April 15, 1924. 1,490,612

F. W. LAENCHER

UNIT PACKAGE FORMING MACHINE

Filed Feb. 14, 1920 5 Sheets-Sheet 1

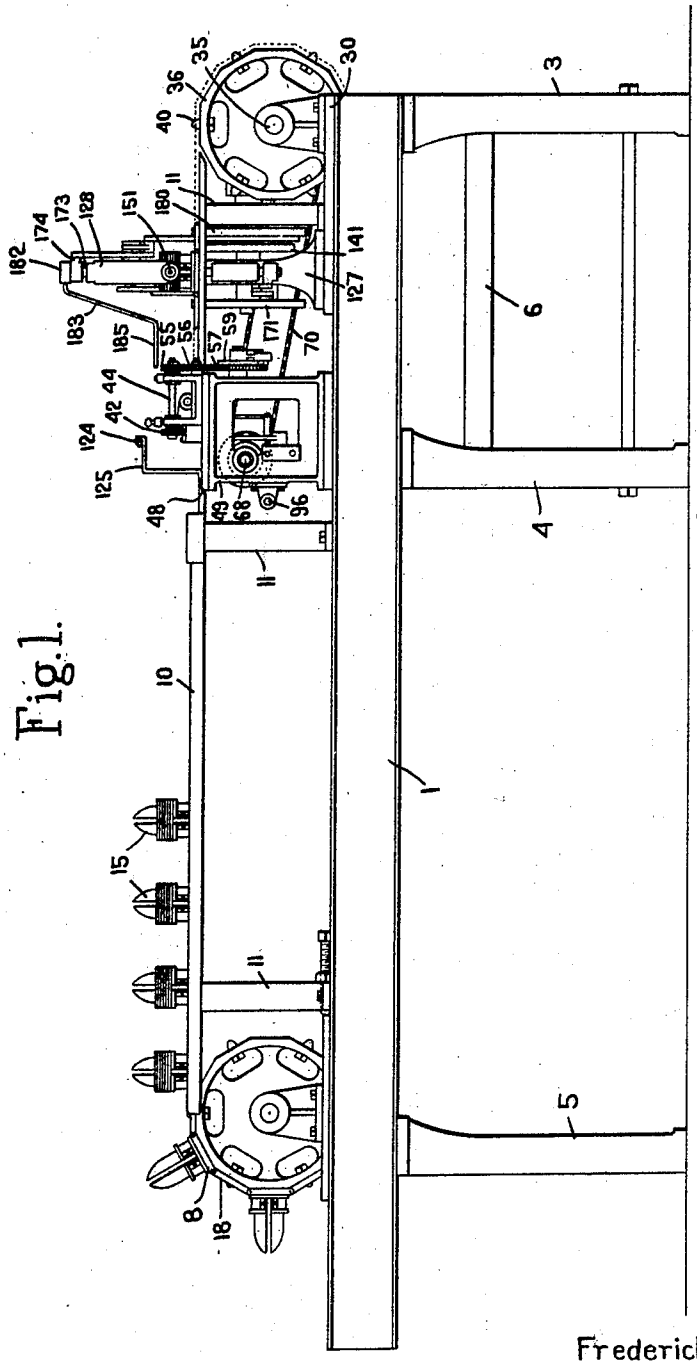


Fig. 1.

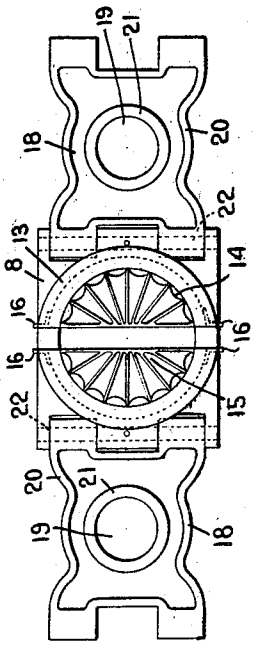


Fig. 2.

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Filed Feb. 14, 1920 5 Sheets-Sheet 2

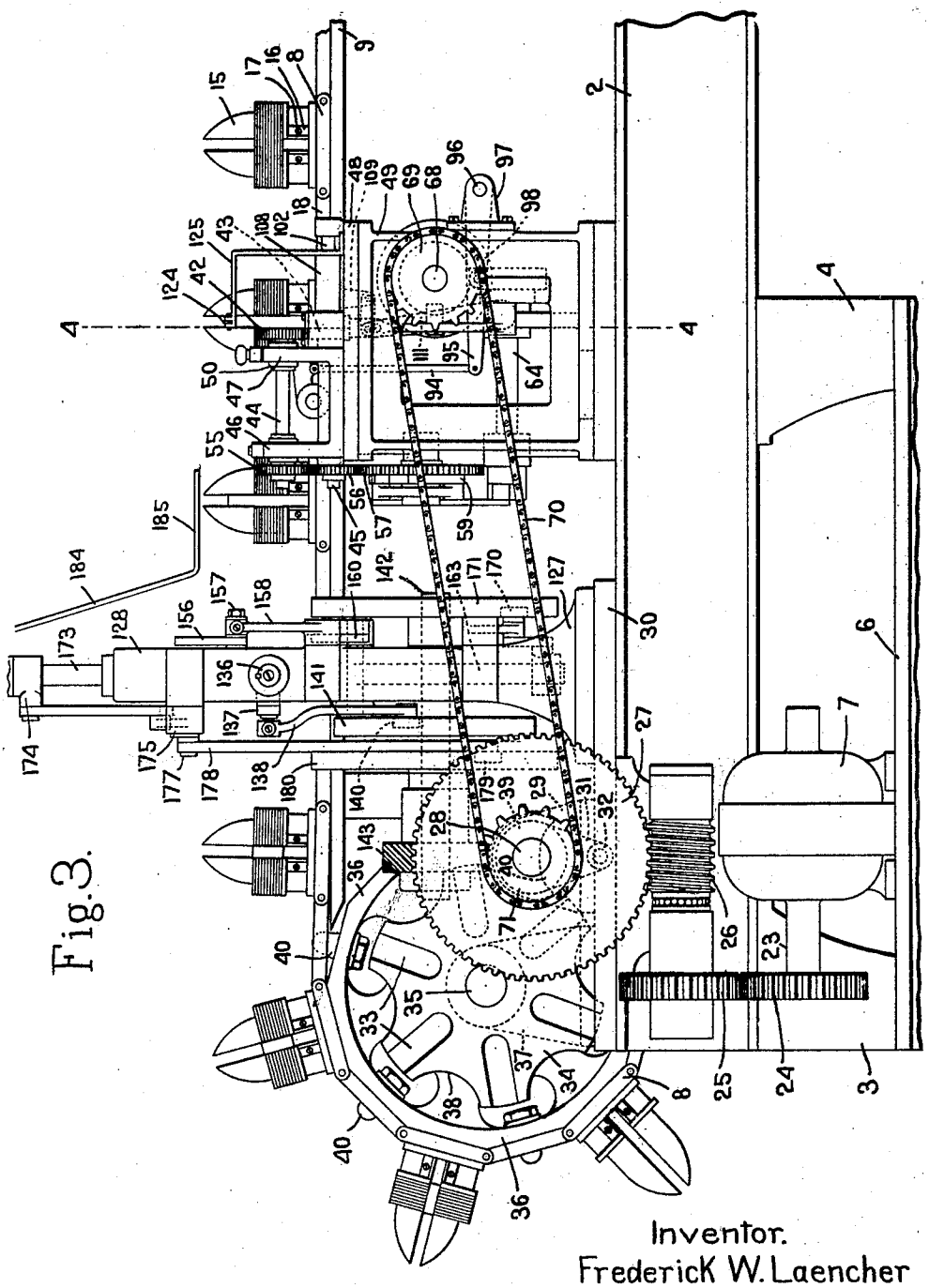


Fig. 3.

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Filed Feb. 14, 1920 5 Sheets-Sheet 3

Fig.4.

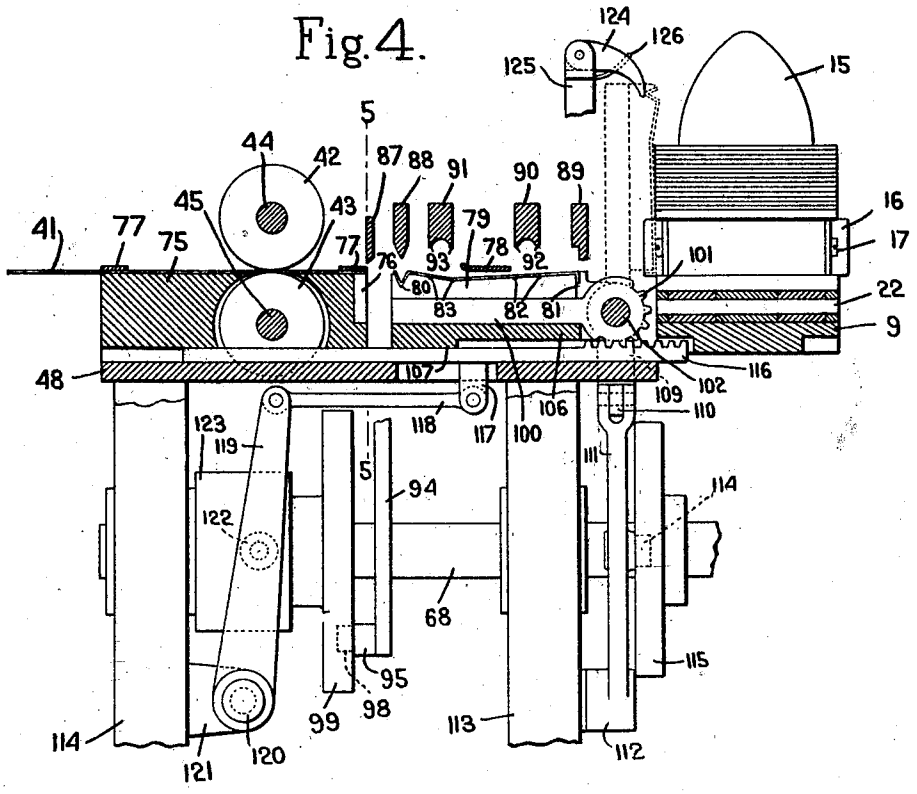


Fig.5.

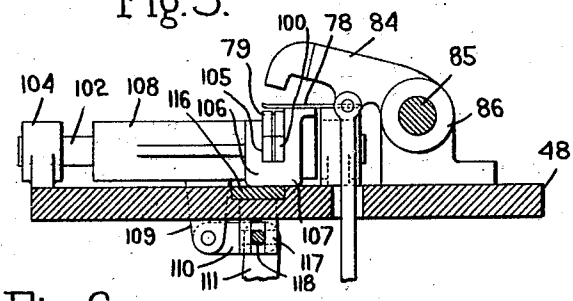
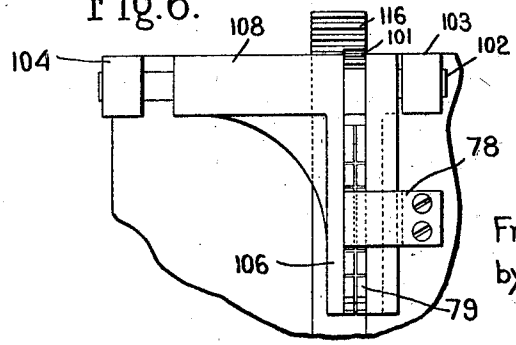


Fig.6.



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UNIT PACKAGE FORMING MACHINE

Filed Feb. 14, 1920 5 Sheets-Sheet 4

Fig. 7.

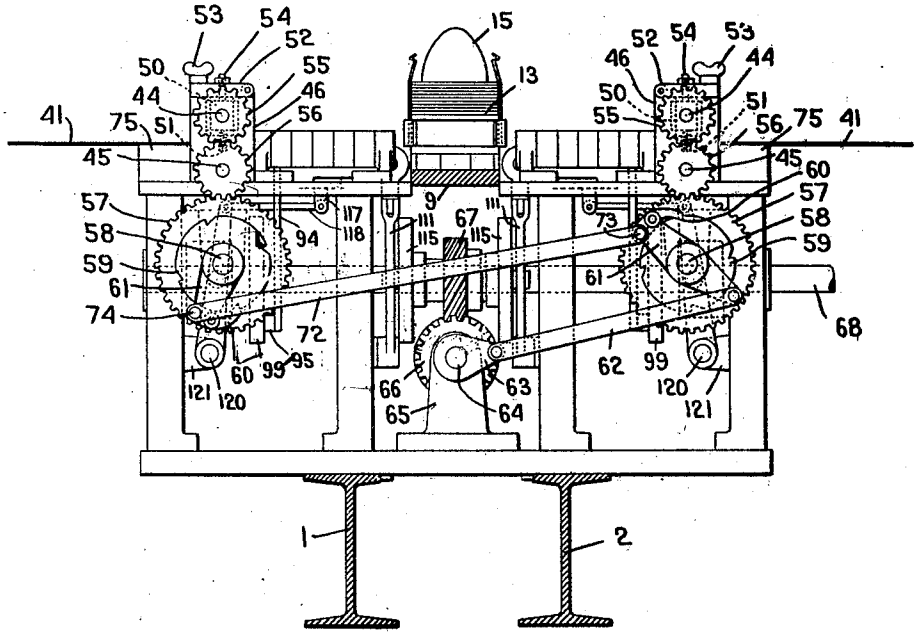


Fig. 8.

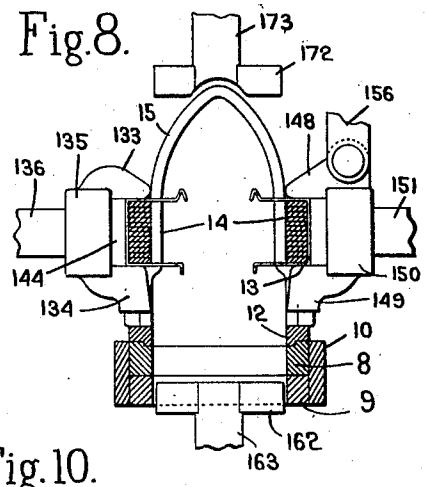


Fig. 9.

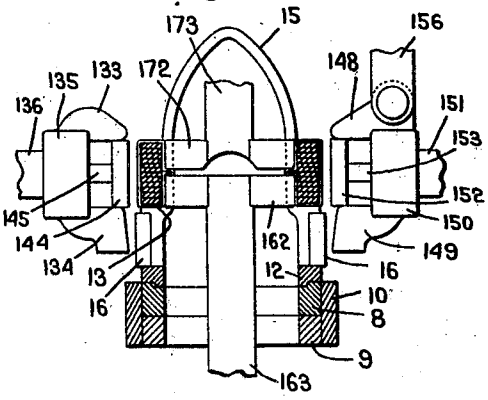
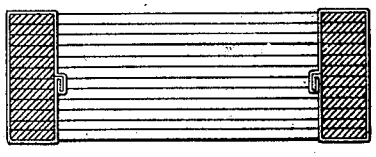


Fig. 10.



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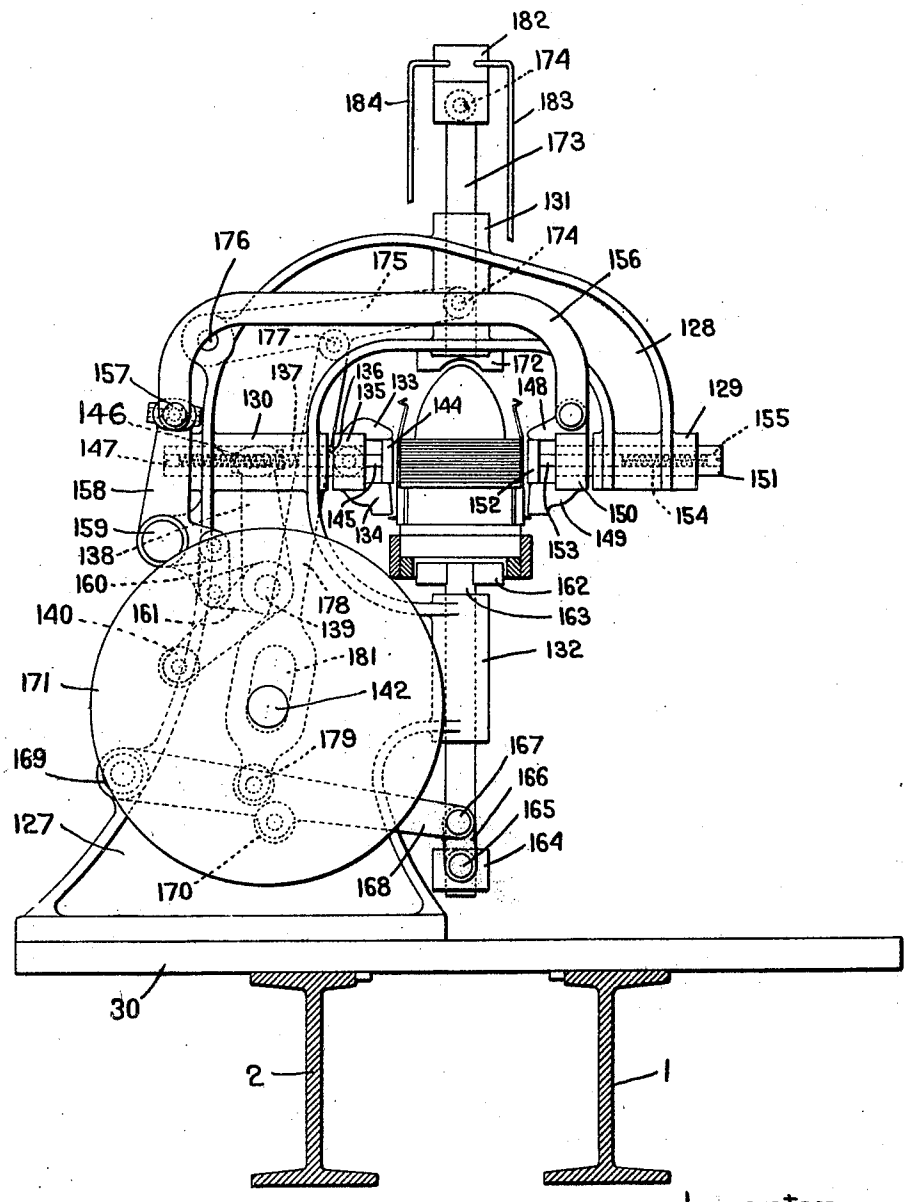
April 15, 1924. 1,490,612

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UNIT PACKAGE FORMING MACHINE

Filed Feb. 14, 1920. 5 Sheets-Sheet 5

Fig. 11.



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Patented Apr. 15, 1924. 1,490,612

UNITED STATES PATENT OFFICE.

FREDERICK WILLIAM LAENCHER, OF WOODHAVEN, NEW YORK, ASSIGNOR TO A. KIMBALL COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

UNIT-PACKAGE-FORMING MACHINE.

Application filed February 14, 1920. Serial No. 358,744.

To all whom it may concern:

Be it known that I, FREDERICK WILLIAM LAENCHER, a citizen of the United States, and resident of Woodhaven, Long Island, county of Queens, State of New York, have invented an Improvement in Unit-Package-Forming Machines, of which the following description, in connection with the accompanying drawing, is a specification, like characters on the drawing representing like parts.

This invention relates to improvements in packaging machines and the object thereof is to provide a machine for automatically binding together a series of superimposed articles by means of a binding strip embracing said superimposed articles, the ends of the binding strip preferably being locked together. Any desirable type of binding strip may be used, but preferably the binding strip is of substantially flat material presenting a surface of sufficient extent to receive identifying indicia. The binding strip preferably also comprises, or is composed of material which when bent will have a permanent set.

The invention is disclosed herein as adapted to bind a series of superimposed rings, such as the rubber rings which are used in fruit jars, said rings being arranged in superimposed relation and bound together by binding strips embracing the rings at diametrically opposite points.

Another object of the invention is to provide an automatic mechanism having means for supporting a plurality of assembled units of superimposed rings and to present the same to the binder applying mechanism.

Another object of the invention is to provide means for severing and forming the binders for the unit package from a continuous strip of binding material and preferably presenting the binders thus formed successively in proper position to the holders for the unit package in order that the binders may be readily applied to the superimposed articles.

A further object of the invention is to provide means for automatically securing the binders upon the superimposed articles to complete the unit package.

Another object of the invention is to provide a novel form of support for a series of superimposed rings adapted to hold the binders in proper relation to the rings and to enable them to be properly applied to the rings to complete the unit package.

Other objects and features of the invention will more fully appear from the following description and the accompanying drawings and will be pointed out in the annexed claims.

In the drawings:

Fig. 1 is a side elevation of a machine for forming unit packages of superimposed rings.

Fig. 2 is an enlarged plan view of a portion of the conveyor showing the holder for the superimposed rings and connecting links of the endless carrier.

Fig. 3 is an elevation of a portion of the machine from the opposite side to that illustrated in Fig. 1 upon a larger scale and showing the binding strip, cutting and forming mechanism, the binder bending and locking mechanism and the driving mechanism.

Fig. 4 is a vertical sectional view on lines 4—4 Fig. 3 showing in detail the binder strip feeding, forming and presenting mechanism.

Fig. 5 is a vertical detail sectional view on lines 5—5 Fig. 4 showing the binder forming and presenting mechanism and the means for shifting the binding presenting mechanism laterally.

Fig. 6 is a plan view of a lower binder forming mechanism.

Fig. 7 is a vertical sectional view taken transversely of the endless carrier and illustrating in end elevation the binder strip feeding, cutting and forming units and the mechanism for intimately actuating the feeding mechanism.

Fig. 8 is a detail vertical sectional view of the mechanism for bending the binders around the superimposed rings showing the binders as having been bent around the top and bottom of the series of superimposed rings.

Fig. 9 is a similar detail vertical sectional view showing the mechanism in position in which the ends of the binders are locked together.

Fig. 10 is a vertical sectional view through the unit package of rings showing the ends of the binders locked together and pressed firmly against the inner wall of the superimposed rings, and,

Fig. 11 is a vertical sectional view trans-

versely of the carrier showing the bending and forming mechanism in the position in which it engages the binders after the same have been presented to the superimposed rings by the cutting, forming and presenting mechanism.

The present invention contemplates the production of a machine which is adapted to bind together a series of superimposed articles of uniform width by means of a binder which is caused to embrace the articles and preferably has its ends locked together. The specific embodiment of the invention disclosed herein comprises a machine for binding a series of superimposed rings, such for example, a dozen rubber rings for fruit jars, together by means of a preferably flat binding strip of pliable material adapted when bent to have a permanent set.

Binding strips desirably are bent around the superimposed rings at diametrically opposite points and the ends of each strip fastened together by a locked seam which is pressed firmly against the inner walls of the rings.

Briefly summarized, the machine comprises an intermittently moving endless carrier having a series of holders adapted to receive piles of superimposed rings, said carrier being actuated to present the holders with the superimposed rings thereupon first—to mechanism for cutting, forming and presenting to the holders suitable binders for the superimposed rings, said carrier being by a subsequent movement adapted to present the superimposed rings with the binders thus applied to mechanism which will automatically bend the binders around the rings, lock their ends together and press them firmly against the inner walls of the rings. The carrier upon further movement is adapted to discharge the unit package of rings thus formed, thus providing means for assembling in packages a predetermined number of rings and so securing them together that they may be easily transported and handled without the liability of becoming loose.

A great advantage is obtained by providing unit packages of this character, since rings of particular sizes may be thus assembled in uniform packages and the liability of the packages becoming broken, or the rings mixed up with other rings of different size, will be reduced to a minimum.

The preferred mechanism illustrated in the accompanying drawing comprises a frame having in general two longitudinally extending girders, preferably in the form of I-beams 1, 2 supported upon suitable legs 3, 4, 5. A shelf 6 carried by the pairs of legs 3. 4 may be provided for supporting a suitable motor 7 for actuating the driving mechanism of the machine.

A series of superimposed rings of any predetermined desirable number, such as a dozen, are carried by holders which preferably are supported upon links of an endless chain which carries the packages successively to the binder strip presenting and the bending and locking mechanisms. The preferred form of holders disclosed herein are secured to special links 8 of an endless chain, the upper lead of which travels upon a plate or way 9 and is guided between suitable side bars 10, said supporting plate and guide bars being carried by suitable standards 11 rising from the I-beams 1, 2.

Each of the holders preferably comprise a base 12, which is secured to the link 8, and preferably integral semi-circular sections spaced apart substantially the width of the binder strip extending upwardly therefrom. The sections are provided with laterally extending seats 13 to support the lowermost of the series of rings and upwardly extending dome portions 14 to engage the inner walls of the rings, the dome portions 14 being preferably cylindrical through a distance corresponding to or greater than the height of package of superimposed rings, and the upper part 15 of the dome portion being desirably of conoidal form.

The sections of the holders which are spaced apart are provided at the lower ends with clamping members 16 which are adjustably secured to the semi-circular sections of the holders by screw and slot connections 17 to enable the clamping members to be adjusted to engage and hold the edges of the binders when the latter are presented to said clamping members by the forming dies, so that said binders will be retained in proper relation to the superimposed rings while the holders are being moved to the station at which the binders are bent around and clamped upon the superimposed rings.

The special links 8 of the endless conveyor are connected by driving links 18 which desirably may be in the form of flat plates having central openings 19 to receive the teeth or studs of a driving wheel. In order to make the links 18 light, while preserving the strength, the links may be provided with thickened marginal flanges 20 and a flange 21 provided around the opening 19. The links 8 and 18 may be connected by interengaging extensions pivoted together by the usual bolts or pins 22.

It is desirable that the holders shall dwell during the application of the binders and also during the bending and clamping operation. The endless carrier for the holders, therefore, must be given an intermittent motion. Any suitable driving mechanism may be employed for imparting such a motion to the endless carrier. Inasmuch as the accurate positioning of the holders, in respect to the binder presenting mechanism and the bending and clamping mechanism,

is necessary, a Geneva feeding and stop mechanism is provided for actuating the endless chain. This feeding mechanism is illustrated in detail in Fig. 3 in which the shaft 23 of the motor is provided with a gear 24 which meshes with a gear 25 upon the shaft of a worm 26 which drives a worm wheel 27 fixedly secured to a transverse shaft 28 journalled in suitable bearings in brackets 29 extending upwardly from a supporting plate 30 which rests upon the I-beams 1 and 2.

An arm 31 is secured to the shaft 28 and is provided at its end with a roller 32 which upon rotation of said shaft is adapted to enter one of the radial slots 33 in a disk 34 which is secured to the shaft 35 of the driving wheel 36 for the endless chain. The shaft 35 is journalled in brackets 37 rising from the plate 30. The disk 34 is provided with arcuate recessed portions 38 which are adapted to be engaged by the arcuate surface of a cylindrical boss or hub 39 on the arm 31. The hub 39 is provided with an arcuate recessed portion 40 adapted to receive the periphery of the disk 34 during a portion of the rotation of the shaft 28 and to permit rotation of the disk 34 during the time the roller 32 engages one of the slots 33 in said disk.

Inasmuch as the Geneva stop mechanism is well known further description is unnecessary for it will be understood that the rotation given to the wheel 36 will endure only during the time in which the roller 32 is in engagement with the walls of one of the slots 33 and that immediately upon emerging from said slot the hub 39 will engage the circular recess 38 and lock the disk 34 and consequently the wheel 36 against further rotation.

A series of studs 40 secured to the periphery of the wheel 36 in any suitable manner are adapted to enter successively the apertures 19 in the endless chain and thereby impart to the endless chain or carrier the intermittent movement of the wheel 36.

The driving mechanism thus described may be applied at either end of the frame, but preferably is located at the end adjacent to which the bending, cutting and forming mechanism and the bending and clamping mechanism for the binders are located in order to economize space for the driving mechanism.

The endless carrier may be of any desired length and preferably is of such length as to permit a number of operators to place the required number of superimposed rings upon holders as they are approaching the binder presenting and clamping mechanisms. It will, however, be understood that if automatic feeding mechanism for the rings or other articles is provided the length of the conveyor may be materially shortened. Where the rings are applied to the holders by hand it is found in practice that at least two or three operators are required to fill the holders when the machine is being operated to form unit packages of rings at the rate of 100 packages per minute and that additional operators are required when the machine is driven at a greater speed.

The holders having the superimposed rings upon them are carried successively into such position that the binders may be presented to the spaces between the sections of the holders and held in said spaces by the clamping members 16 until they are acted upon by the bending and clamping mechanism. Any suitable form of binder may be used—preferably a binding strip formed of paper with one or more re-inforcing wires of pliable, non-resilient material such as disclosed in Patent No. 1,073,828 granted to Wallin Sept. 28, 1913, is utilized and means are provided for forming and creasing the binders from a continuous strip of material carried by a suitable roller.

A preferred mechanism for feeding and forming the binders is illustrated in Figs. 1 and 3 and in detail in Figs. 4 and 5 of the drawings in which the binder strip 41 is fed continuously from a suitable roll (not shown) by a pair of feed rollers 42 and 43 to the cutting and forming mechanism. The feed rollers 42 and 43 are carried respectively by shafts 44, 45 which are carried in suitable bearings in brackets 46, 47 having a base which is secured to a plate 48 which rests upon a frame 49 which supports the feeding, cutting and forming mechanism.

The bearings 50 for the shaft 44 are slidably mounted in ways in the bracket 46 and supported upon a spring 51. The bearing 50 is normally held down by a lever 52 which is pivotally mounted at one end and adapted to be pressed downwardly at the other end by a screw having a thumb nut 53, a bolt or pin 54 adjustably secured in the central portion of said lever bears against the upper end of the bearing and enables the bearing to be set at any desired position, whereby the face of the roller 42, which preferably is knurled, may be caused to engage the binder strip at any desired degree of pressure.

Any suitable means may be provided for imparting to the feeding rollers an intermittent movement to cause the binder strip to be fed forward in sections of the right length to form binders.

As illustrated herein the shafts 44, 45 of the feed wheels 42, 43 are provided with intermeshing gears 55, 56, the gear 56 meshing with a much larger gear 57 which is mounted upon a stud shaft 58 carried by a suitable

bracket depending from the plate 48. Intermittent movement is imparted to the gear 57 through a notched disk 59 which is secured to the face of the gear 57 and is actuated by a pawl 60 which is pivotally mounted upon one end of the lever 61 which is fulcrumed upon the shaft 58.

The lever 61 is operated through a link 62 pivotally secured to the other end of said lever and to the end of an arm 63 of a counter shaft 64 which is mounted in bearings in suitable stand 65. The shaft 64 is rotated through a spiral gear 66 which meshes with a complementary spiral gear 67 upon a cam shaft 68 which extends transversely of the machine. The cam shaft 68 is provided with a sprocket wheel 69 which is driven by a sprocket chain 70 from a sprocket 71 upon the shaft 28 which actuates the Geneva feeding and stop mechanism for moving the endless carrier which supports the holders for the rings. By reason of this driving connection a proper coordination of the movements of the endless carrier and of the feeding mechanism for the binder strip is at all times maintained.

Inasmuch as it is desirable to apply a plurality of binders to the superimposed rings of each unit package two feeding mechanisms are provided and are located upon opposite sides of the carrier for the superimposed rings. The construction of the feeding mechanism for the other binder strip is identical with that above described and is indicated by the same reference numerals.

An intermittent movement is imparted to this second feeding mechanism by a link 72 which is secured to a stud 73 upon the lever 61 adjacent to the pawl 60, the other end of the lever 72 being pivotally mounted upon a stud 74 at the free end of the lever 61 of the second feeding mechanism. The ratio of the gears and other parts of the driving mechanism for the feed rollers are so proportioned that the movement imparted to the feed rolls is one which will serve to advance the binder strips a predetermined distance and position each strip in the path of a cutter and former which will sever the binders from the strip and bend the ends thereof to provide locking means, and also preferably provide weakened lines therein which will cause the binder to bend properly about the superimposed rings.

In order to accomplish this function the binder strip 41 is advanced intermittently by the feed rollers 42 along a bed plate 75, which has at its end a hardened steel ledger blade 76. Guides 77, one of which desirably is located above the ledger blade 76, direct the binder strip to the dies, while a resilient hold-down 78 overlying the binder strip serves to retain the binder strip upon the lower member or die of the former. The feed rollers 42 and 43, therefore, force the binder strip over the bed 75 until the predetermined length has passed the ledger blade 76 of the cutter and lies upon the forming die.

In the preferred mechanism disclosed herein one of the members of the forming die is so mounted that when the binder has been formed upon it said die member can be actuated to present the binder strip to the holders for the superimposed rings and place the same within the slots at the sides of said holders. In the mechanism illustrated one of the former members comprises a die 79 having at one end a notch 80 into which one end portion of the binder may be given an offset V-shaped form and at the other end a recess 81 by means of which the opposite end of the binder may be bent at right angles. The die is also provided with pairs of notches 82, 83 by means of which weakened or bending lines may be impressed upon the binder. A co-operating upper cutter and former comprises a series of arms 84 which are adjustably secured to a shaft 85 which is journalled in suitable brackets 86 carried by the supporting plate 48. The respective arms 84 have secured to their ends a cutter 87 which is positioned to co-operate with the ledger blade 76; a V-shaped die 88 which co-operates with the V-shaped notch 80; a die 89 of L-shaped form which, in co-operation with the recess 81, bends the opposite end of the binder at right angles, and two dies 90, 91 having respectively pairs of edges 92, 93 which co-operate with the notches 82, 83 respectively of the former member or die above described. The hold-down 78 preferably is in the form of a spring plate which extends beneath the upper die and presses the binder strip upon the lower die while the upper die is acting to cut and form the binder.

The upper cutter and former is actuated through a link 94 which is secured at its upper end to the arm 84 and at its lower end to the end of the lever 95 which is pivoted upon a stud 96 carried by a bracket 97 secured to one of the vertical members of the frame 49, the lever 95 being provided with a cam following roll 98 which engages the groove of a face cam 99 which is fixedly secured upon the cam shaft 68. The groove of the cam 99, is, of course, so constructed as to actuate the upper cutter and former after the feeding mechanism has advanced the binder strip a suitable distance over the lower former member.

The lower former member or die 79 is carried upon an arm 100 which has at its end a toothed cylindrical boss 101 which is pivotally mounted upon a shaft 102 which is mounted in suitable bearings in brackets 103, 104 projecting upwardly from the plate 48. The die carrying arm 100 normally

rests upon the base of a slot formed in a laterally movable support or carrier 106 which is provided at its end with a thickened portion or flange 107 which rests upon the surface of the plate 48. The carrier 106 has at its end an integral sleeve 108 which is slidably mounted upon the shaft 102. The sleeve 108 has a downward extension 109 which is connected by a link 110 to the upper end of a lever 111 which has at its lower end a boss 112 which is pivotally mounted upon a stand 113 forming a part of the frame 49, the lever 111 being provided intermediate of its ends with a cam following roll 114 which engages a cam slot in a face cam 115 which is fixedly secured upon the cam shaft 68.

The slot of the cam 115 is so constructed as to actuate the lever 111 to move the die carrier 106 laterally from beneath the upper die after the binder has been severed from the strip and formed, thereby enabling the die carrier to be actuated to present the formed binder to the holder.

The means which are provided for moving the die carrying arm and die with the binder strip upon it to vertical position comprises a rack 116 which is slidably mounted in a suitable way in the plate 48 and engages the teeth 101 of the boss upon said die carrying arm. The rack 116 is provided with a downwardly extending bracket 117 which is pivotally connected by a link 118 to the upper end of a lever 119 which is fulcrumed at its lower end upon a stud 120 carried by a bracket 121 upon the standard 114 of the frame 49. The lever 119 is provided intermediate its ends with a roller 122 which engages a cam groove formed in the face of a cylinder 123 which is fixedly secured to the cam shaft 68. The groove of the cam 123 is so constructed as to actuate the lever 119 after the carrier 106 is moved laterally to remove the die carrying arm 100 and die 79 from beneath the upper die or former and serve to raise the binder into vertical position and to force it into the slot between the holders between the clamping members of said holder, whereby the binder is held in vertical position ready to be bent around the rings.

In order to release the binder from the die or former a spring actuated pawl 124 is so positioned as to snap behind and engage the V-shaped end of the binder when the latter reaches vertical position as illustrated in Fig. 4. The pawl 124 is pivotally mounted upon the upper end of a bracket 125 which is secured to the plate 48, a spring 126 secured to the bracket 125 serving normally to force the pawl downward so as to cause its engagement with the end of the binder when the latter is moved into said vertical position.

As soon as the binder has been forced into the clamping members 16 upon the holder the die carrying arm is returned to horizontal or normal position. After the die carrier has thus been moved out of the path of the holder the endless carrier is actuated to forward the holder into a position in which the binder or the oppositely disposed pair of binders will be bent around the rings, and the ends of said binder locked together.

It will be noted that the binders are presented to the holders in such a manner that the central portion of the binders intermediate of the notches forming the weakened lines will lie against the outer walls of the superimposed rings, the ends of the binders projecting substantially equal distances above the superimposed ring and below the lowermost ring. Bender mechanism is, therefore, provided for first bending the ends of the binders horizontally, then bending the lower end upwardly and the upper end downwardly until the flange at the lower end is engaged by and interlocked in the V-shaped notch of the upper end of the binder.

The bending and locking mechanism for accomplishing this purpose is carried by a standard 127 which is mounted upon the plate 30. The standard 127 has at its upper end an inverted U-shaped portion 128 in which are oppositely disposed bosses 129, 130 which support the mechanism for bending the ends of the binders into horizontal position. Other bosses 131, 132 positioned at right angles to the bosses 129, 130, support bender mechanisms which co-operate to bend the ends of the binders around the rings and to cause the interlocking of said ends and the closing of the lock joint which secures the ends of the binders together.

The horizontally operating benders comprise respectively two bending jaws, one pair of which 133, 134 is formed integrally with a head 135 secured to a shaft 136 which is slidably mounted in the boss 130. The shaft 136 is connected by a link 137 to the slotted upper end of a bell crank lever 138 which is secured to a rock shaft 139 journalled in the standard 127. In order to provide for the positioning of the former the slotted end of the bell crank lever 138 is provided with suitable set screws which bear upon the link forming the pivotal connection therebetween. The other arm of the bell crank lever 138 is provided with a cam following roller 140 which engages a suitable cam groove in a face cam 141 fixedly secured upon a shaft 142 which is journalled in the standard 127. The shaft 142 is provided with a spiral gear 143 which meshes with a complementary spiral gear fixedly secured upon the driving shaft 28.

A plunger 144 is located intermediate of the jaws 133, 134 and is provided with a

stem 145 which extends into an axial aperture in the shaft 136 and engages the inner end of a helical spring 146 which at its opposite end abuts against a screw 147 threaded into the end of said axial aperture.

In the operation of the machine the holder for the rings is first positioned in front of the jaws of the bender. The cam 141 then actuates the bell crank lever 138 in such a manner as to push forward the former until the plunger 144 abuts against the binder and clamps the same firmly against the outer walls of the superimposed rings. Further movement of the cam causes the jaws 133, 134 to bend the upper and lower portions of the binder strip into horizontal position. The spring 146 holds the plunger 144 against the binder as the jaws 133, 134 advance to perform this bending action. If desired, the yieldable clamping members may be omitted and a projection formed upon the head intermediate of the jaws provided to press the binder against the outer walls of the rings.

A co-operating pair of bending jaws 148, 149 for the opposite binder are carried by a head 150 on a shaft 151 which is slidably mounted in the boss 129. A plunger 152 similar to the plunger 144 is provided with a stem 153 which is mounted in an axial aperture in the shaft 151 and engages one end of the spring 154, the opposite end of which engages the screw threaded plug 155. The head 150 on the shaft 151 is connected to one end of the inverted U-shaped link 156, the opposite end of which is adjustably pivoted upon a stud 157 at the end of one arm of a bell crank lever 158 which is fulcrumed upon a stud 159 projecting from suitable bracket or boss upon the standard 127. The other arm of the bell crank lever 158 is connected to a link 160 which is connected at its opposite end to an arm 161 formed integral with or secured to the shaft 139 and which is operated by the cam 141 through the cam following roll 140 and bell crank lever 138.

The levers and linkages for actuating the bending jaws 148, 149 are so constructed as to cause them to move simultaneously with the movement of the jaws 133, 134 so that both binders are bent into horizontal position simultaneously as illustrated in Fig. 8. The lower ends of the binders when in horizontal position are then bent upwardly by a suitable former.

As illustrated herein the former comprises a plunger having a head 162 which moves upwardly through a suitable recess in the conveyor supporting plate 9 and in the special holder links of the conveyor chain. The forming plunger head 162 is carried by a rod 163 which is slidably mounted in the boss 132 of the standard 127 and is provided at its lower end with a collar 164 having a laterally extending stud 165 which is connected by a link 166 to a stud 167 upon a lever 168 which is fulcrumed at its opposite end on a stud 169. The lever 168 is provided intermediate of its ends with a cam following roll 170 which engages a suitable cam groove in a cam 171 carried by the shaft 142. The action of the cam 171 is such that the head 162 of the lower plunger and former will be raised after the ends of the binder strip have been moved to horizontal position and will serve to force the lower ends of the binders upwardly alongside the inner walls of the superimposed rings.

A co-operating upper former and plunger is also provided. This upper plunger comprises a head 172 which is carried by a stem 173 which is slidably mounted in the boss 131. The stem 173 is provided with a laterally extending stud 174 which is connected by a link to a lever 175, the opposite end of which is fulcrumed upon a stud 176 carried by a boss upon the U-shaped portion 128 of the standard 127. The lever 175 is provided intermediate of its ends with a stud 177 which is pivotally connected to the upper end of a link 178, the lower end of which is provided with a cam following roll 179 which engages a suitable cam groove in a cam 180. The link 178 is provided with a slot 181 which receives the shaft 142, said slot being of sufficient length to permit the necessary vertical movement of the link 178 to actuate the plunger.

The cam grooves of the cams 171 and 180 are so formed that the upper and lower plungers remain at rest while the side formers are bending the upper and lower portions of the binder transversely across the upper and lower faces of the pile of superimposed rings into the horizontal position illustrated in Fig. 8. The lower former is then actuated by the cam 171 to bend the lower ends of the binder upwardly against the inner walls of the rings where it comes to rest. The upper former is then actuated to bend the upper end of the binder downwardly alongside the inner walls of the rings until it positions the V-shaped upper end over the flanged lower end of the binder strip where it comes to rest. The lower former is then again moved upwardly into co-operative relation with the upper plunger to lock the interengaged ends of the binder strip and is then caused immediately to recede.

The upper former is then actuated to complete its downward movement and to bend the interengaged ends of the binder strip downwardly alongside the inner walls of the rings to form the locked seam joint illustrated in Fig. 10.

In order to pack the superimposed rings firmly together as they are being advanced toward the final bending and clamping

mechanism the stem 173 has affixed to its upper end a block 182 to which are attached arms 183, 184 having lateral extensions 185 which overlie the superimposed rings upon the holders as the latter are moved to an intermediate position between that in which the binder strips are presented to the holders and the position in which the binders are bent around the rings so that upon the descent of the upper plunger in its action in bending one set of plungers the arms 185 will engage the rings upon the holder which is next to be presented to the bending and clamping mechanism and pack the superimposed rings together so that they will be in proper position to be operated upon by the bending and clamping formers.

Thus the unit package of rings is completely formed upon subsequent movements of the carrier; the holders are brought into inverted position, and the unit package of rings permitted to drop from them by gravity.

In the operation of the machine a predetermined number of rings is placed upon each of the holders by the operator or operators as the holders are being intermittently advanced toward the binder forming and presenting mechanism. As each holder is arrested at the station at which the binder is presented each feeder for a binder strip advances a sufficient length of the strip over the die to form a binder. The cutters and formers are then actuated to cut and form the binder strip. The upper cutter and die is then raised and the lower die with the binder strip upon it is moved first laterally from beneath the upper die and is then pivotally moved to a vertical position, in which position it presents the binder strip to the clamp members of the holders. The pawl at the same time engages the top of the binder strip and with the clamping members holds the strip alongside the slots in the holder as the lower die is returned to its horizontal position. The holder is then advanced another step to an intermediate position between the binder presenting mechanism and the binder bending and clamping mechanism. While at this station the rings are pressed together by the descending arms which are attached to the stem of the upper plunger of the bending and clamping mechanism. The holder is forwarded upon the next intermittent movement to the station of the bending and clamping mechanism where the binders are first pressed against the outer walls of the rings, then bent by the jaws of the formers horizontally around the lowermost and uppermost rings to horizontal position. The upper and lower formers are then actuated to bend the ends of the binders upwardly and downwardly thereby causing an interlocking engagement of the ends of the binders, the final movement of the upper plunger serving to bend the interlocked ends downwardly alongside the inner walls of the rings thereby forming a locked seam joint. Upon further intermittent movements of the carrier the holders are inverted and the unit packages of rings dropped from them into a suitable receptacle.

It will be understood that the embodiment of the invention disclosed herein is of an illustrative character and is not restrictive and that various changes in construction and arrangement of parts may be made within the meaning and scope of the following claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. A machine for forming a unit package of a plurality of superimposed articles, comprising a holder for said articles, means automatically operable successively to form a binder and to present the formed binder to the superimposed articles carried by said holder and means for securing the binder around said articles.

2. A machine for forming a unit package of a plurality of superimposed articles comprising a holder for said articles, means automatically operative to sever a binder from a binder strip, means to form a binder from said strip, means for causing the binder forming means to present the formed binder to the superimposed articles and means to secure the binder around said articles.

3. A machine for forming a unit package of a plurality of superimposed articles comprising a holder for said articles, means automatically operative to sever a binder from a binder strip, means to form a binder from said strip, means for causing the binder forming means to present the formed binder to the superimposed articles, means to secure the binder around said articles, and means for clamping said binder around said articles.

4. A machine for forming a unit package of superimposed rings comprising a holder for said rings, means automatically operable simultaneously to form a plurality of binders and to present the formed binders to the superimposed rings carried by said holder, and means for securing said binders around said superimposed rings.

5. A machine for forming a unit package of superimposed rings comprising a holder for said rings, means automatically operable simultaneously to form a plurality of binders and to present the formed binders to the rings in said holder at spaced intervals, and means for securing said binders around said superimposed rings.

6. A machine for forming a unit package of superimposed rings comprising a holder

for said rings, a plurality of means intermittently operable each to advance a strip of binding material, a plurality of means each operable to sever a predetermined length of binding material forming a strip, a plurality of means each operable to form the severed binder strip into a binder, means for causing the binder forming means to present the formed binders simultaneously to the superimposed rings in said holder at spaced intervals and means for simultaneously bending said binders around said rings.

7. In a machine for forming unit packages of superimposed articles, a travelling carrier having a plurality of holders for the superimposed articles, means for moving said carrier intermittently and causing the same to dwell intermediate of said movements, means automatically operable to present a binder to said superimposed articles when the holder dwells at a predetermined station, and means operable when said holder is caused to dwell at another station to bend said binder around said superimposed articles.

8. In a machine for forming unit packages of superimposed articles, a travelling carrier having a plurality of holders for the superimposed articles, means for moving said carrier intermittently and causing the same to dwell intermediate of said movements, means automatically operable to present a binder to the superimposed articles in one of said holders when said holder dwells at a predetermined station, means for bending said binder around said article when the holder is caused to dwell at another predetermined station and means for pressing said articles together intermediate of said binder presenting and binder bending stations.

9. In a machine for forming unit packages of superimposed rings, a holder having a recess therein to permit a binder to be bent around said rings and means for engaging and holding a binder adjacent said recess in position to be bent around said rings.

10. In a machine for forming unit packages of superimposed rings, a holder comprising a base, a pair of substantially semi-cylindrical sections having conoidal domes rising from said base, and spaced apart to permit binders to be bent around the superimposed rings carried by said semi-cylindrical sections and co-operating clamping members carried by said sections adapted to engage the edges of the binder strips to retain them in position to be bent around said superimposed rings.

11. In a machine for forming unit packages of superimposed rings, a holder having a recess therein to permit a binder to be bent around said rings, adjustable means for engaging the edges of the binder adapted to hold said binder in position to be bent around said rings.

12. In a machine for forming unit packages of superimposed rings comprising an intermittently movable carriage having holders for a plurality of superimposed rings, co-operating binder forming dies, means for relatively moving said dies to form a binder therebetween and means for actuating one of said dies to cause the same to present the formed binder to one of said holders for the superimposed rings when the latter is in a predetermined position.

13. A machine for forming unit packages of superimposed rings, comprising an intermittently movable carrier having holders for a plurality of superimposed rings, co-operating upper and lower binder forming dies, means for actuating the upper forming die, and means for moving the lower forming die to cause the same to present the formed binder to one of said holders for the superimposed rings when the latter is in a predetermined position.

14. A machine for forming unit packages of superimposed rings, comprising an intermittently movable carrier having holders for a plurality of superimposed rings, co-operating upper and lower binder forming dies, means for actuating the upper forming die, means for shifting the lower forming die laterally subsequent to the co-operating forming movement of said dies and means for pivotally moving said lower die when shifted to cause the same to present the formed binder to one of the holders for the superimposed rings when the latter is in a predetermined position.

15. A machine for forming unit packages of superimposed rings, comprising an intermittently movable carrier having holders for a plurality of superimposed rings, co-operating upper and lower binder forming dies, means for actuating the upper forming die, means for shifting the lower forming die laterally subsequent to the co-operating forming movement of said dies, means for pivotally moving said lower die when shifted to cause the same to present the formed binder to one of the holders for the superimposed rings when the latter is in a predetermined position, and means for detaching the binder from the forming die when presented to said holder.

16. A machine for forming unit packages of superimposed rings, comprising an intermittently movable carrier having a plurality of holders for said superimposed rings, co-operating upper and lower binder forming dies, a laterally movable die carrier for the lower forming die, a die supporting arm pivotally mounted in said die carrier, means for actuating the upper die to form a binder, means for shifting the die carrier

laterally to remove the lower die from beneath the upper die, means for pivotally moving said die supporting arm to cause said lower die to present the formed binder to a positioned holder for the superimposed rings and means operable to bend said binder around said rings.

17. A machine for forming unit packages of superimposed rings, comprising an intermittently movable carrier having a plurality of holders for said superimposed rings, co-operating upper and lower binder forming dies, a laterally movable die carrier for the lower forming die, a die supporting arm pivotally mounted in said die carrier, means for actuating the upper die to cause the some to cooperate with the lower die to form a binder, cam operated means for shifting said die carrier laterally, means including a rack and gear for pivotally moving said die supporting arm to cause said die to present the binder to a positioned holder for the superimposed rings and means for bending said binder around said rings.

18. A machine for forming unit packages of superimposed rings, comprising an endless carrier having a series of links provided with holders for superimposed rings, means for imparting an intermittent movement to said endless carrier, means automatically operable to present a binder to the superimposed articles carried by said holders when the same are positioned at predetermined stations and means for securing the binder around said articles when the holders are at a different predetermined station.

19. A machine for forming unit packages of superimposed articles comprising a holder for the superimposed articles, intermittently operable means for advancing a strip of binding material, means for severing a predetermined length of said binding material from said strip and means for bending the severed strip around the superimposed articles.

20. A machine for forming unit packages of superimposed rings comprising a holder for said superimposed rings, a plurality of means intermittently operable each to advance a strip of binding material, means respectively operable to sever a predetermined length of said binding material from each strip and means operable to bend the respective severed strips around the superimposed rings at predetermined spaced intervals.

21. A machine for forming unit packages of superimposed rings comprising an endless carrier having a plurality of holders for the superimposed rings, means for moving said carrier intermittently and causing said holders to dwell at a predetermined station, means for advancing a strip of binding material at said station, means for severing a predetermined length of said binding material from said strip and means for bending the severed strip around the superimposed rings.

22. A machine for forming unit packages of superimposed rings comprising an endless carrier having a plurality of holders for the superimposed rings, means for moving said carrier intermittently and causing said holders to dwell at a predetermined station, a plurality of means intermittently operable each to advance a strip of binding material to said station, means for severing a predetermined length of binding material from each strip and means for bending the severed strips respectively around the superimposed rings at predetermined spaced intervals.

In testimony whereof, I have signed my name to this specification.

FREDERICK WILLIAM LAENCHER.