating cam 126' of the operating means associated with the opposite side rail of the hinged chute portion 116 appears in Fig. 2.

The end lamp 1 in the movable chute portion 116 is released at the lower limit of motion thereof by the movement of the control finger 119, associated with each rail, in a direction outward and away from the end of the channel-way formed by the end sections 120 of the hinged chute portion 116. This release is effected when the downward movement of each hinged chute portion 116 causes the nuts 130 on the actuating rod 131 associated with said chute portion 116 to engage a stationary upstanding arm 132 on the support bracket 21 for the blank hoppers 5, and effects longitudinal motion in the actuating rod 131. Under these conditions, the finger 119, which extends laterally from a pin 134 journalled on the end chute section 120, is turned about the pin against the contraction force of a helical spring 135 connected between posts in the end chute section 120 and an actuating arm 136 on said pin 134, because of the rotation of the arm 136 caused by continued movement of the chute portion 116.

Only the end lamp 1 of the succession within the hinged chute portion 116 is released and falls to the apron 6 as succeeding lamps 1 are blocked from movement by other control fingers 137 mounted on the side rails at positions further back from the end of the hinged chute section 120. These secondary control fingers 137 were in a raised position above the path of movement of the lamps 1 through the hinged chute section 120 when the hinged chute portion 116 was aligned with the feed chute 2 and moved down to the blocking position during the first motion thereof. The actuating arm 138 for the supporting pin 139 of each secondary control finger 137, at that time, is moved away from the overhanging stationary pressure plate 140 attached to the bracket 21, so that the contraction force of a helical spring 141, extending between posts in said arm 138 and the hinged chute portion 116, is free to pull said secondary control finger 137 to the blocking position.

The lamp 1 dropped from the feeding mechanism 8 comes to rest upon a sagging portion of the apron 6 between the wrapping head 9 and the immediately adjacent end portion of the wrapping bed 11 and in so doing contributes to the operation of the wrapping machine by pulling any additional slack in the apron 6 into the immediate area of said end portion. The apron 6, in the present instance, is formed of a plurality of strips 28 (Fig. 1) of unequal width and spacing and which are cooperatively arranged with a wrapping bed 11 of sections of corresponding width and, accordingly, provide areas thereacross in which the blank feeding means 7 and other means can operate. One such means is the fingers 144 which are mounted adjacent opposite edge portions of the apron 6 at positions to keep the lamp 1 from inadvertently falling upon and possibly being broken by contact with a portion of the apron 6 over the wrapping bed 11. The strips 28 of the apron 6 extend from a fixed anchor or fastening means 145 on the sections of the wrapping bed 11 adjacent the discharge end of the machine, across said sections to an unsupported position below the lamp feeding mechanism 8 and thence up between a series (Fig. 4) of rollers 146, 147 and 148 of the wrapping head 9 to tensioning means 149 and a resilient fastening or anchor means 150. The tensioning means 149 and the resilient anchor means 150 do not at the presently described time stretch the entire apron 6 tight; however, the portion of said apron 6 between the wrapping head 9 and the resilient anchor means 150 is pulled taut since the wrapping head 9 has previously moved away from the resilient anchor means 150, so as to cause the excess apron portion to form the depression below the end of the lamp feeding mechanism 8. When the lamp 1 is deposited upon the apron 6, the hinged chute portion 116 is raised to provide clearance about the lamp 1.

The acts of rolling the lamp 1 over onto the blanks 3 at the wrapping position upon the bed 11 and of wrapping the blanks 3 about said lamp 1 are the objects of a movement of the wrapping head 9 which carries it across the bed 11 in an arcuate course of motion initiated by movement of the arms 10 in engagement with opposite ends of said head 9. The wrapping head 9 is a composite member comprised of a solid support bar 151 extending across the full width of the apron 6 from mountings upon the upper ends of the arms 10, which are located beyond the edges of the apron 6, and has a series of blocks 152 attached to the support bar 151 at intervals to function as journals for the ends of groups of rollers 146, 147 and 148 for holding the respective strips 28 of the apron 6. The arm 10 at both ends of the wrapping head 9 is mounted for movement about a point below the wrapping bed 11 on a pin 153 retained by mounting blocks fastened to the bed 46 of the machine and swings the wrapping head 9 over the bed 11 under the impetus of a crank produced motion in the connecting rod 154 which extends from a pin 155 to crank pin 156 upon the face of a cam corresponding to that shown at 50 and 50', Figs. 2 and 3, on an end portion of the cam shaft 32.

The first part of the movement of the wrapping head 9, which carries it over the lamp 1 and part way over the inclined forward portion of the wrapping bed 11, lays the apron 6 over the lamp 1 and pulls the apron 6 tightly in a loop thereabout inasmuch as the weight of the lamp 1 offers some resistance to movement of the loop. Further resistance to the movement of the apron 6 is created by the blocking effect of resilient means comprised of the fingers 144, 144 at the forward edge of the wrapping bed 11. The fingers 144, 144 resist movement of the lamp 1 until the pulling pressure of the wrapping head 9 along the apron 6 is strong enough to effect the displacement thereof. Each finger 144 is pivoted upon a pin 157 projecting from a frame portion 33 and offers the resistance of a helical spring 158 connected between the lower end thereof and the frame portion 33. Another primary function of the fingers 144, 144 is to prevent the strips 28 of the apron 6 from buckling and, accordingly, forcing the lamp 1 forward along the apron 6 at an early moment so as to be in the path of movement of the wrapping head 9.

The loop or pocket in the strips 28 containing the lamp 1 travels up the inclined forward portion of the wrapping bed 11 as the wrapping head advances relative to the apron strips 28, with the result that the lamp 1 is finally raised to a position directly behind the wrapping head 9 and is almost completely surrounded by the strips 28 when it occupies a position over the upper and substantially horizontal surface of the wrapping bed 11. Still further movement of the wrapping head 9 advances it and the lamp 1 over onto the blanks 3 and thereafter causes the portion of the apron 6 holding said blanks 3 to pass around said lamp 1. The guide 159 upon the forward lower edge of the wrapping head 9 causes said head 9 to pass without difficulty over blanks 3 having slightly upturned edges.

The next step in the wrapping operation occurs midway in the course of the rolling of the blanks 3 about the lamp 1 and consists in a tightening of the strips 28 of

the apron 6 by the tensioning means 149. This tightening operation causes the pocket therein to be closed even more, so that the blanks 3 are bent into very close contact with lamp 1, and causes the pocket in said strips 28 to be pulled even closer to the wrapping head 9. The latter function pulls the lamp 1 into the hollow 160 in the back of the bar 151 so that the lower lip 161 thereon is brought under the lamp 1 and the leading edges of the blanks 3 meet the lips 12 thereof at an acute angle enabling them to lap each other properly. The tightening operation of the tensioning means 149 results from a downward motion of the crossbeam 162, whereby the rods 163 and 164 which extend from mounting blocks therealong are brought down against portions of the strips 28 between the rods 165, 166 and 167 which extend from mounting blocks along the stationary plate 129 of the frame and deflect said strip portions out of their normal straight path between said rods. The crossbeam 162 is mounted through arms 168 extending from end portions thereof to pivot pins 169 in brackets attached to the crossbar 31 of the frame and moves the rods 163 and 164 according to the cam initiated movements of follower levers 170 connected to the arms 168 by links 171. As shown in one instance, a roller 172 upon the follower lever 170 enters the groove in the face of the cam 126' on the shaft 32 and causes said follower lever 170 to be turned about the shaft 35 in a manner to move the crossbeam 162.

During the interval of operation of the tensioning means 149, the strips 28 are so foreshortened thereby as to cause the fastening or anchor means 150 associated with each strip 28 to be flexed and accordingly to cause said strips 28 to be retained at a determinable tension at all times. Each anchor means 150 has a yoke 174 in engagement with a pin 175 in an overlapped end portion of the strip 28 and exerts a pulling force on the strip 28 directly proportionate to the contraction of a helical spring 176 which is located between a collar at the lower end of sleeve 177 attached to said yoke 174 and a washer 178 bearing against a pin 179 in a rod 180 within the sleeve 177. Slits in the side walls of the sleeve 177 give free movement thereof with respect to pin 179 except at the fully contracted limit of motion of the tensioning means 150 which is fastened to the bed 46 of the machine by the bracket 181.

Although the apron 6 presses the overlapping lips 12 of the blanks 3 tightly against the backs of the corrugated sections thereof and will ordinarily cause these adhesive coated surfaces to seal together properly, still other pressure applying means are provided in the corresponding pads 182 and 183 (Fig. 1) opposite each blank 3 at positions between the wrapping bed sections. Each of these pads 182 or 183 is adapted to be forced upward to a position slightly above the top surface of the wrapping bed 11 by a helical spring 184 (Fig. 2) between it and the crossbar 31 and is mounted for movement about a pin retained by a bracket 185 attached to said crossbar 31. The further rolling motion of the lamp 1 and the blanks 3 along the top surface of the wrapping bed 11 carries it to the end thereof and tends to set the blanks 3 to the curved contour of the lamp 1.

The wrapped lamp 1 is released from the loop of the apron 6 when the motion of the wrapping head 9 carries it beyond the end of the wrapping bed 11 and the fixed fastening 145 of the apron 6. At that time, the loop in the apron 6 opens at the bottom, as shown in Fig. 5, and the lamp 1, plus the wrapping in which it is encircled, drops through the opening in the loop to the inclined discharge chute 4. The continued tension applied to the strips 28 of the apron 6 by the resilient fastening means 150 tends to straighten out said strips 28 and, in effect, ejects the lamp from the apron.

Each cycle of operation of the wrapping machine also includes the return motion of the wrapping head 9, which carries it back across the wrapping bed 11, and such other movements of the wrapping head 9 and the tensioning means 149 which cause the apron 6 to be prepared to receive another lamp 1. The returning movement of the wrapping head 9 is effected by the normal return crank motion introduced in arms 10 by the connecting rods 154 and the cams 50 and 50' and shifts the wrapping head 9 back along the strips 28 of the apron 6 which remains taut for its entire length until the tensioning means 149 is relaxed at the end of said movement. The function of the presently described operation of the tensioning means 149 is to release sufficient lengths of the strips 28 on the opposite side of the wrapping head 9 from the bed 11 to cause said strips 28 to advance with the wrapping head 9 and not immediately slide through the wrapping head 9 when it again reverses its direction of movement and advances toward the bed 11. This final operation in the cycle causes extra portions of the strips 28 to appear on the opposite side of the wrapping head 9 from the tensioning means in a position to form a depression suited to receive the lamp 1 so that the wrapping head 9 can pass over said lamp 1 and loop the strips 28 over the said lamp 1 as previously described. The machine is now in position to initiate another cycle of operation.

While I have described a preferred embodiment of the invention, I do not wish to be limited to the exact structure shown as it will be understood that many modifications of the precise manner by which the invention is carried into effect may be made without departing from the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A wrapping machine for elongated tubular lamps comprising a wrapping bed, a flexible apron passing thereover and adapted to support a paper blank on its upper side, means holding the apron in place over the bed with slackness therein and providing a resilient fastening, a movable wrapping head having a portion engaging the underside of the apron to form a loop to the rear of the head when it is displaced relative to the apron, said loop being adapted to encircle partly a lamp, means advancing the head across the bed to run the loop thereacross and wrap the blank around the lamp, and means tensioning the apron during the advance of the wrapping head across the bed to cause the loop in the apron encircling the lamp to press the paper blank tightly about the lamp.

2. A wrapping machine for elongated tubular lamps comprising a wrapping bed, a flexible apron composed of a plurality of spaced strips passing over the bed and adapted to support a paper blank on their upper sides, means holding the apron strips in place over the bed with slackness therein and providing a resilient fastening, a movable wrapping head having portions engaging the underside of the apron strips, said head being initially spaced to the front of the wrapping bed to allow the apron strips to sag in order to receive a lamp, resilient blocking means positioned between the apron strips at the front edge of the wrapping bed to prevent movement of the lamp thereover until the apron strips are pulled tightly about it, and means advancing the head across the bed in order to form loops in the apron strips partly encircling the lamp and to run the loops across the bed whereby to wrap the blank around the lamp.

3. A wrapping machine for elongated tubular lamps comprising a generally horizontal wrapping bed including laterally spaced sections with pads movable upwardly between the sections, a flexible apron comprising a plurality of spaced strips passing over the sections and adapted to support on their upper sides a paper blank having an adhesive coated edge, fastening means holding the apron strips in place over the bed with slackness therein, a movable wrapping head having a portion engaging the underside of the apron strips to form loops therein to the rear of the head when it is displaced relative to the apron strips, said loops being adapted to encircle

partly a lamp, means advancing the head across the bed to run the loops thereacross and wrap the blank around the lamp, and means pressing the said pads upwardly to force the adhesive coated edge of the blank against an overlapped portion thereof.

4. A wrapping machine for elongated tubular lamps comprising a generally horizontal wrapping bed composed of laterally spaced sections, a flexible apron consisting of a plurality of strips passing over said bed sections and adapted to support on their upper sides a paper blank, a hopper mounted over the bed for holding a stack of substantially horizontal paper blanks, said hopper having a generally open bottom and including means preventing the blanks from dropping freely therethrough, blank feeding means including vacuum suction cups movable upwardly between the bed sections to engage the lowermost blank in the bottom of the hopper and downwardly to pull that blank from the hopper and deposit it on the apron strips over the bed, fastening means holding the apron strips in place over the bed with slackness therein, a movable wrapping head having portions engaging the undersides of the apron strips to form loops therein to the rear of the head when it is displaced relative to the apron, said loops being adapted to encircle partly a lamp, and means advancing the head across the bed to run the loops thereacross and wrap the blank around the lamp.

5. A wrapping machine for elongated tubular lamps comprising a generally horizontal wrapping bed composed of laterally spaced sections, pads movable upwardly through the sections, a flexible apron composed of a plurality of strips passing over the sections and adapted to support on their upper sides a paper blank having an adhesive coated edge, fastening means holding the apron strips in place over the bed with slackness therein, a hopper mounted over the bed for holding a stack of substantially horizontal paper blanks, said hopper having a generally open bottom and including means preventing the blanks from dropping freely therethrough, blank feeding means including vacuum suction cups movable upwardly between the bed sections to engage the lowermost blank in the bottom of the hopper and downwardly to pull that blank from the hopper and deposit it on the apron strips over the bed, a movable wrapping head having portions engaging the undersides of the apron strips to form loops to the rear of the head when it is displaced relative to the apron, said loops being adapted to encircle partly a lamp, means advancing the head across the bed to run the loops thereacross and wrap the blank about the lamp, and means pressing said pads upward to force the adhesive coated edge of the blank against an overlapped portion thereof.

6. A wrapping machine for elongated tubular lamps comprising a generally horizontal wrapping bed composed of a plurality of laterally spaced sections, a flexible apron composed of a plurality of strips passing over the bed sections and adapted to support on their upper sides a paper blank having an adhesive coated edge, a hopper mounted over the bed for holding a stack of substantially horizontal paper blanks, said hopper having a generally open bottom and including means preventing the blanks from dropping freely therethrough, blank feeding means including vacuum suction cups movable upwardly between the bed sections to engage the lowermost blank in the bottom of the hopper and downwardly to pull that blank from the hopper and deposit it on the apron strips over the bed, a movable wrapping head having portions engaging the undersides of the apron strips, said head being initially spaced to the front of the wrapping bed to allow the apron strips to sag between it and the bed, lamp feeding means comprising a chute for stacking the lamps horizontally, a discharge portion receiving lamps from the chute and movable to a position over the sagging portions of the apron strips, and escapement means at the lower end of the chute portion for releasing lamps singly to the apron, and means advancing the head across the bed in order to form loops in the apron strips partly encircling the lamp and to run the loops across the bed whereby to wrap the blank around the lamp.

7. A wrapping head for a machine of the type wherein a blank is wrapped around a tubular article as a result of rolling a loop formed in a flexible apron which loop is run across a wrapping bed by moving the wrapping head across the bed, comprising a body portion adapted to engage the underside of the apron and to be advanced relative to the apron along the wrapping bed, said body portion having a lip projecting rearwardly on its lower side next to the wrapping bed and proportioned to constrain the apron to bend down around the leading edge of the article whereby to force the leading edge of the blank to meet the apron at an acute angle as the blank encircles the article.

8. A wrapping head for a machine of the type wherein a blank is wrapped around a tubular article as a result of rolling in a loop formed in a flexible apron which loop is run across a wrapping bed by moving the wrapping head across the bed, comprising a body portion having a plurality of rollers disposed to engage the apron transversely, at least one of said rollers to engage the underside of the apron and one to engage the upper side of the apron, said body portion having a curved rearward face conforming generally to the curvature of the article to be wrapped and having a lip projecting rearwardly on its lower side next to the wrapping bed, said curved face and projecting lip being proportioned to constrain the apron to bend down around the leading edge of the article whereby to force the leading edge of the blank to meet the apron at an acute angle as the blank encircles the article.

9. In combination, a wrapping machine for elongated tubular lamps comprising a wrapping bed, a flexible apron passing thereover and adapted to support a paper blank on its upper side, fastening means holding the apron in place over the bed with slackness therein, a movable wrapping head having a portion engaging the underside of the apron to form a loop to the rear of the head when it is displaced relative to the apron, said loop being adapted to encircle partly a lamp, and rip cord inserting apparatus comprising a cord supplying unit on one side of the bed, a cord gripping head transversely reciprocable across the bed and vertically reciprocable to lower the cord onto the blank, means for severing the cord at the cord supplying unit, and means advancing the head across the bed to run the loop thereacross and wrap the blank around the lamp with the cord caught between overlapped portions of the blank.

10. In combination, a wrapping machine for elongated tubular lamps comprising a wrapping bed composed of a plurality of spaced sections, a flexible apron comprising a plurality of strips passing over said sections and adapted to support on their upper sides a paper blank having an adhesive coated edge, fastening means holding the apron strips in place over the bed sections with slackness therein, a hopper mounted over the bed for holding a stack of substantially horizontal paper blanks, said hopper having a generally open bottom and including means preventing the blanks from dropping freely therethrough, blank feeding means including vacuum suction cups movable upwardly between the bed sections to engage the lowermost blank in the bottom of the hopper and downwardly to pull that blank from the hopper and deposit it on the apron strips over the bed, rip cord inserting apparatus comprising a cord supplying unit on one side of the bed, and a cord advancing unit comprising a gripping head horizontally reciprocable over the bed to draw the rip cord transversely across the blank, means for lowering the cord supplying unit and the cord advancing unit to deposit the cord on the adhesive coated edge of the blank, means at the cord supplying unit for severing the cord, a movable wrapping head having portions en-

gaging the undersides of the apron strips to form loops to the rear of the head when the head is displaced relative to the apron, said loops being adapted to encircle partly a lamp, and means advancing the head across the bed to run the loops thereacross and wrap the blank around the lamp with the rip cord caught in the adhesive where the edges of the blank overlap.

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