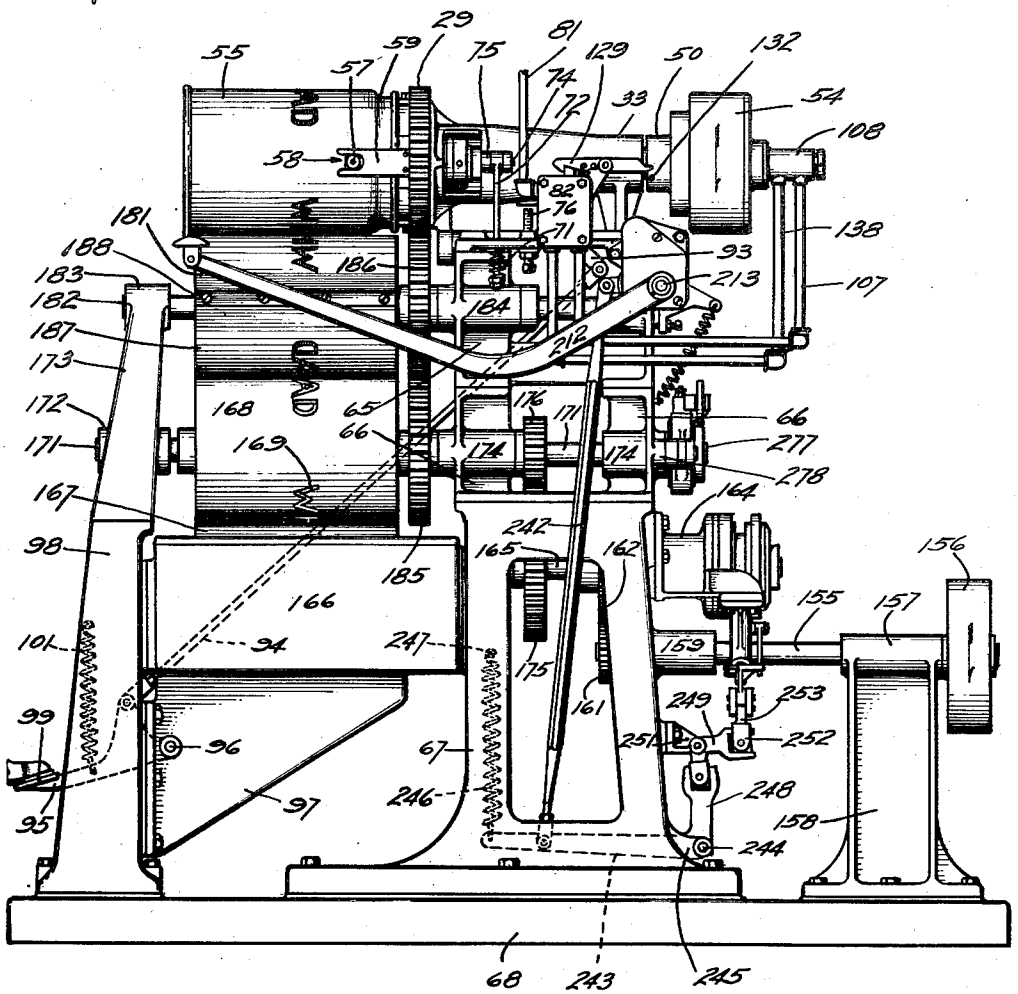
Sept. 24, 1935. H. J. PAYNTER ET AL 2,015,086

PRINTING MACHINE FOR TUBULAR BODIES

Filed May 27, 1929 4 Sheets-Sheet 1

Fig. 1



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PRINTING MACHINE FOR TUBULAR BODIES

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Fig. 2

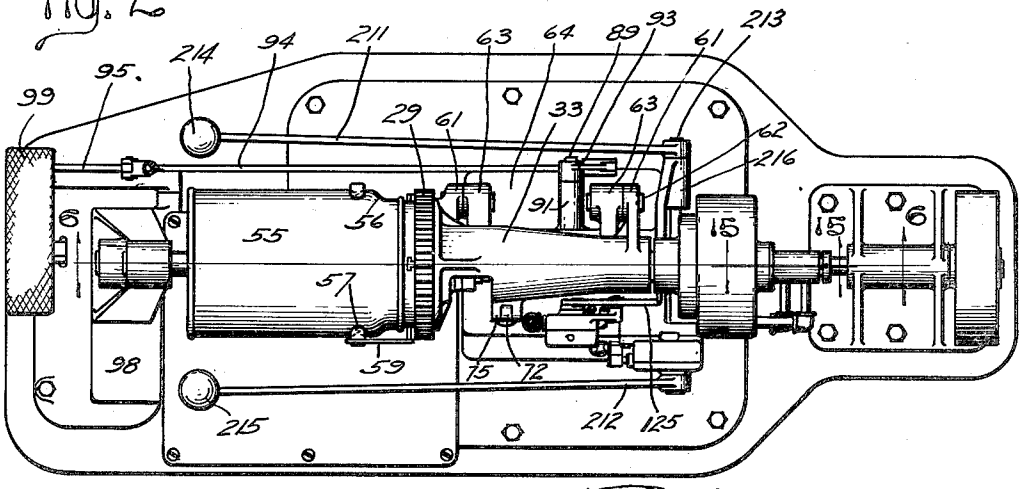


Fig. 5

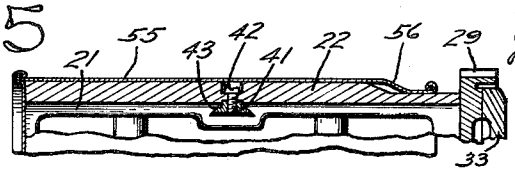


Fig. 4

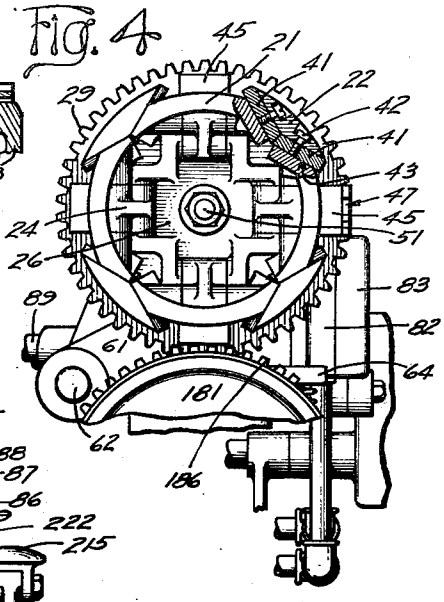
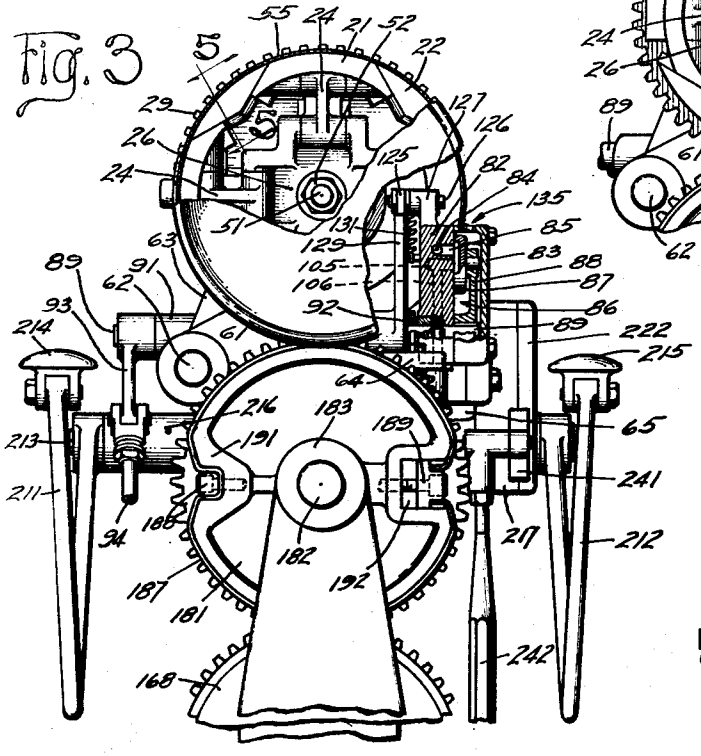


Fig. 3



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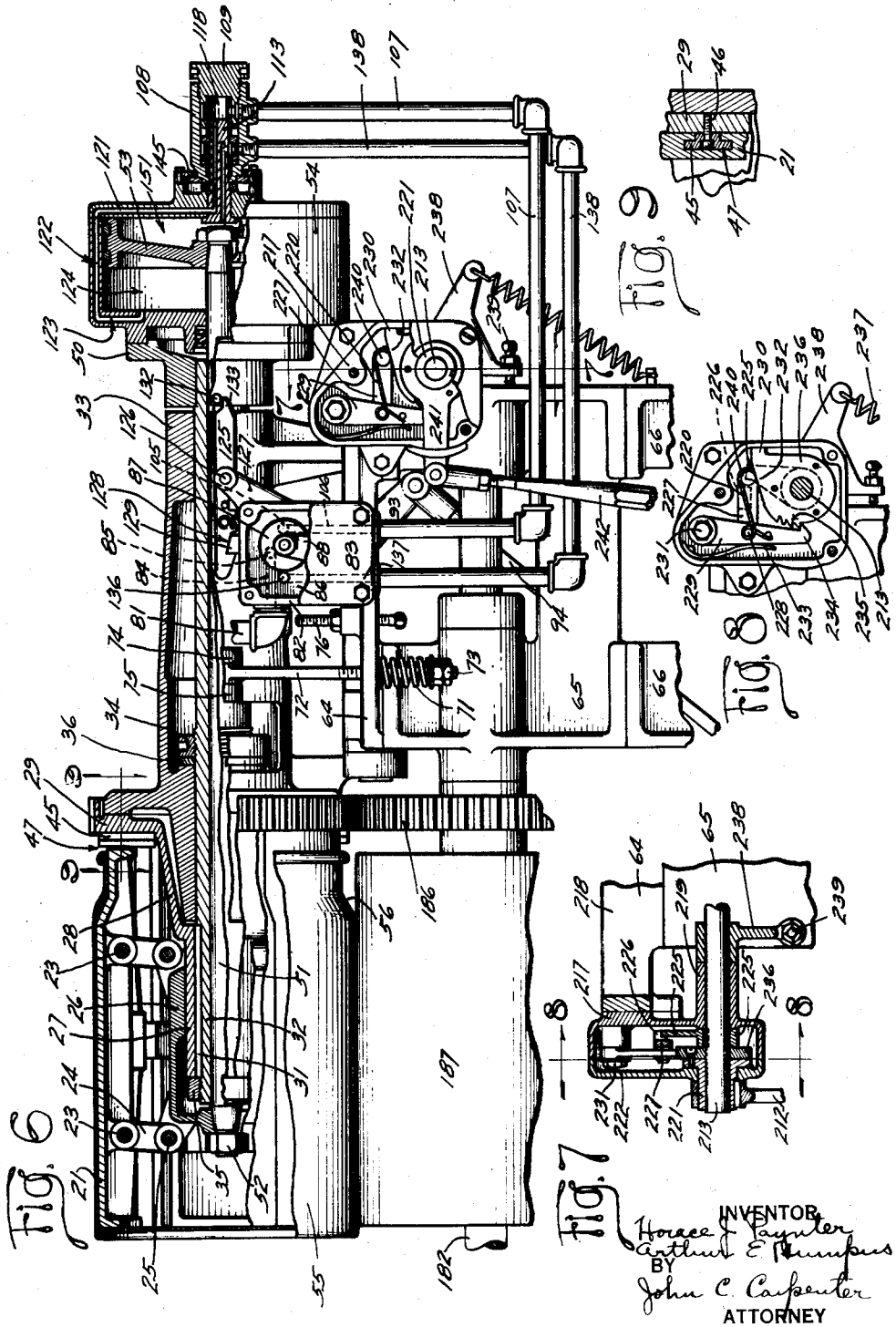


Fig. 6

Fig. 7

Fig. 8

Fig. 9

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PRINTING MACHINE FOR TUBULAR BODIES

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Fig. 10

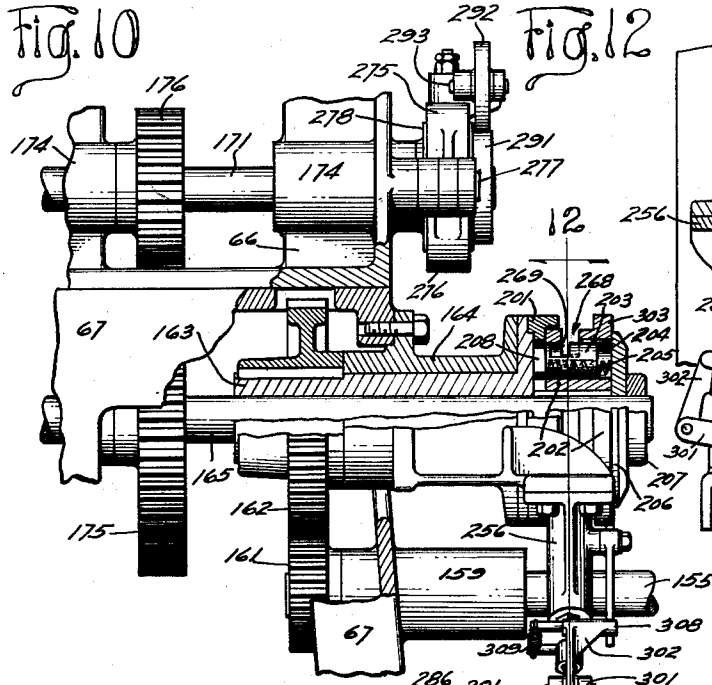


Fig. 12

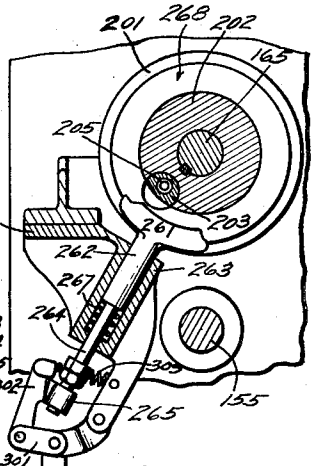


Fig. 13

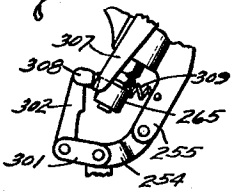


Fig. 11

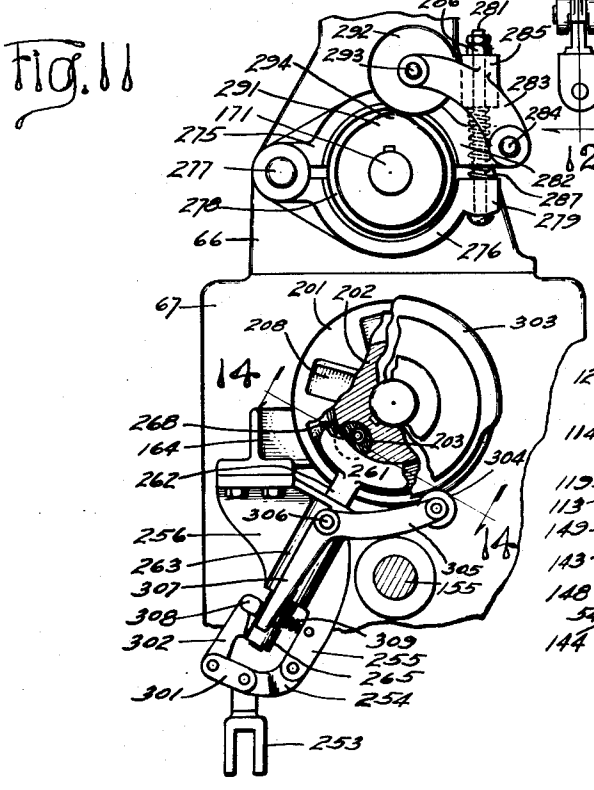


Fig. 14

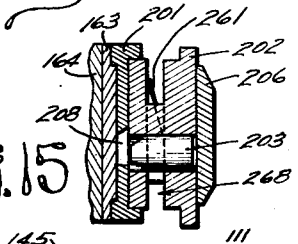
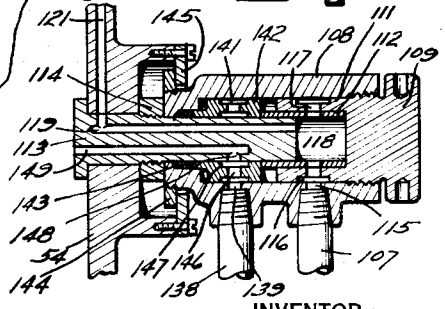


Fig. 15



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UNITED STATES PATENT OFFICE

2,015,086

PRINTING MACHINE FOR TUBULAR BODIES

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Application May 27, 1929, Serial No. 366,114

25 Claims. (Cl. 101—38)

The present invention relates to a printing machine for tubular objects and has particular reference to an apparatus for holding a tubular container body in definite register relative to a printing mechanism and for printing a design on the container body so held.

The apparatus of the present invention is particularly well adapted to the printing of a label or a design on the outside of a tubular drum or keg such as is ordinarily used in the packaging of white lead and similar products.

Such drums or kegs are usually previously painted or coated with a protective covering which is thoroughly dried. The label or design must then be applied to such a coated surface. The printing must be done with relatively great pressure between the container body and the printing roller and must have accurate register at all times to prevent smearing or blurring of ink or paint used in the design being transferred.

The apparatus of the present invention provides the greatest security against non-registration of parts by supporting the inside of the container body at all points in its inner peripheral surface. This feature affords a complete backing-up of the container body at its point of contact with the printing roller permitting the use of great printing pressure and at the same time preventing any slipping of the container on its support or relative to the printing roller.

The principal object of the present invention is the provision of a printing machine having an expanding chuck for holding a tubular body, the chuck engaging and rigidly holding the inner wall of the body when expanded and presenting a smooth unbroken peripheral engaging surface at such time.

An important object of the invention is the provision of an expanding and contracting chuck for use in a printing machine which is expanded for engagement with a tubular container body and which is contracted to a relatively small size to permit the easy removal of the container body therefrom.

Another important object of the present invention is the provision of an expanding and contracting chuck for use in a printing machine which has a rapid expanding action and one in which the parts are locked against collapse while expanded.

An important object of the invention is the provision of a chuck for use in a printing machine which is expanded and contracted by the action of compressed air controlled in a simple and efficient manner.

An important object of the invention is the provision of a chuck for use in a printing machine which is expanded to engage a tubular body by direct action on the part of the operator but which is automatically collapsed at termination of the printing cycle.

A further important object of the invention relates to the hinged mounting of a chuck relative to a printing roller whereby a proper printing engagement is always secured between the printing roller and a body carried by the chuck.

A still further important object of the invention is the provision of a locating gauge for registering a tubular body in predetermined position upon the holding chuck of a printing machine.

A further important object of the invention is the provision of an organized printing mechanism for tubular bodies comprising a series of operations automatically coördinating when set in motion by the operator to produce one, and one only, complete printing cycle.

An important object of the invention is the provision of a clutch device for connecting driving power to the operating parts of a printing press the clutch device being controlled and actuated through a safety device requiring predetermined manual operations.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

Referring to the drawings:

Figure 1 is a side elevation of the machine.

Fig. 2 is a top plan view of the machine.

Fig. 3 is a front elevation of the upper part of the machine, parts being broken away and a tubular body being shown in position upon the expanded holding chuck.

Fig. 4 is a front elevation of the holding chuck in collapsed position, parts being broken away.

Fig. 5 is a sectional detail of a part of the holding chuck, the view being taken substantially along line 5—5 in Fig. 3.

Fig. 6 is a longitudinal central sectional view of the upper part of the machine the top portion of the view being taken substantially along line 6—6 in Fig. 2 the lower portion of the view showing parts in elevation.

Fig. 7 is a sectional detail taken substantially along line 7—7 in Fig. 6.

Fig. 8 is a sectional detail taken substantially along line 8—8 in Fig. 7.

Fig. 9 is a sectional detail taken substantially along line 9—9 in Fig. 6.

Fig. 10 is a fragmentary side elevation, partially in section of the clutch device and the control instrumentalities associated with the transmission of driving power in the machine.

Fig. 11 is an end elevation of the parts shown in Fig. 10.

Fig. 12 is a transverse sectional view taken substantially along line 12—12 in Fig. 10.

Fig. 13 is a fragmentary detail of a part of the clutch mechanism illustrated in Fig. 12.

Fig. 14 is a sectional detail taken substantially along line 14—14 in Fig. 11.

Fig. 15 is an enlarged central section of the mechanism illustrated at the extreme right of Fig. 6, being taken substantially along line 15—15 in Fig. 2.

The apparatus of the present invention comprises an organized printing mechanism embodying a contracting and expanding chuck adapted to hold a container body and to rotate the same about its axis during a printing operation.

Cooperating with the rotating chuck and positioned directly beneath is a printing mechanism comprising a printing roller of the "offset" printing type. In this type of printing the printing roller carries a rubber or other kind of blanket upon which is superimposed the printing design or legend which is built up in ink or in paint applied to the surface of the blanket by a type roller positioned therebeneath. The type roller which carries the design matrix, in turn cooperates with an inking roller and the matrix is thereby furnished with the paint or ink which is transferred to the blanket of the printing roller and this, in turn, is transferred to the outer wall of the tubular container held on the expanded chuck.

All of these rollers and parts are suitably mounted for rotation and are rotated in synchronism to effect the printing operation upon the tubular container body. Mechanism is provided for expanding the holding chuck after a tubular container body has been placed by hand or in any suitable manner in proper position thereon. This expanding mechanism comprises interconnected parts actuated by compressed air, in turn, controlled by the operator through a foot treadle.

A clutch device is provided for connecting operating parts of the machine with a source of driving energy. Actuation of the clutch device is made through control safety instrumentalities, a feature of which necessitates actuation in proper sequence by the operator before rotation of any of the printing mechanism takes place.

Other mechanism is provided for insuring a single printing operation after which the machine automatically comes to rest and the cycle of operation can then only be repeated by a repeated actuation of the various parts by the operator in their proper order.

As illustrated in the drawings the tubular body holding chuck (Figs. 3 to 6 incl.) comprises a series of sections 21 and 22, a section 22 being positioned between two alternate, spaced sections 21. There are four each of the sections 21 and 22 in the present embodiment although this number may vary with different diameters of holding chucks. These sections are arranged concentrically about the center of the chuck and when expanded, as illustrated in Fig. 3, the outer surfaces of the alternating sections 21 and 22 present one complete, smooth, unbroken periphery.

Sections 21 (Fig. 6) are pivotally connected at 23 to links 24, in turn pivotally connected at 25 to a cap 26 sliding longitudinally over a tubular member 27 formed integrally with a conical sleeve 28, in turn, extending into a spur gear 29.

The tubular member 27 is keyed at 31 to one end of a rotatable sleeve 32 extending substantially throughout the width of the machine, the sleeve being mounted within a chuck frame 33. Sleeve 32 is held in fixed longitudinal position relative to the frame 33 by adjusting collars 34 and 35 threadedly connected with the sleeve, the former clamping a thrust washer 36 carried on sleeve 32 against the frame 33, this construction holding gear 29 against frame 33. By reason of the link connections between sections 21 and cap 26, these sections (functionally "active sections") are actuated, as will be hereinafter fully described, to expand or contract the holding chuck. Sections 22, in turn, are radially moved only through movement of the active sections and, therefore, constitute "passive sections."

Each section 22 is provided with two dovetail keys 41 (Fig. 4) secured thereto by screws 42 and each key 41 has sliding movement within a dovetail slot 43 formed in each sliding face of a section 21. This permits radial sliding movement between the active and the passive sections the latter being moved out and in by reason of the inclined construction of the contacting surfaces of the sliding sections. This dovetail or tongue and groove construction and the transverse position of the keys prevents longitudinal movement between the sections 21 and 22.

Each section 21, in turn, is movably connected with gear 29 by feather and featherway. Each connection comprises a feather 45 (Figs. 4, 6 and 9) secured to the front wall of gear 29 by a screw 46 there being illustrated four feathers 45 spaced around the gear center. Sections 21 are slotted and thereby provided with featherways 47 in which the feathers 45 slide and this construction permits radial movement of the sections 21 relative to the gear 29 but prevents any axial movement therebetween.

Sections 21 are moved outwardly to expanded position by sliding movement of the cap 26 acting through the links 24 (Figs. 3, 4 and 6). Cap 26 is clamped to one end of a piston rod 51 extending through sleeve 32, the cap being held thereon by a locknut 52. The opposite end of rod 51 carries a piston 53 operating within a cylinder 54 secured to a collar 50 carried by the sleeve 32.

When piston 53 is moved toward the right, (as viewed in Fig. 6) rod 51 moves the cap 26 along the tubular member 27 to the position illustrated and links 24 at the end of the movement are in a substantially vertical position, the sections 21 being moved outwardly. The inclined contacting surfaces of sections 21 and 22 at such time move the latter to their expanded positions thus completing a continuous peripheral surface for the holding chuck (Fig. 3). In this expanded position the pivots 25 and 23 of links 24 are practically in alignment forming a locked toggle system preventing collapse of the expanded chuck. During this expanding movement the connecting members 41 and 43, and 45 and 47 maintain the sections in their longitudinal position relative to the gear 29.

In expanded position (Fig. 3) the outer diameter of the holding chuck is considerably in excess of the diametrical distance between the outermost opposite passive sections 22 when in collapsed position (Fig. 4). The collapsed position, therefore, not only permits easy positioning

of a tubular body 55 over the holding chuck but, also, permits the use of a necked-in body, one having a restricted upper part 56 (see Figs. 2, 5 and 6). Such a necked-in tubular body is widely used for paint and putty and is often provided with bail ears 57 used for holding a bail or handle which is subsequently assembled with the body. In placing such a tubular body upon the holding chuck one ear 57 of the can (Figs. 1 and 2) is pushed within a slot 58 formed in the outer end of a gauge strap 59 secured to gear 29. This provides a reference point for the body 55 and determines the exact location of the printed design applied to the body in the printing operation.

Chuck frame 33 is provided with arms 61 (Figs. 2 and 3) which are hinged at 62 to arms 63 projected from a plate 64 (see also Figs. 1 and 6) mounted upon a printing roller bracket 65 which, in turn, is carried upon a type roller bracket 66 supported by a main frame 67 carried upon a base 68. By reason of the hinged connection of chuck frame 33 the entire chuck mechanism carried thereby has slight vertical movement about the hinge pintles 62, around a center line parallel with the axis of the chuck and permitting a yielding printing pressure to be applied between the container body 55 (upon the holding chuck) and the printing roller.

The weight of the chuck mechanism assisted by the action of a coil spring 71 (Figs. 1, 2 and 6) surrounding the lower end of a vertical rod 72 gives the necessary printing pressure. Spring 71 is interposed between the plate 64 and nuts 73 threadedly engaging the lower extremity of rod 72, the latter having sliding movement through the plate 64. Rod 72 is pivoted at 74 to a lug 75 projected from one side of chuck frame 33, this being on the side opposite to the hinged connection with the brackets 63.

When the chuck sections 21 and 22 are in their contracted position, the weight of and the spring action upon, the chuck mechanism holds it in a lowered position this position being determined by a setscrew 76 threadedly adjusted in the plate 64, and supporting the free unhinged side of frame 33.

After a container body 55 has been positioned over the contracted chuck, compressed air operates to move piston 53 within its cylinder 54 and to expand the chuck parts into holding position. This operation of the compressed air within the cylinder 54 is regulated through a control air valve which, in turn, is actuated by the operator. Compressed air is introduced into the machine from any suitable source of supply by means of a pipe 81 (Figs. 3 and 6) connecting with the interior of an air valve casing 82 mounted upon one side of the plate 64. Casing 82 is provided with a cover 83, these parts enclosing the mechanism of the air valve.

Air entering through pipe 81 passes through a horizontal passageway 84 and thence through a lateral port 85 to an interior chamber 86 confined within the parts 82 and 83. Provision is made for selectively connecting port 85 with one of two ports leading respectively to the front of or to the back of the piston 53 in cylinder 54. This selective control comprises a cup member 87 carried on the upper end of an arm 88, keyed to a rockshaft 89 (Fig. 3) journaled in the casing 82 and in a bearing 91 projected from one side of plate 64. Shaft 89 where it passes through the casing 82 is provided with a stuffing box 92 permitting oscillation of the shaft but preventing passage of air along the shaft at that place.

Rockshaft 89 (Figs. 1, 2 and 3) carries an arm 93 pivotally connected to a tie rod 94 pivoted at its lower end to a lever 95 pivoted at 96 in a bracket 97 projected from one face of a column 98 carried by the base 68. Lever 95 is provided with a foot treadle 99 actuation of which moves lever 95 to oscillate shaft 89 and move the air cup member 87. A coil spring 101 is interposed between lever 95 and column 98. Spring 101 normally holds lever 95 in normal raised position.

Upon depression of the foot treadle 99 through the described mechanism arm 88 is shifted to carry cup member 87 toward the right as illustrated in Fig. 6, where this cup member covers port 85 and a port 105 formed in the casing 82 and communicating with a vertical passageway 106 (see also Fig. 3) which, in turn, communicates with the interior of a pipe 107.

Pipe 107 is threadedly secured to a sleeve 108 (Figs. 6 and 15) which forms a housing for a stuffing box unit and air connections with the cylinder 54. Sleeve 108 is held stationary with pipe 107 but permits rotation of the cylinder 54 with rotation of the sleeve 32 and the holding chuck.

Sleeve 108 is closed at its outer end by a threaded plug 109 formed with a tubular extension 111 which encircles a gland 112, in turn, positioned over the end of a stem 113 projected from one end of cylinder 54 and threadedly secured thereto by a locknut 114. The interior of pipe 107 communicates with a passageway 115 passing through one wall of sleeve 108 and communicating with an annular groove 116 formed in the extension 111 of plug 109. Compressed air passing through pipe 107 and port 115 fills the annular groove 116.

Radial ports 117 cut through gland 112 form a connection between the annular groove 116 and an air chamber 118 on the inside of gland 112, this chamber being confined between the end of stem 113 and plug 109. Gland 112 is held stationary with plug 109 and stem 113 is free to rotate within the gland. Compressed air passes from chamber 118 through a horizontal passageway 119 communicating with a lateral passageway 121 in the rear wall of cylinder 54. Passageway 121, in turn, communicates with passageways 122 and 123 formed respectively in the outer and front walls of cylinder 54, the end of passageway 123 communicating with an air chamber 124 in cylinder 54 forward of the piston 53. This compressed air passing into air chamber 124 forces the piston 53 toward the right (as viewed in Fig. 6) this action expanding the chuck sections 21 and 22 as previously described.

The operator does not need to hold foot treadle 99 depressed throughout this cycle of chuck expanding operation as provision is made for automatically holding cup member 87 in the position illustrated in Fig. 6 until after the printing operation. This device comprises a lever 125 (Figs. 3 and 6) pivoted at 126 to a bracket 127 projected from one wall of casing 82. One end of lever 125 is formed with a notch 128 adapted to engage the upper end of an arm 129 mounted on the rockshaft 89. Arm 129 is moved into the slot 128 by depression of the treadle 99 and upon oscillation of the shaft 89. Moving into position, the upper end of arm 129 which is inclined at its top strikes against an inclined rounded nose formed on the lever 125 and rocks the lever

about its pivot 126 against the action of a coil spring 131 interposed between lever 125 and a pin projected from casing 82. The upper end of arm 129 is thereupon engaged within the slot 128, spring 131 retaining this locked position of arm 129. Treadle 99 may thereupon be immediately released but lever 125 will still hold the parts in chuck expanded position until after the printing operation.

The printing operation is performed in one rotation of the holding chuck and provision is made for disengaging arm 129 from lever 125 on the termination of one complete rotation of the holding chuck and mechanism carried therewith. This comprises a pin 132 (Fig. 6) projected from the collar 55 and adapted to engage a notched end 133 of lever 125 just prior to the completion of a single rotation of the collar 55. Figure 6 illustrates the parts in position where pin 132 has just engaged lever 129. Lever 125 upon further movement of pin 132 with its collar 55 will move about its pivot 126 and release arm 129 which thereupon moves with the oscillation of shaft 88 under action of spring 101. Such oscillation of shaft 89 moves arm 88 and cup member 87 from the position illustrated in Fig. 6.

This movement of cup member 87 uncovers port 105 and air from chamber 124 thereupon passes through the ports and passageways described, through the pipe 107 and to the interior chamber 86 of the air valve. From chamber 86 the air escapes to atmosphere through a port 135 (Fig. 3) formed in the upper part of the cover 83.

In this normal position of cup member 87 (toward the left Fig. 6) connection is formed between the supply port 85 and a lateral port 136 communicating with a vertical port 137 both formed in casing 82 the latter port leading to the interior of a pipe 138, also, threadedly secured to the sleeve 108.

Compressed air conducted through pipe 138 passes through a port 139 (Fig. 15) in sleeve 108 and communicates with an annular groove 141 formed in the outer periphery of a stuffing box gland 142 held in position on stem 113 by gland 112 and plug 109. In this position gland 142 confines a packing 143 within the forward end of sleeve 108. Sleeve 108 at this position is threadedly held by a washer 144 against a plate 145 bolted to the rear end wall of cylinder 54. This completes the movable connection between the stationary sleeve 108 and the movable cylinder 54.

The compressed air passing through pipe 138, port 139 and into the annular groove 141 is thence conveyed through radial ports 146 to an annular groove 147 formed on the interior of gland 142, thus surrounding the rotatable stem 113. Air then flows through a radial port 148 communicating with a longitudinal passageway 149 leading to an air chamber 151 (Fig. 6) within cylinder 54 and to the right of piston 53. The pressure of this air against the face of piston 53 causes it to move toward the left (as viewed in Fig. 6) carrying rod 51 and connected parts toward the left to collapse the holding chuck. During this movement, air from chamber 124 passes to the atmosphere through the air valve and port 135.

With a container body 55 in position on the holding chuck and the parts expanded by depression of the foot treadle 99 and operation of the air valve, as described, the can body is ready for its printing operation. This operation is automatically carried on by rotation of the holding chuck and cooperating rotation of printing mechanism.

Driving power for the machine is communicated to a drive shaft 155 through the medium of a belt pulley 156 (Fig. 1). Shaft 155 is journaled in a bearing 157, carried on the upper end of a bracket 158 bolted to the base 68. Shaft 155, also, operates in a bearing 159 formed on frame 67. Shaft 155 carries a pinion 161 which meshes with a gear 162 (Fig. 10) keyed to a sleeve 163 journaled in a bearing bracket 164 carried by frame 67. Sleeve 163 constitutes the driving part of a clutch mechanism which will be hereinafter fully described and which constitutes, at certain periods, a connection between the rotating sleeve 163 and an inking roller shaft 165 extending through and supported by the sleeve 163. Shaft 165 extends at its forward end into a usual form of inking mechanism generally designated by the number 166 (Fig. 1) which embodies the usual ink or paint applying and distributing rollers, shaft 165 having suitable bearing within this mechanism.

The ink or paint by this mechanism is evenly distributed over an inking roller 167 suitably carried within the inking mechanism 166 and contacting a type roller 168 provided with a design or legend matrix 169 carried on its periphery in the usual and preferred manner. Roller 168 is carried by a horizontal shaft 171 journaled in a bearing 172 formed in a bracket 173 mounted upon the column 98 and in bearings 174 formed in the bracket 66 (Figs. 1 and 10).

Shaft 171 receives rotation from shaft 165 through a pair of intermeshing gears 175 and 176 mounted respectively upon the shafts 165 and 171. Type roller 168 is positioned directly beneath a printing roller 181 carried by a horizontal shaft 182 journaled in a bearing 183 formed in the bracket 173 and in bearings 184 carried by bracket 65. Shaft 182 and printing roller 181 rotate in unison with shaft 171 and type roller 168 through the intermeshing gears 185 and 186 carried by the respective shafts 171 and 182.

Printing roller 181 (Fig. 3) is covered with a rubber or other suitable printing blanket 187 held on the periphery of the roller by clamping bars 188 and 189 positioned within longitudinal slots 191 and 192 this being a preferred construction universally used in offset printing. The design or type matrix 169 of type roller 168 contacts the outer surface of this blanket 187 during the rotation of the respective rollers 181 and 168 and the paint or ink applied to the outer surface of the type by the inking rollers is transferred to the surface of the blanket 187 in the regular printing manner.

With printing engagement taking place between the outer surface of the blanket 187 on the printing roller 181 and the outer surface of the held container 55 positioned upon the holding chuck, the design is transferred from the printing roller to the outer wall of the container 55. Gear 186 is at all times in mesh with gear 29 and this insures proper moving contact between printing roller 181 and container body 55 during this printing operation.

The proper pressure between container 55 and the printing roller 181 is insured by reason of the hinged construction of the chuck frame 33 assisted by the yielding action of spring 71 as has been previously described. The teeth of gears 29 and 186 are sufficiently deep to permit this hinging action without getting out of mesh.

The clutch device for connecting the driving parts 155 and 163 with the driven shaft 165 comprises a mechanism disclosed in detail in Figs. 10 to 14 inclusive. Sleeve 163 carries a disc ring 201 positioned adjacent a clutch pawl collar 202 keyed to shaft 165. Collar 202 carries a spring clutch pawl 203 having sliding movement within a transverse bore 204 formed in the collar 202. A coil spring 205 is seated within one end of pawl 203 and presses against the forward face of the same. The opposite end of spring 205 is held by a washer 206 positioned on shaft 165 adjacent collar 202 and held in place by a locking collar 207. Under the action of spring 205 pawl 203 has a tendency to move toward the left as viewed in Fig. 10 and when unrestricted in its movement engages with one of several radial slots 208 formed in disc 201. When the forward end of pawl 203 moves within a slot 208, parts 201 and 202 are locked together and shaft 165 rotates in unison with the rotating sleeve 163.

Provision is made for removing pawl 203 from a slot 208 whereupon the shaft 165 will be disconnected from the rotating sleeve 163. This mechanism constitutes control instrumentalities for the clutch and is under the direct actuation of the operator. In this actuation, provision is made for insuring that both hands of the operator are in a safe position during the printing cycle of the apparatus requiring the proper actuation in proper sequence of two separate and widely spaced handles.

Two handle levers 211 and 212 are mounted upon a transverse shaft 213 (Fig. 3) lever 211 being secured thereto. Levers 211 and 212 are provided respectively with a hand rest 214 and 215. Handle 211 controls a "latch mechanism" this handle being positioned on the left-hand side of the machine, viewing the machine from the front as illustrated in Fig. 3. Lever 212 is connected with what will be considered the "clutch control", this lever being positioned on the right-hand side of the machine.

Latch lever 211 must first be operated to unlatch lever 212 before the latter can be used to actuate the clutch device and operate the printing mechanism. Shaft 213 is journaled for oscillation within a bearing 216 carried by the bracket 65 (Figs. 2 and 3) and extends through a latch casing 217 (Fig. 7) carried by a bracket 218 formed as a part of plate 64. Shaft 213 where it passes through the casing 217 has oscillating movement within a bearing 219 formed therein and projects through and oscillates within a sleeve 221 carried by a casing cover 222 secured to the casing 217. Sleeve 221 directly supports handle lever 212 the lever being keyed thereto. The latch mechanism is partially confined within the casing 217 and its cover 222 and is shown in detail in Figs. 6, 7, and 8.

Oscillation of shaft 213 by movement of the handle lever 211 under pressure of one hand of the operator moves an arm 225 (Figs. 7 and 8) which is keyed to the shaft and positioned within the casing 217. The upper end of arm 225 moves toward the left (Fig. 8) and strikes a projecting lug 226 (Figs. 7 and 8) carried by a link 227 pivotally connected at 228 to a latch member 229 pivoted on a bolt 231 secured to a boss formed in the casing 217. Latch member 229 thereupon moves against the action of a leaf spring 233 and its lower hooked end 234 disengages teeth 235 formed on a plate 236 loosely mounted on shaft 213 and connected to the sleeve 221.

This movement of shaft 213 by actuation of the handle 211 is resisted by a coil spring 237 (Fig. 6) connected at one end to the bracket 66 and at its opposite end to an arm 238 keyed to shaft 213 (see also Fig. 7). Arm 238 which carries an adjusting bolt 239 moves it away from its normal engagement with one face of the bracket 65. Spring 237 is used to return handle lever 211 to normal position upon its release by the operator.

With the latch member 229 held in disengaged position plate 236, sleeve 221 and handle lever 212 are free to move upon the shaft 213. Upon actuation of the handle lever 212 by depression of the other hand of the operator, the plate 236 is moved in a counter clockwise direction (Figs. 6 and 8). This action moves a stop projection 230 formed on the plate away from one wall of casing 217 and at the same time an inclined cam face 232 of the plate engages a boss 240 formed on one end of link 227, lifting that end of the link against the action of a spring 220 carried by latch member 229.

Spring 220 holds boss 240 against the cam face 232 and as the end of link 227 is lifted, lug 226 is raised above the upper end of arm 225. Spring 233 thereupon returns the hooked end 234 of latch member 229 to its normal position in engagement with plate 236. By reason of the shape of the teeth 235 and the hooked end 234, plate 236 may be returned to normal but can not be again actuated without again unlatching the parts by actuation of handle 211. This necessitates the proper sequence of operations on the part of the operator for each cycle of operations of the machine and provides a fool proof safety feature.

As plate 236 and sleeve 221 are moved with handle 212, an arm 241 (Figs. 1 and 6) formed integrally with sleeve 221 moves a connecting rod 242 downwardly. Rod 242 is pivoted at its upper end to arm 241 and at its lower end to a bellcrank lever 243. Bellcrank lever 243 is pivoted at 244 on a bracket 245 projected from the frame 67.

Movement of the bar 242 causes bellcrank lever 243 to move about its pivot 244 against the action of a coil spring 246 interposed between one end of the lever 243 and a pin 247 projected from the frame 67. The opposite arm 248 of lever 243 is connected in a universal joint with one arm of a bellcrank lever 249 pivoted on a bracket 251 bolted to the frame 67. The opposite arm of bellcrank lever 249 is pivotally connected in a universal joint 252 to a block 253 carried by a link 254 (Figs. 11 and 12) pivotally connected to an arm 255 of a bracket 256 bolted to bracket 164.

Bracket 256 carries those devices directly associated with the clutch members 201 and 202 for withdrawing the pawl 203 from that one of the openings 208 in which it may be positioned thereby disconnecting the driving and driven parts of the clutch. These devices comprise a wedge member 261 (Figs. 11, 12 and 14) formed on the upper end of a sliding rod 262 moving within a bearing 263 formed in bracket 256. Rod 262 is provided with an extension rod 264 passing through the end of bearing 263 and carrying at its extremity a block 265.

A coil spring 267 surrounds the extension rod 264 and is enclosed within the bearing 263, it being interposed between the end of rod 262 and

the end of bearing 263. Spring 267 normally holds wedge member 261 in raised position, this position being illustrated in Fig. 11. In raised position wedge member 261 rests within a groove 268 formed in the collar 202. When in this raised position wedge member 261 is in the path of travel of pawl 203 as it is carried about the center of shaft 165 by rotation of the clutch disc ring 201 and collar 202. As pawl 203 moves into engagement with wedge member 261, one wall of a transverse slot 269 formed in the pawl 203 engages the inclined forward end of wedge member 261 and passing along the inclined surface moves from within its slot 208 against the action of spring 205. Upon the withdrawal of pawl 203 from a slot 208 the driving and driven parts of the clutch are disconnected.

Immediately upon the disconnecting of shaft 165 from the driving member 163 the former comes to rest and pawl 203 remains retracted by engagement with the wedge member 261. During this retraction rotation of the sleeve 163 and the ring 201 takes place without effecting movement of collar 202 and shaft 165.

Upon the disconnection of the clutch members and the coming to rest of shaft 165, shafts 171 and 182 and the holding chuck are correspondingly brought to rest by reason of the interconnecting gears 175, 176, 185, 186 and 29 previously described.

To insure that this stopping of the mechanism takes place at a definite predetermined position without overthrow of the parts caused by momentum, there is provided on shaft 171 a brake mechanism illustrated in detail in Figs. 10 and 11. This brake mechanism is of the frictional type which automatically puts a drag on shaft 171 when this shaft reaches a predetermined position in its revolution.

This brake mechanism comprises a pair of semicircular braking shoes 275 and 276 pivoted on a stud 277 held in a boss formed in bracket 66. Shoes 275 and 276 encompass a disc 278 secured to shaft 171. Shoe or arm 276 is provided with an extension lug 279 in which is positioned a bolt 281 which extends through an opening formed in a similar extension lug 282, carried by shoe or arm 275. An arm 283 is pivotally mounted at 284 on lug 282 and carries a boss 285 through which the upper end of bolt 281 passes. Bolt 281 is retained in position within boss 285 by locknuts 286. A coil spring 287 surrounds bolt 281 and is interposed between lug 279 and boss 285 and normally holds shoes 275 and 276 separated.

Shaft 171 carries at its extremity a cam 291 the periphery of which is engaged by a roller 292 rotatably mounted at 293 on arm 283. Cam 291 rotates with shaft 171 and past roller 292. When shaft 171 reaches the predetermined position at which it is designed to stop, a raised portion 294 of cam 291 lifts roller 292 pivoting arm 283 about its pivot 284 using lug 282 as a fulcrum and lifting shoe 276 through bolt 281 this action clamping the two arms 275 and 276 together against the disc 278.

Proper actuation of the handle levers 211 and 212, as previously described, and movement of connecting rod 242 and bellcrank levers 243 and 249 cause a corresponding lowering of block 253. Link 254 (Figs. 11 and 12) thereupon rocks on its pivot thereby moving a pair of links 301 pivotally connected therewith. Links 301, in turn, are pivotally connected to a latch 302 which, at certain times, engages a projection formed on block 265. When latch 302 is in engagement with block 265, lowering of links 302 by block 253 causes a corresponding movement of the parts 264, 262 and 261. This lowering movement of wedge member 261 takes place against the resistance of spring 267, the final lowered position being illustrated in Fig. 12.

As soon as wedge member 261 moves away from pawl 203 its spring 205 forces the same outwardly against ring disc 201 and the forward end of pawl 203 immediately engages within that particular slot 208 which is brought adjacent by the rotating sleeve 163 thus forming connection between the driving and driven parts. Shaft 165 and the mechanism connected therewith thereupon make one complete cycle of operation, shaft 165 making one complete revolution.

As shaft 165 is making its single revolution a cam projection 303 formed in the periphery of collar 202 strikes against a roller 304 idly carried on one arm of a lever 305 which is pivoted on a pin 306 projecting from bearing 263. Lever 305 is thereupon rocked about its pivot and its opposite extremity 307 (Fig. 13) strikes against a projection 308 formed on latch 302 moving the latch toward the left thereby unhooking the end of the latch from block 265. This movement takes place against the action of a coil spring 309 interposed between arm 255 and latch 302, (see also Fig.10).

Upon freeing of the end of projection 264 of rod 262 wedge member 261 is moved upwardly within slot 268 by action of the spring 267. In this position, it will engage pawl 203 as it is brought around with the rotating collar 202. Upon engagement of the wedge member 261, the pawl 203 is withdrawn from its slot 208 and the driving and driven members are immediately disconnected as has been previously described.

By reason of the automatic release of the wedge member 261 and its moving into position to withdraw the pawl 203 from its clutch position only one revolution of shaft 165 is permitted regardless of whether the handles 211 and 212 are held downwardly as connection is always broken between block 265 and latch 302. This necessitates the release of the handles 211 and 212, the raising of connecting rod 242, the shifting of bellcrank levers 243 and 249 and the raising of block 253 and the parts connected therewith after each cycle of operations in order to again engage latch 302 with block 265 and move wedge member 261 to form a driving connection for the machine.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the form hereinbefore described being merely a preferred embodiment thereof.

We claim:

1. An apparatus for printing tubular container bodies comprising in combination, a supporting frame, a chuck frame, a sleeve carried by said chuck frame, an expanding chuck carried by said sleeve and adapted to engage the inside of a container body, said chuck frame being hinged on a line parallel with the axis of said chuck, printing means positioned adjacent said chuck and adapted to transfer a printing design to a container body held on the chuck, and means for moving the chuck frame on its hinged connection to position said container body into printing engagement with the printing means.

2. An apparatus for printing tubular container bodies comprising in combination, a supporting frame, a chuck frame, a sleeve carried by said chuck frame, an expanding chuck carried by said sleeve and adapted to engage the inside of a container body, said chuck frame being hinged on a line parallel with the axis of said chuck, a printing roller positioned adjacent said chuck and adapted to transfer a printing design to a container body held on the chuck, means for moving the chuck frame on its hinged connection to position said container body into printing engagement with the printing roller, and a limit stop for regulating the maximum pressure between container body and printing roller during printing engagement.

3. An apparatus for printing tubular container bodies comprising in combination, a supporting frame, a chuck frame, a rotatable sleeve carried by said chuck frame, an expanding chuck carried by said sleeve and adapted to engage the inside of a container body, said chuck frame being hinged on a line parallel with the axis of said chuck, a rotatable printing roller positioned adjacent said chuck and adapted to transfer a printing design to a container body held on the chuck, means for moving the chuck frame on its hinged connection to position said container body into printing engagement with the printing roller, and means for rotating said chuck and said printing roller in synchronism to effect such printing.

4. In an apparatus for printing tubular container bodies, the combination of an expanding chuck adapted to engage the inside of a container body and having a continuous peripheral surface when expanded, a chuck expanding and contracting mechanism comprising a sliding shaft, a piston carried by said shaft, and a cylinder surrounding said piston, and means for applying pressure on said piston and within said cylinder for sliding the shaft to effect expansion and contraction of said chuck.

5. A chuck for holding tubular container bodies in position for printing, comprising a plurality of active sections, a plurality of passive sections movably positioned therebetween, all of said sections presenting a continuous peripheral surface when the chuck is expanded, and an actuating member having pivotal connection with the active sections thereof, said actuating member having longitudinal movement in one direction for expanding the chuck into container holding position and in the opposite direction for contracting the chuck into container releasing position.

6. A chuck for holding tubular container bodies in position for printing, comprising a plurality of spaced active sections, a plurality of spaced passive sections, a said passive section being positioned in the space between each pair of adjacent active sections, an alignment key located between each active and each passive section for maintaining longitudinal alignment thereof, and means for radially moving the sections to expand and contract the chuck into container holding and into container releasing position.

7. A chuck for holding tubular container bodies in position for printing, comprising a plurality of spaced active sections, a plurality of spaced passive sections, a said passive section being positioned in the space between each pair of adjacent active sections, an alignment key located between each active and each passive section for maintaining longitudinal alignment thereof, a gear for rotating said chuck, gear alignment keys for maintaining longitudinal alignment between said sections and said gear, and means for radially moving the sections to expand and contract the chuck into container holding and into container releasing position.

8. A chuck for holding tubular container bodies in position for printing, comprising a plurality of radially movable sections having an expanded and a contracted position, said sections in expanded position presenting a smooth, unbroken peripheral surface for engagement with the interior of the container body, an actuating member disposed centrally of said chuck, links pivotally connecting the actuating member with the chuck sections, and means for moving said actuating member to expand the chuck into container body holding position, and means for printing on said bodies.

9. A chuck for holding tubular container bodies in position for printing, comprising a plurality of radially movable sections having an expanded and a contracted position, said sections in expanded position presenting a smooth, unbroken peripheral surface for engagement with the interior of the container body, an actuating member having connection with said sections and disposed centrally of said chuck, means for moving said actuating member to expand the chuck into container body holding position, and means for locking said sections in expanded position, and means for printing on said bodies.

10. The combination of a printing cylinder, a rotary expansible chuck for carrying a container to be printed, a chuck frame for carrying said chuck, a printing roller for operating on the container when held on said chuck, a support for said roller, said chuck frame being swingably connected with the roller support on an axis parallel with the axis of the chuck, and fluid pressure means carried with the chuck frame for operating the chuck.

11. In a machine for printing on container bodies, in combination, a rotary chuck expansible in all radial directions for engaging within such body, means for expanding and contracting said chuck comprising a sliding shaft and means for moving said shaft longitudinally, a movable chuck frame carrying said shaft, means for printing on such body when it is on said chuck, a support for the printing means, and devices hingedly connecting said chuck frame and said support on a line parallel with the axis of the chuck.

12. In an apparatus for printing tubular container bodies, the combination with printing means and actuating mechanism therefor, of an expanding chuck adapted to engage the inside of a container body held adjacent said printing means, said chuck embodying a plurality of sections having relative movement during expansion and contraction, the sections in expanded position presenting a smooth, continuous peripheral surface which is contractible on all sides for introduction into and engagement with the interior of the container body, and means for moving said printing means and said chuck in synchronism to effect printing on said container body.

13. In an apparatus for printing tubular container bodies, the combination with a printing roller and actuating mechanism therefor, of a rotatable expanding chuck adapted to engage the inside of a container body held adjacent said printing roller, said chuck embodying a plurality of sections having relative movement during ex-

pansion and contraction, the sections in expanded position presenting a smooth, unbroken peripheral surface which is contractible on all sides for engagement with the interior of the container body, and mechanism for rotating said printing roller and said chuck in synchronism to effect printing on said container body.

14. In an apparatus for printing tubular container bodies, the combination with a printing roller and actuating mechanism therefor, of an expanding chuck adapted to engage the inside of a container body held adjacent said printing roller, said chuck embodying a plurality of sections having relative movement during the expansion and contraction and contractible on all sides for introduction into a container, the sections in expanded position presenting a smooth, unbroken peripheral surface for engagement with the interior of the container body, means for expanding and contracting said chuck sections, and means for moving said printing roller and said chuck in synchronism to effect the transfer of a printed design to said container body.

15. In an apparatus for printing tubular container bodies, the combination with a printing roller for transferring a printed design to said bodies, and driving mechanism for said roller, of an expanding chuck having a continuous peripheral surface adapted to engage the inside of a container body held adjacent said printing roller, a locating gauge for registering said container body in predetermined position upon said chuck, and means for moving said printing roller and said chuck in synchronism to effect such printing.

16. In an apparatus for printing tubular container bodies, in combination with printing means and actuating mechanism therefor: an expanding chuck adapted to engage the inside of a container body held adjacent said printing means and having a continuous peripheral surface when expanded, a chuck expanding and contracting mechanism comprising a sliding shaft, a piston carried by said shaft, and a cylinder surrounding said piston, means for applying fluid pressure on said piston and within said cylinder for sliding the shaft to effect expansion and contraction of said chuck, and means for moving said printing roller and said chuck in synchronism to effect the transfer of a printed design to said container body.

17. An apparatus for printing tubular container bodies, comprising, in combination with a printing organization including a printing roller adapted to engage a container body and to transfer a printing design thereto: a chuck adapted to hold a container body, a driving shaft, a driven shaft, a transmission mechanism connecting the chuck and the printing roller with said driven shaft, a clutch device for connecting the driving and driven shafts, and control instrumentalities including a latch member and a clutch operating member for actuating said clutch to effect a printing operation upon the container body.

18. An apparatus for printing tubular container bodies, comprising in combination with a printing organization including a printing roller adapted to engage a container body and to transfer a printing design thereto: a chuck adapted to hold a container body adjacent said printing roller, means for moving said printing roller and said chuck in synchronism to effect such printing, said means including a clutch device and control instrumentalities therefor, the latter embodying a transverse shaft, a handle for one hand of the operator fixed on said shaft, a handle for the other hand of the operator loosely mounted on said shaft, and interconnections for operation of the clutch device which are controlled by and require operation of both of said handles for each printing cycle.

19. An apparatus for printing tubular container bodies, comprising in combination with a rotatable printing roller for engaging a container body and for transferring a printed design thereto: a rotatable expanding chuck having a continuous peripheral surface adapted to hold a container body, compressed air means for expanding and contracting said chuck including an air valve, means for rotating said chuck and printing roller in synchronism to effect the printing on said container body, a foot control for actuating said air valve and a hand control for actuating said rotating means.

20. In an apparatus for printing tubular container bodies, in combination with a printing roller for engaging a container body and for transferring a printed design thereto, and actuating mechanism for said roller: of a rotatable expanding chuck adapted to hold a container body when in expanded position, means for expanding said chuck, means including a clutch device for rotating said chuck and printing roller in synchronism to effect such printing, manual control instrumentalities for actuating said clutch, and devices for automatically restoring the clutch device to non-operating position following each printing cycle.

21. In an apparatus for printing tubular container bodies, in combination with a printing roller for engaging a container body and for transferring a printed design thereto, and actuating mechanism for said roller: of a rotatable expanding chuck adapted to hold a container body when in expanded position, means for expanding said chuck, foot control devices for actuating said expanding means, means including a clutch device for rotating said chuck and printing roller in synchronism to effect such printing, manual control instrumentalities for actuating said clutch, and devices for automatically contracting said chuck following each printing cycle.

22. In an apparatus for printing tubular container bodies, in combination with a printing roller for engaging a container body and for transferring a printed design thereto, and actuating mechanism for said roller: a rotatable expanding chuck adapted to hold a container body when in expanded position, means for expanding said chuck, foot control devices for actuating said expanding means, said chuck being contractible all around its periphery and having parts which present a continuous peripheral surface for cooperation with the printing roller, means including a clutch device for rotating said chuck and printing roller in synchronism to effect such printing, manual control instrumentalities for actuating said clutch, devices for automatically contracting said chuck, and devices for automatically restoring the clutch device to non-operating position following each printing cycle.

23. In an offset printing machine for printing on metallic vessels, the combination with printing means and actuating mechanism therefor, of a chuck for engagement within the vessel and having a sectional peripheral surface for opposing the pressure of the printing means, and devices connected with the sections of the chuck and movable in the direction of the axis of the

chuck for expanding and contracting the chuck, and a piston for operating said devices to cause the peripheral parts of the chuck to be expanded so as to support from within the wall of the vessel suitably for printing on the outside of said wall by said printing means.

24. The combination with a printing cylinder and actuating mechanism therefor, of a rotary expansible chuck for engaging the interior surface of a container to be printed, said chuck having radially and oppositely expansible parts arranged around the periphery of the chuck forming a peripherally continuous surface supporting the container wall against the action of the printing cylinder.

25. In a machine for printing on container bodies, in combination with means for applying coloring and the like to such bodies and actuating mechanism therefor, of a rotary chuck expansible in all radial directions and having a continuous periphery when expanded for engaging within such body, means for expanding and contracting said chuck comprising a sliding shaft, a piston for operating said shaft, a cylinder enclosing said shaft, and means for applying fluid pressure on either side of the piston to actuate said expanding and contracting means.

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