March 2, 1926. 1,574,913

C. E. McMANUS

BOTTLE CAP ASSEMBLING MACHINE

Filed March 17, 1924 7 Sheets-Sheet 1

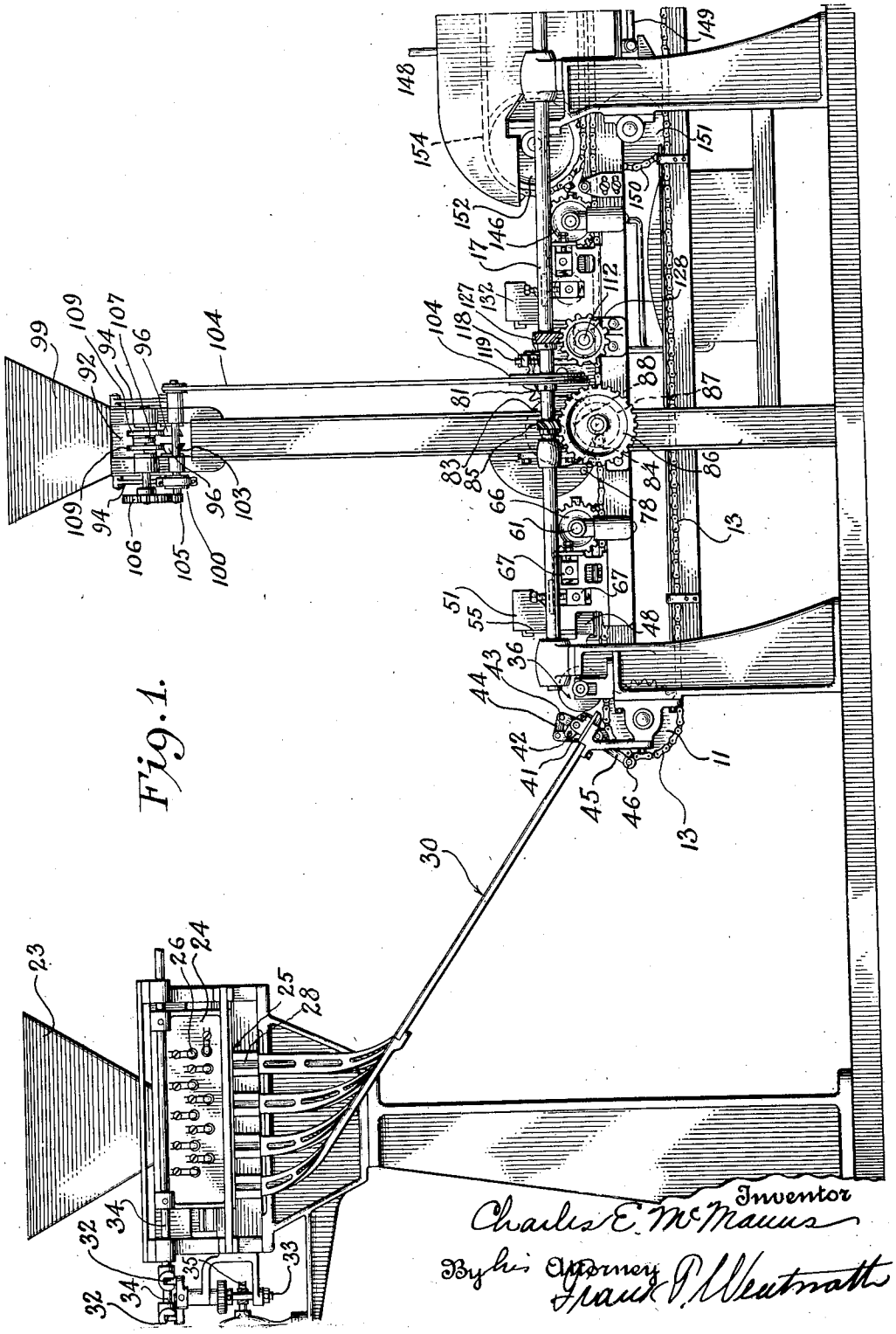


Fig. 1.

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March 2, 1926. 1,574,913

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BOTTLE CAP ASSEMBLING MACHINE

Filed March 17, 1924 7 Sheets-Sheet 2

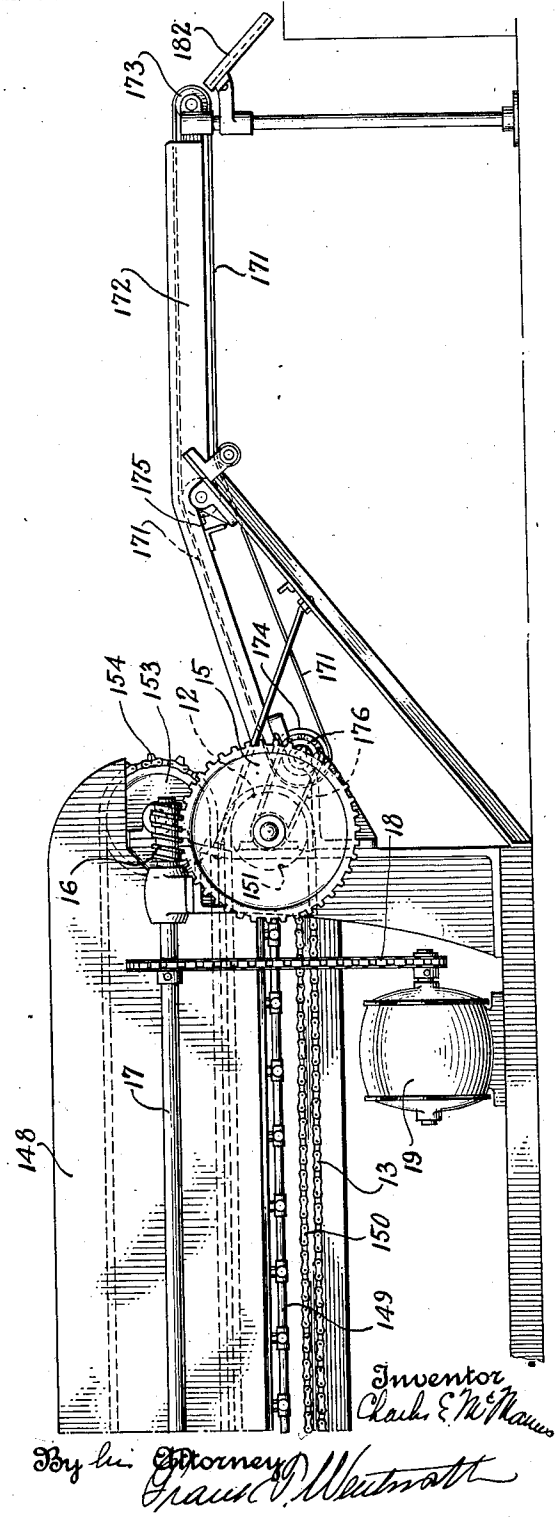


Fig. 2.

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BOTTLE CAP ASSEMBLING MACHINE

Filed March 17, 1924 7 Sheets-Sheet 3

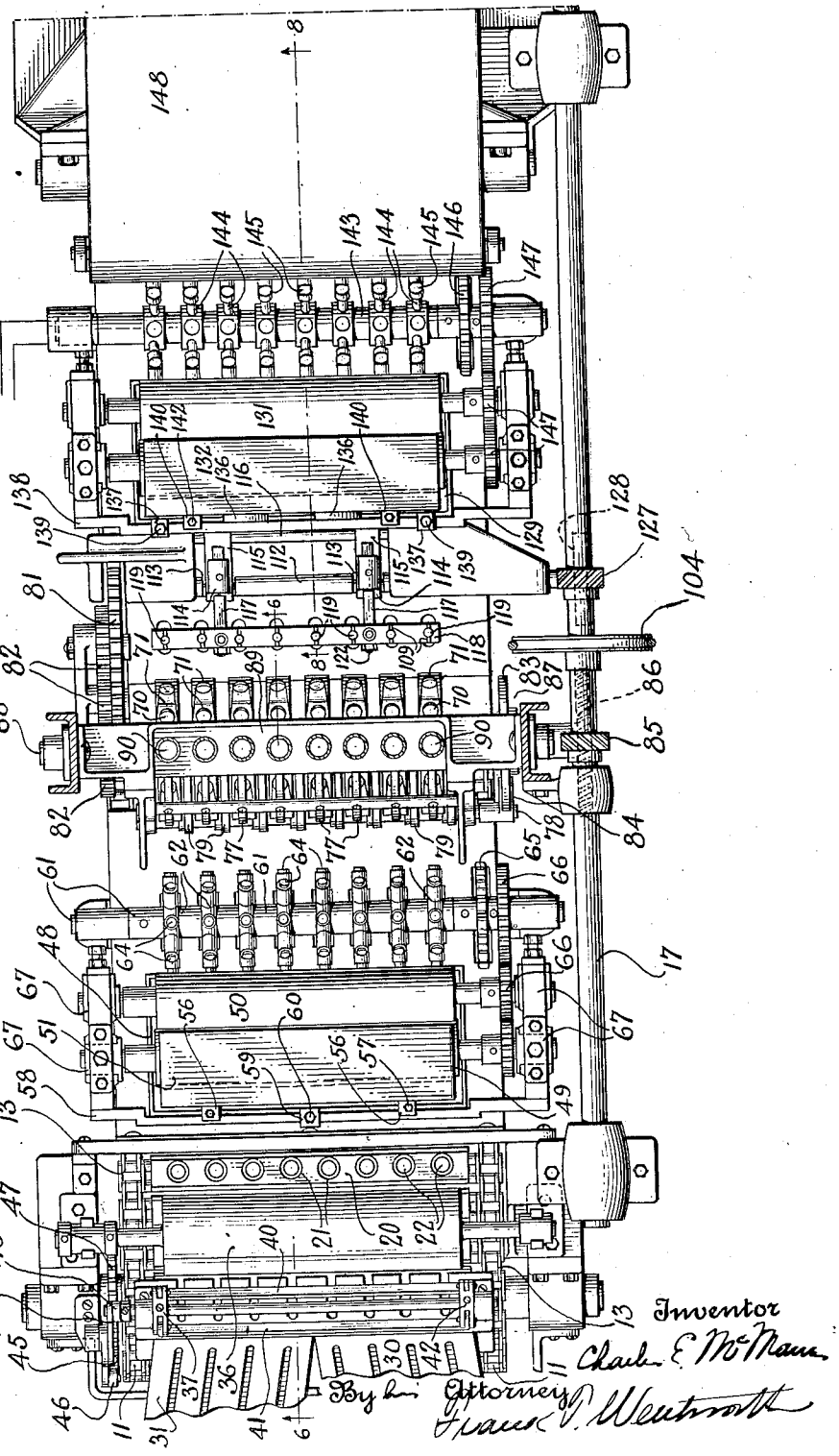


Fig. 3.

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BOTTLE CAP ASSEMBLING MACHINE

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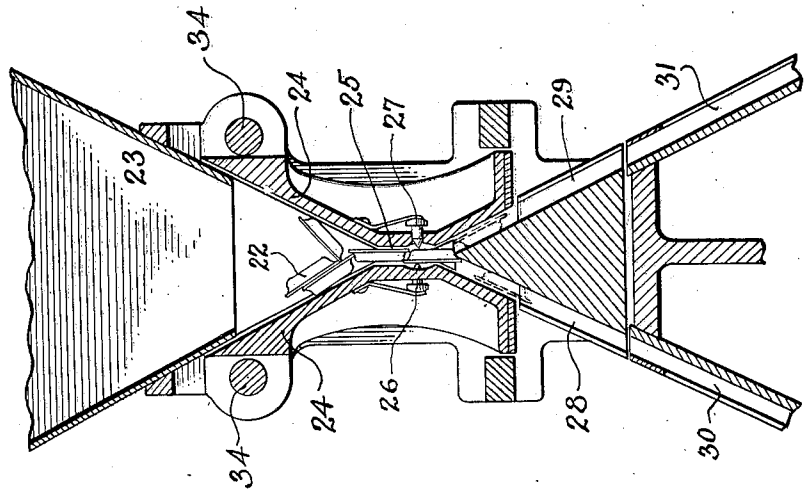


Fig. 5.

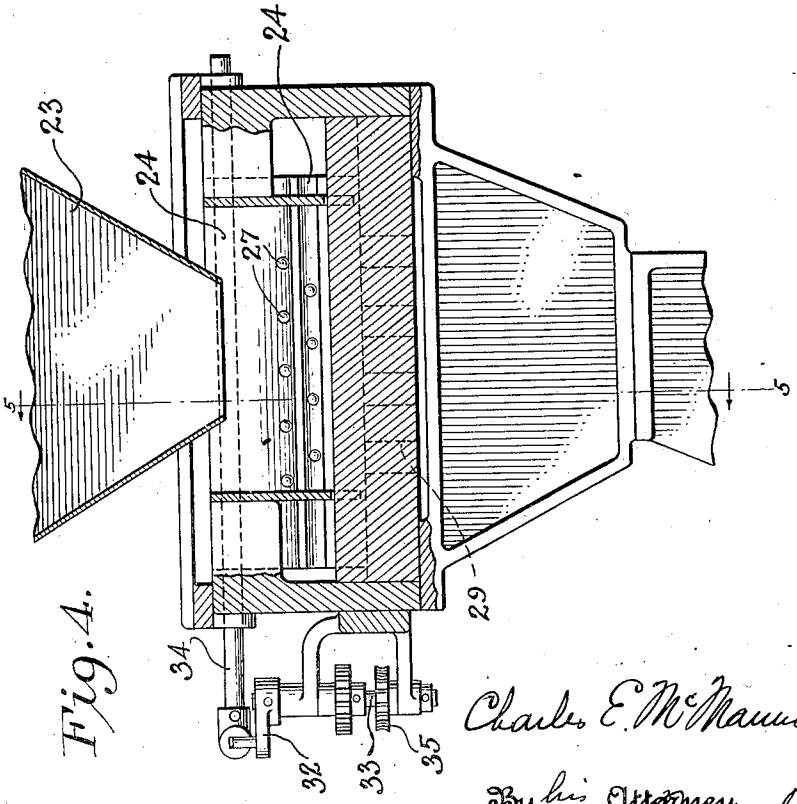


Fig. 4.

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BOTTLE CAP ASSEMBLING MACHINE

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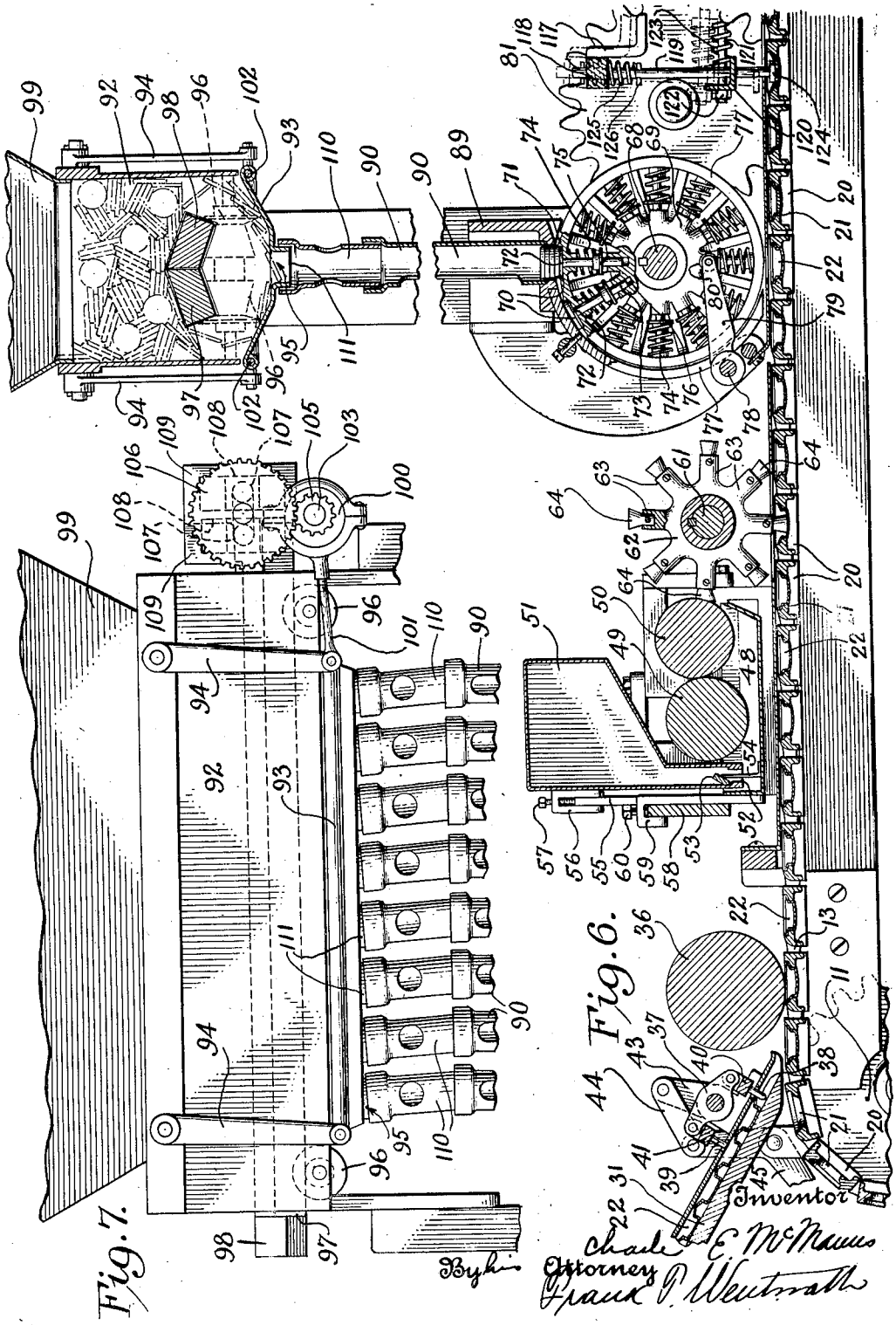


Fig. 7.

Fig. 6.

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March 2, 1926. 1,574,913

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BOTTLE CAP ASSEMBLING MACHINE

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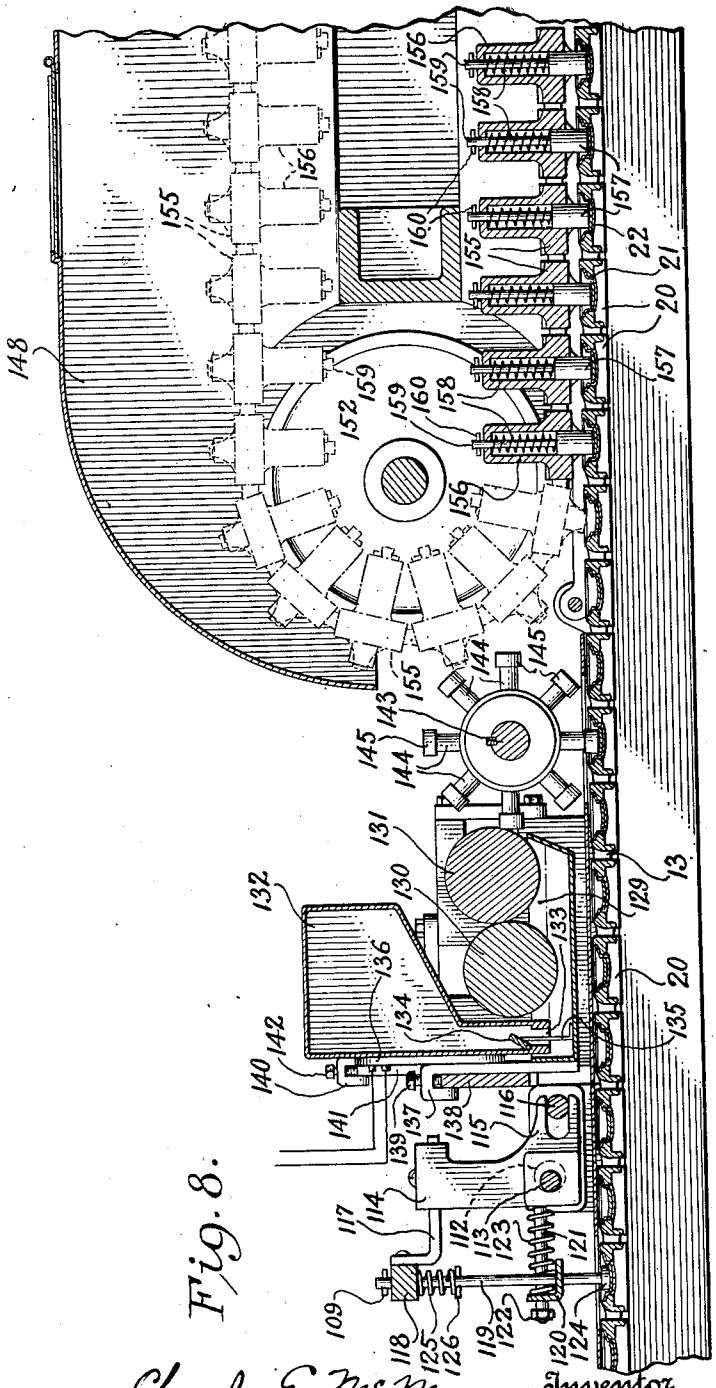


Fig. 8.

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March 2, 1926. 1,574,913

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BOTTLE CAP ASSEMBLING MACHINE

Filed March 17, 1924 7 Sheets-Sheet 7

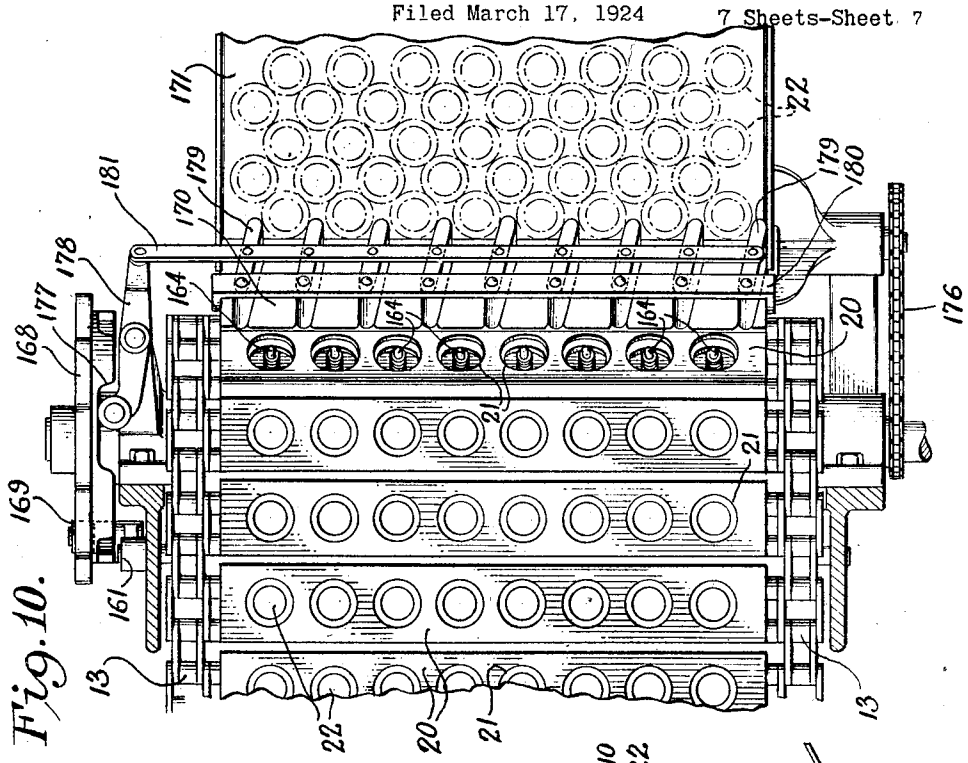


Fig. 10.

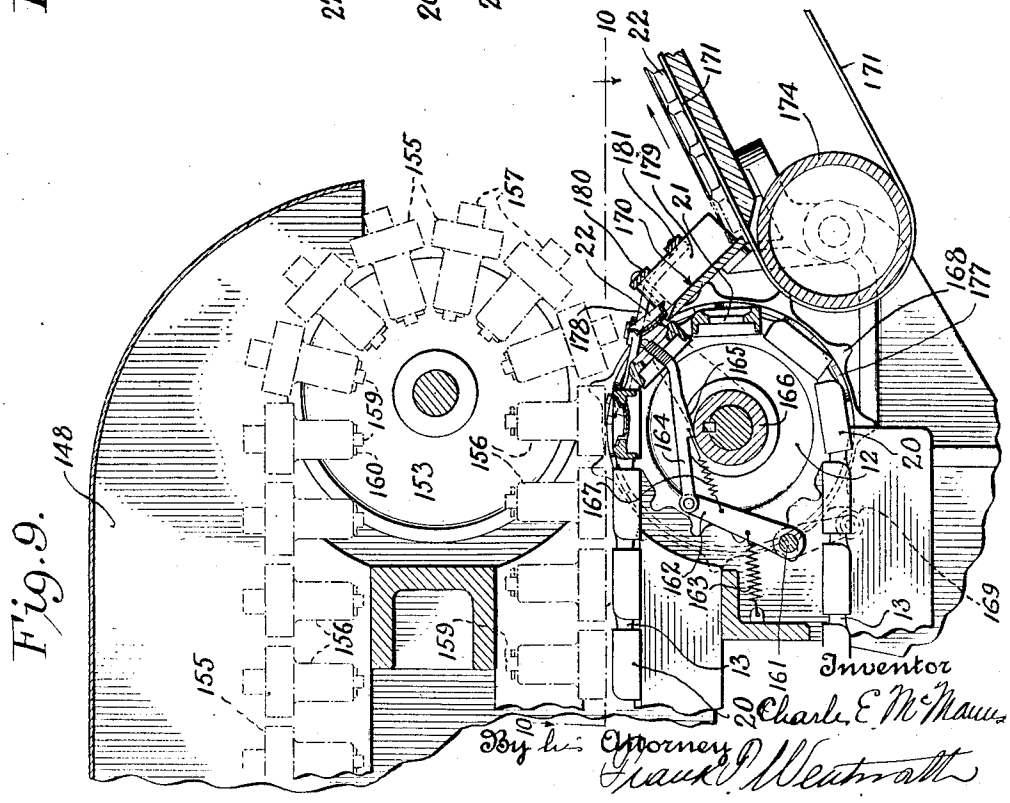


Fig. 9.

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Patented Mar. 2, 1926. 1,574,913

UNITED STATES PATENT OFFICE.

CHARLES E. McMANUS, OF NEW YORK, N. Y.

BOTTLE-CAP-ASSEMBLING MACHINE.

Application filed March 17, 1924. Serial No. 699,771.

To all whom it may concern:

Be it known that I, CHARLES E. McMANUS, a citizen of the United States, residing at the borough of Manhattan, in the city, county, and State of New York, have invented certain new and useful Improvements in Bottle-Cap-Assembling Machines, of which the following is a specification, reference being had therein to the accompanying drawings, which form a part thereof.

My invention relates to bottle cap assembling machines, and more particularly to a machine adapted to assemble cork or composition cork disks within metal shells having a fluted skirt, and bonding such disks within said shells.

Heretofore in this art it has been the common practice to use a bottle cap assembling machine in which the metal shells were automatically delivered to the machine and advanced with a step by step movement in relation to mechanisms adapted respectively to apply adhesive, or deliver an adhesive coated collet to, within the shell, for delivering a cork or composition cork disk within the shell upon the adhesive or the adhesive coated collet; to applying heat and pressure to the assembled parts of the cap to properly condition the adhesive, and to convey the completed cap from the last named mechanism in a manner which will permit the cooling and setting of the adhesive before delivering the cap to the inspecting belt, I have heretofore also invented a machine in which a mechanism is arranged between the point of the delivery of the cork or cork composition disk to within the shell, and the heat and pressure mechanism, by which wax or wax composition is applied to the exposed surface of the cork or cork composition disk so that upon the application of heat and pressure to the cap, the wax will be melted and spread about the surface of the cork or cork composition disk in a thin film.

In machines of the character above described, the metal shell and its contents are stationary while the adhesive or the collet is being delivered thereto, while the cork or cork composition disk is being delivered to within each shell, and while the wax or wax composition is being applied to the surface of the cork or cork composition disk when this practice is followed in the assembling machine, these operations occurring simultaneously between succeeding feeding steps of the shells, but upon the parts of different caps.

In such machines, the capacity output of each machine is limited by the necessity of a dwell between feeding movements of the shell, sufficient to permit the other mechanisms to function, and while each interval of rest, or dwell, is very short, the aggregate of such dwells in a day's run is sufficient to materially reduce the output of the machine. This will be readily understood when it is realized, that the output of the machine of the type described, will range from 900 to 1000 gross of bottle caps during a day. Furthermore, the construction of the heat and pressure mechanisms in such machines is such as to require the operation of other mechanisms of the machine below the maximum speed of which they are mechanically possible, in order to allow a sufficient time interval for causing proper conditioning of the adhesive in the shell or on the collet.

With the above conditions in mind, I have produced a machine which will operate continuously, as distinguished from intermittently, and one in which the various mechanisms may be operated at their maximum speeds and without any restriction being imposed upon same, as a result of the application of heat and pressure for conditioning the adhesive and securing the desired intimate bond between the cork or cork composition disk and the metal shell.

In addition to this continuous operation of the machine, it is so constructed that a number of caps instead of a single cap will be completed and delivered by the machine with each cycle of operations, the various mechanisms being so constructed, and so combined with relation to each other, that each mechanism will act as a unit and in synchronism with the other mechanisms. Hence any such possible variation in any of the operations with relation to any cap of each group or

row such as to tend to cause interference of parts or the improper functioning of any of these mechanisms with a resultant jamming of the whole machine, is avoided.

Another characteristic of the machine is its capability of using an adhesive in the form of a paste, in lieu of a liquid adhesive or an adhesive coated collet, thus "spotting" the formed caps with a moist adhesive while they are passing through the assembling machine and avoiding likelihood of oil being deposited upon the exposed surface of the "spot" adhesive or of the adhesive being broken away from the shell in spots as a result of the action of punch pressers upon a "spotted" sheet of tin when forming the shell.

In a machine of my invention in which the shells are delivered in parallel rows, I have found it preferable to associate with the shell feeding mechanism, a member which will readjust all the shells of each row after the delivery of the shells thereto by the shell feeding mechanism, so as to secure the desired accurate positioning of the shells and avoid any likelihood of loss of accuracy in the succeeding operations due to the displacement of any shell in any row.

Where the carriers for the metal shells have continuous lineal traverse, it is essential to provide a mechanism which will deliver the cork or composition cork disks to within the shells while the shells are in motion, and since these disks are slightly oversize, as compared with the diameter of the portion of the metal shell adjacent its top, so as to develop frictional resistance to the displacement of the disk, I have also found it necessary to provide a presser mechanism adapted to engage the disks after they have been deposited in the shell and force them against the top of the shell. Owing to the shells having movement while said presser mechanism is operative, the plungers of said mechanism must have simultaneous downward or upward, and longitudinal movement, the longitudinal movement being at the same speed as that of the carriers. This permits the plungers to enter the shell, force the disk against the inside of the top thereof and disengage themselves from the disk of the shell without interrupting the travel of the carriers.

It is also possible and desirable to embody in the machine, a mechanism between the mechanism for positioning the disk within the shell and the heat and pressure mechanism, which will apply to the exposed surface of the disk, a wax or other finishing composition, before the carriers enter the heat and pressure mechanism.

With a machine of the high capacity which it is possible to develop in a machine embodying the characteristics of my invention, a baking or vulcanizing oven of any desired length may be employed without any material loss of floor space, since the increase in the size of this oven will not necessitate any increase in the width of the machine.

In a machine embodying my invention, the pressure developing mechanism will consist of parallel rows of plungers having continuous movement at the same speed as the carriers, each row being so positioned as to co-operate with a carrier or with assembled shells upon a carrier, the pressure exerted upon the cork or cork composition disk toward the metal shell being developed as a result of the engagement of the plungers with the disks. The disengagement of said plungers from the caps at the delivery point of the machine, and the relieving of the pressure are also entirely automatic, due to a mere change in the relation of the pressure mechanism and the carriers.

I also provide a mechanism for ensuring the intermittent feeding of the metal shells in relation to the carriers for conveying the shells in relation to other mechanisms in the machine, and means co-operating with said carriers adjacent the delivery end of the baking or vulcanizing oven, which will positively remove the completed caps from the carriers and deliver them in relation to a delivery, inspecting and cooling belt. Said caps will pass along said belt for a sufficient length of time to permit the adhesive used to set, and permit the inspectors to remove any defective caps before their final delivery from the machine.

To increase the time interval during which the caps are on the delivery, inspection and cooling belt and thus permit a decrease in its length, I provide a mechanism adjacent the ejecting mechanism by which all of the caps ejected in each operation of said mechanism will be nested in relation to the row of shells ejected during the preceding operation of said ejecting mechanism, thus securing the close juxtaposition of the caps of succeeding rows, to facilitate inspection and avoid waste of space upon the delivery, cooling and inspection belt.

The construction and arrangement of the actuating means for the various mechanisms in the machine is such as to ensure absolute accuracy in the timing of the operations performed by each mechanism with relation to the movement of the carriers, this accuracy not only being in relation to the parts of the cap while upon succeeding carriers, but to the parts of the cap upon the same carrier. In fact, while each of these mechanisms include a plurality of duplicated elements, each operating upon a cap, all of these elements are so constructed and combined that they act as a unit and are incapable of any variation with relation to the adjoining elements.

It is essential, in a machine capable of simultaneously operating upon a row or group or metal caps and the cork or composition cork disks cemented therein, that every shell and every disk shall be acted upon by the same or corresponding mechanisms at exactly the same instant, since variation from this condition where a sequence of multiple unit mechanisms act progressively upon the same article, will result in injury to shells, improper feeding of the cork disks and resultant losses which will make the operation of such machines commercially impracticable.

The invention consists in the novel features of construction and combination of parts hereinafter set forth and described, and more particularly pointed out in the claims hereto appended.

Referring to the drawings,

Fig. 1 is a side view of one end of the machine showing all of the mechanisms for assembling the different parts and substances entering into the caps, up to a point of their delivery to the heat and pressure mechanism;

Fig. 2 is a side view of the other end of the machine showing the remaining portion of the oven, and the delivery mechanism including the cooling and inspection belt;

Fig. 3 is a plan view of a portion of the mechanism shown in Fig. 1, with the exception of the shell feeding hopper, and the parts appurtenant thereto;

Fig. 4 is an enlarged sectional view of the shell hopper;

Fig. 5 is a section on the line 5—5 of Fig. 4;

Fig 6 is a section on the line 6—6 of Fig. 3;

Fig. 7 is a front view of the cork or composition cork disk hopper, and the feeding mechanism for the disks, adjacent thereto;

Fig. 8 is a section on the line 8—8 of Fig. 3;

Fig. 9 is an enlarged section of the delivery end of the oven; and

Fig. 10 is a section on the line 10—10 of Fig. 9.

Like numerals refer to like parts throughout the several views.

A machine embodying my invention includes therein a sequence of similar carrier bars or members each adapted to receive and convey a group or row of metal shells as commonly used in the bottle cap art.

These carriers are simultaneously actuated so as to be progressively brought into the operative relation to a mechanism for simultaneously delivering a group or row of metal shells to said carriers; a mechanism for applying a suitable adhesive upon the upwardly presented inner face of such shells; a mechanism for simultaneously depositing a cushion disk, usually of cork or composition cork, within each shell of each group or row; a mechanism for forcing said cushion disks within the respective shells; a pressure developing mechanism passing through an oven with said carrier; and an ejector mechanism operative upon the shells of each group or row to remove them from the carrier and deposit them upon a delivery, cooling and inspection belt by which they will be conveyed from the machine with a speed substantially coincident with that of said carriers within the machine.

In describing the machine, I will first refer to the construction of the carrier mechanism, and then each of the mechanisms in the order of their progressive co-operation with each carrier forming a part of said carrier mechanism.

Referring to the accompanying drawings, at 11 and 12 upon opposite ends of the machine are two pairs of sprocket wheels about which parallel endless sprocket chains 12 pass, and by which said chains are simultaneously and continuously driven.

The sprocket wheels 12 are driven by means of a worm gear 15 co-operating with the worm 16 upon a shaft 17 driven through the chain and sprocket mechanism 18 by an electric motor 19, although any other desired means of driving said shaft may be employed. Said shaft 17 extends for substantially the entire length of the machine, and is utilized for driving various other mechanisms in the machine, the timing of which mechanisms must be in accord with that of the chains 13.

Extending between the chains 13 upon opposite sides of the machine and secured to these chains in any desired manner, is a sequence of closely spaced carrier bars 20 having a sequence of alined openings 21 therein each adapted to receive a metal cap 22 which is held upon said bar by its outwardly flared, fluted skirt. In the embodiment of the invention shown in the drawings, each bar is shown as having eight such openings 21, which are spaced slightly apart and extend laterally of the machine in a straight row. It is not my intention, however, to limit the invention to the particular number of openings through each carrier bar, since this number may be increased or decreased as desired. The number of such openings, however, will determine the number and arrangement of the elements of each unit and every other mechanism in the machine, the number and arrangement of these elements of necessity being varied with any variation in the number or arrangement of the openings in each of said bars. The openings 21 in each carrier bar 20 correspond in number and position with the openings 21 in every other bar, so as to have corresponding openings in succeeding bars in alinement, longitudinally of the machine. Great pre-

cision is not required, since the various mechanisms operating upon the cap parts carried by said bars are of a nature which will allow slight leeway in the positioning of these openings.

In a machine embodying my invention, the metal shells are delivered to these bars as each bar approaches the proper relation to a metal shell hopper and its feeding mechanism, the completely assembled cap being delivered at the opposite end of the machine.

Referring more particularly to Figs. 1, 3, 4, 5 and 6 of the drawings, the hopper for the metal shells, shown at 22, is provided with a straightening mechanism shown more particularly in Figs. 4 and 5 consisting of oscillatory members 24 forming downwardly converging side walls and adapted to receive shells from the open bottom of said hopper and subject them to violent agitation in a manner to cause the readjustment of these shells to cause them to pass through narrow outlets 25 corresponding in number to the number of openings 21. In each of said outlets are selectors 26 and 27, which will direct the shells to diverging channels 28 and 29 at opposite sides of the outlets 25 according to the position of the shell as it passes through said constricted outlets. In the form of the invention shown, there are four such outlet openings 25 upon each side of the member 24, and four channels 28 and four channels 29 communicating respectively with a chute 30 or 31. The number and arrangement of the selectors 26 and 27 is merely such as to ensure the feeding of the shells in the proper position through an outlet 25 to a channel 28—29 and a chute 30—31 irrespective of the position of the member 24. Each member 24 is reciprocated by means of a crank 32 carried by a shaft 33, which shaft is driven in any desired manner as the motor-driven gearing 35, Fig. 1, at high speed so as to rapidly reciprocate the member 24 in relation to the part in which the channels 28—29 are formed. The cranks 32 enter slotted heads carried by the parallel rods 34 connected with the member 24, as shown more particularly in Figs. 4 and 5 of the drawings.

The construction and arrangement of the shell hopper and its delivery mechanism is immaterial to the present invention, since any suitable mechanism may be used for accurately positioning and feeding the shells in relation to the chutes 30 and 31, so as to cause an adequate supply of such shells to be maintained in said chutes at all times and avoid any limitation upon the capacity of the machine as a result of failure to deliver shells to each opening 21 in each bar 20 during the operation of the machine.

All of the chutes 30 and 31 extend downwardly at an incline toward, and terminate above, the sprocket wheels 11 with the discharge end of each chute positioned in longitudinal alinement with an opening 21 of the various bars 20. Positioned above the sprocket wheels 11 and the carrier bars 20 passing from about said sprocket wheels, and in close relation to the upper surface of said bars, is a roller 36, the curvature of which will form a graduated pocket between which and the bars 20, the shells will be directed as they leave the delivery end of the chutes 30 and 31 in a position where they will either fall of their own accord into an opening 21 as each carrier bar 20 passes beneath the roller 36, or so fall that the roller will engage every shell thus delivered to the bar. In the event of any shell not being properly seated in its opening, when passing from a chute to a bar 20, the roller 36 will readjust it so that it will be brought perfectly flat and in a true relation to said opening. Hence with a continued progress of the bar through the machine, each shell will be in a position where every other mechanism in the machine will accurately register therewith and any likelihood of mutilation of the shell, or a jamming of the machine is avoided.

The various shells 22 will descend through the chutes 30 and 31 by gravity, but it will be readily realized that such shells must be maintained in the same position with relation to the delivery point of its chute as every other shell, since these shells must all leave their chutes at exactly the same instant, or substantially so, inasmuch as their delivery is timed with relation to the position of a carrier bar for receiving them. Also it is apparent that these shells must be intermittently delivered from their chutes, since notwithstanding the continuous progressive movement of the bars, there are intervals during which no bar is in a position to receive such shells. To meet this condition, I provide a mechanism normally operative to prevent the escape of any shell from a chute while permitting movement of all other shells in the chute toward the delivery point, which mechanism is so actuated in synchronism with the movements of the carrier bars, that the shell nearest the delivery end of each chute will be simultaneously released, and the succeeding shell will be simultaneously held against movement in order to limit the operation of the shell feeding mechanism to the delivery of one shell at a time from each chute. This mechanism comprises a lever 37 actuating two stop pins 38 and 39 adjacent each chute, said pins being spaced apart a distance greater than the diameter of a shell. One of these pins as 38 is adapted to be interposed between the lowermost shell in a chute and the outlet of said chute, while the

remaining pin 39 is adapted, with the elevation of the pin 38, to release the lowermost shell 22, and to engage the shell 22, next above it in the chute, and hold it and all the remaining shells against movement. These are two such pins 38 and 39 co-operating with each chute 30 and 31, these pins being carried by the cross bars 40 and 41, extending across both groups 30—31 of said chutes and connected at one end with the lever 37 and the other end with a lever 42, Fig. 3.

The lever 37 is provided with a crank 43 acted upon by a link 44 connected with a rocking lever 45 carrying an anti-friction roller 46 co-operating with a striker wheel 47, the teeth of which are so positioned as to impart a timely oscillation to the lever 45, the levers 37—42 and the pins 38—39 actuated thereby.

The parallel sprocket chains 13 and the respective bars 20 carried thereby, after leaving the roller 36, pass beneath a fount 48, or a container for any suitable adhesive either in liquid or paste form, having therein the feeding rollers 49 and 50, which will serve to work and distribute the paste so as to secure the application of a proper small amount thereof to within each shell by daubers or similar devices receiving paste from the roller 50.

The fount 48 is renewably supplied with paste from a removable reservoir 51 having a constricted outlet opening 52 in which is mounted a hinged cover 53 normally preventing the escape of paste from the reservoir. The fount 48 has a projection 54 in the bottom thereof so positioned as to engage the closure 53 as the reservoir 51 is positioned in relation to its support 55.

The bracket 56 carried by said reservoir and straddling the support 55 is provided with an adjusting screw 57 by means of which the reservoir may be raised and lowered to regulate the level of the paste in the fount 48.

The fount 48 is supported from the cross bar 58 by means of the bracket 59, which bracket is also provided with an adjusting screw 60 for regulating the position of the fount with relation to the feeding and distributing rollers 49 and 50 receiving paste therefrom and delivering it to a mechanism for impressing it in the form of a "spot" within the various shells of each bar.

Mounted adjacent the fount 48 is a shaft 61 having secured thereto a sequence of dauber units 62, each consisting of a plurality of radially extending daubers 63 having a flexible head 64 adapted to successively engage the paste distributing roller 50 and the inner face of the top of the caps upon different carriers 20. The number of dauber units will correspond with the number of openings 21 in each bar and will be so positioned as to center each dauber 63 with relation to the openings 21 upon succeeding bars 20. The daubers 63 of each unit will be spaced apart as to the operative surfaces 64 thereof, a distance equal to the distance between centers upon the corresponding openings 21 upon succeeding bars 20 so that the number of such daubers will vary with the diameter of the unit.

The shaft 61 is driven by means of the sprocket wheel 65 carried thereby and engaging one of the chains 13, the paste rollers 49 and 50 being driven from this shaft 61 through the gear train 66.

While the dauber heads 64 may be made of rubber or other flexible material, it is not my intention to limit the invention to the use of the daubers of any particular construction, such being largely a matter of choice and of adjustment in the parts of the machine.

The paste rollers 49 and 50 are mounted in suitable spring supported, adjustable bearings 67, so as to permit their adjustment in relation to the paste pot and each other.

After each shell in each bar has received its "spot" of adhesive, the continued movement of the chains 13 will cause said bars to pass below the delivery mechanism of a cork feeding mechanism, which will simultaneously deliver a cork disk within each shell of that row. The distance between the point of application of the adhesive or the "spotting" of the shell, and the point of delivery of the cork disk within the shell and upon the "spot" of adhesive, while not great, is sufficient to permit the surrounding atmosphere to carry off some of the moisture of the adhesive which is beneficial in reducing the necessary drying out action in the oven.

The cork disk delivery mechanism above referred to comprises a plurality of cork delivery units corresponding in number with the number of openings 21 in each of the bars 20, and each unit consists of a plurality of devices adapted to receive a disk from the delivery chute of a cork disk hopper, and convey it to a point immediately above a bar 20, means being provided common to all of said devices whereby they will be actuated to force the disk from the conveying mechanism to within a metal shell carried by said bar 20, one such last named mechanism being associated with each unit, but all of said mechanisms being simultaneously actuated from a common source of power.

Since each unit is a duplication of every other, a detailed description of but one of these units will be necessary.

Extending across and above the upper reach of the chains 13 and the bars 20 carried thereby, is a shaft 68 to which the various cork delivery units are secured so as to

rotate therewith, the peripheral speed of said units coinciding with the lineal traverse of said chains and said bars. Each unit is in the form of a wheel 69 having a sequence of sockets 70 about the periphery thereof, the centers of these sockets being spaced apart a distance coinciding with the centers of the openings 21 upon succeeding bars 20. Rearwardly of each socket is a pickup or thrust shoulder 71 in the form of a ratchet tooth.

Seated within each recess 70 is an ejecting plunger 72 having a stem 73 projecting through an opening in the periphery of the wheel 69 and encircled by a spring 74, one end of which engages a shoulder 75 upon the stem 73. This spring has a normal tendency to withdraw the plunger 72 within the socket 70. The end of the stem 73 is mounted in a suitable bearing 76 adjacent the shaft 68 so as to ensure the desired rectilineal movement of said plunger and avoid any possibility of its displacement in a manner which would cause the jamming of the machine, or interfere with the free rotation of the wheel 69. The shoulder 75 in addition to forming a spring seat, also affords a surface against which an ejecting arm may act for the purpose of forcing the plunger 72 radially outward of the wheel 69 for the purpose of depositing a disk within a metal shell upon a bar 20.

Extending about each wheel 69 is a shield 77, which shield extends in sufficiently close proximity to the periphery of said wheel to prevent the escape of a disk from any socket, and from a point just beyond that at which the cork disk is delivered to said wheel, to a point slightly in advance of that where it is required to deliver the disk to the metal shell.

Pivotally mounted adjacent the various units for delivering disks to the metal shell upon the bars 20, is a rock shaft 78 carrying a plurality of arms 79, one adjacent each wheel 69, the free end of each of said arms carrying an antifriction roller 80 positioned above the lower vertical center of the wheels 69 and between the shaft 68 carrying the wheel and the shoulders 75 upon the plunger stems 73.

The shaft 68 is actuated by a sprocket wheel 81 meshing with one of the sprocket chains 13, and a gear train 82 connecting the shaft of the wheel 81 with the shaft 68, so as to cause a peripheral speed of the wheels corresponding with the lineal speed of the bars 20.

The shaft 78 is actuated by means of a cam 83 cooperating with a crank 84 upon said shaft 78 and actuated by the skew gear 85 upon the shaft 17, the skew gear 86 and the intermeshing gears 87 and 88 one of which is carried by the shaft of the gear 86 and the other of which is carried by the cam 83, the ratio of said gears being such as to impart a full rotation to the cam during the interval required to bring succeeding bars 20 into relation to the wheels 69, or to impart twelve oscillations to the shaft 78 during each full rotation of the shaft 68.

Above the upper vertical center of the various disk delivery units is a cross bar 89 receiving and holding the lower ends of a sequence of delivery chutes 90 in a fixed relation to the various wheels 69. Each of these chutes is adapted to receive disks from a chamber 92 having a vibratory bottom 93 supported by the links 94. The bottom of said chamber has a constricted outlet opening 95 above each chute 90 toward which the side walls of the hopper converge so as to normally impart a tendency of the disks to slide toward and through said outlets 95. At opposite ends of the chamber 92 are two pairs of flanged, bevelled bearing wheels 96 supporting a bi-part vibratory shield 97—98 withing said chamber in a position between the vibratory bottom 93 and the hopper proper 99, which is adapted to receive the disks in bulk, and deliver them within the chamber 92, from which they will be delivered one at a time to the various chutes 90. The links 94 receive oscillatory movement and cause vibratory movement of the bottom 93 of the chamber by means of the eccentric 100 and the eccentric strap and rod 101 shown more particularly in Fig. 7 of the drawings. The links 94 of each pair are connected by rods 102 about which the edges of the movable bottom 93 are rolled as shown more particularly in Fig. 6 of the drawings.

The eccentric 100 is carried by a shaft 103, one end of which is connected by the belt and pulley connection 104 with the shaft 17. The shaft 103 carries a small gear 105 in mesh with a gear 106 carrying cranks 107, each co-operating with and having movement in a vertical opening 108 in the extensions 109 of the oscillatory shields 97—98 respectively for imparting the desired simultaneous movement to said shields in opposite directions to cause the agitation and separation of the disks in the portion 92 of the disk hopper in a manner to cause the disks to descend a few at a time, edge-on, toward the vibratory bottom 93 of the chamber 92. In this manner each of the chutes 90 will be kept substantially full of disks laying perfectly flat one upon the other so as to maintain a constant and adequate supply of such disks for permitting the continued operation of the machine at high speed.

Each of the tubular chutes 90 has a short section 110 movably mounted in relation thereto, and also in relation to the nipple 111 about each outlet opening of the movable bottom 93 of the chamber 92. The short chute length 110 has oscillatory move-

ment with the movable bottom 93 and maintains constant communication between the various chutes 90 and said chamber so that the movement of disks from said chamber to within the various tubes may occur at any time.

The cranks 107 are set 180° apart, so that the oscillatory shields 97 and 98 will be simultaneously moved in opposite directions.

The cork or other cushion disks are delivered from each pocket 70 of each wheel 69 with considerable rapidity, so that I have found in actual practice, that in order to maintain the desired high speed in the machine, the various plungers 72 cannot be relied upon to force the disks into the desired intimate engagement with the inner top of a shell 22, and while the pressure developing mechanism might be relied upon to force the disk into the proper position within a shell, if the disk is at all loose, the conditions in the machine are such that there is always great likelihood of the mutilation of the disk by such pressure developing mechanism. Furthermore, when it is desired to wax the exposed surface of the disk, it is desirable to have all of the parts in their proper relative position before the application of the wax to this surface, it being understood, however, that when so positioned these parts are only lightly bonded, or not bonded at all, since the time interval has been insufficient to permit the setting of the adhesive used, and there has been no application of heat to assist the drying-out operation of the adhesive necessary to secure the desired bond and the effective hardening of the adhesive.

To secure the best results, I preferably provide a mechanism below which the bars 20 will pass after receiving cork disks from the various units of the disk delivery mechanism, which mechanism is so constructed as to have limited lineal traverse with the bars and at the same speed as said bars, while also having a movement inwardly of the shell for forcing the disk against the inner top thereof, and a movement outwardly of the shell followed by a return movement counter to that of its movement with the shells so as to accurately position it with relation to the succeeding bar 20, while at the same time not interfering in any way with the position of the shell upon the bar. In other words, this mechanism is capable of a four-way movement which will permit it to enter and leave a shell, and incidentally force a disk against the inner top thereof while still having ample clearance so as not to disturb the shell in any way. At the same time, the pressure developed by this mechanism will be parallel with the surface of the disk, and throughout a large portion of the area thereof, and will be a yielding pressure so as to compensate for any slight variance in the thickness of the metal of the shell, or of the disk itself.

Extending across the machine above the upper reach of the chains 13 and the bars 20 carried thereby, is a shaft 112 having a plurality of reduced portions 113 formed eccentrically of said shaft so as to have the effect of short cranks.

Mounted upon each of said cranks 113 is a fitting 114 having a forked projection 115 straddling a guide bar 116, thus permitting the fittings to have a four-way movement under the control of its cranks. Supported by extensions 117 adjacent the top of said fittings 114 is a cross bar 118 in which is mounted the upper ends of a sequence of presser plungers 119, these plungers corresponding in number with the number of openings 21 in each bar 20, and being positioned with their centers in alinement with the centers of corresponding openings in the various bars 20.

Extending parallel with the bar 118 and supported from adjacent the bottom of the fittings 114, is a lower guide bar 120 for the presser plungers 119. The bars 118 and 120 have movement with the fittings 114, the bar 120 being capable of limited movement independently of said fittings, toward or away from same, in order to permit the automatic adjustment of the plungers to any slight variance between the lineal traverse of the bars 20 and the corresponding movement of the plungers 119, under the control of said fittings. To impart this flexibility in this portion of the machine, the guide bar 120 is slidably mounted upon rods 121, secured to the fittings 114 respectively, and projecting through suitable openings in said bar 120. The ends of these rods 121 are screw threaded, and carry a suitable adjusting nut 122 by means of which the bar and the lower ends of the plungers 119 may be set with relation to the plane of the bars 20, to avoid the engagement of the plungers with any portion of the metal shell of said bars upon their initial engagement with the caps upon any part thereof.

Encircling each rod 121 is a coiled spring 123 having a normal tendency to engage said bar with the regulating nuts 122.

The plungers 119 have an enlarged head 124 of approximately the diameter of the cork disks upon which they act.

To accommodate this presser mechanism to slight variances in the position of succeeding bars 20, or in the thickness of different shells 22, or of cork disks within said shells, the construction and arrangement of parts heretofore described is such that while the plungers are moved into engagement with the cork disks by positive movement from the fittings 114, the pressure developed by this movement will be regulated through

spring tension, thus causing uniform pressure to be applied to all disks and permit the plungers to automatically adjust themselves to changing conditions in the machine while still applying substantially the same pressure to the disks. To secure this result, the various plungers 119 are slidably mounted in the bars 118 and 120, and are each acted upon by a spring 125, one end of which seats against the bar 118, the other end of which acts against a suitable seat 126 upon the plunger. Since the plungers are thus thrust downward by the spring 125, I provide a stop shoulder such as the pin 109 for limiting the downward movement of the plungers, this spring engaging the upper face of the bar 113.

The shaft 112 is driven by the intermeshing skew gears 127 and 128 carried by the shaft 17 and the shaft 112 respectively.

After being acted upon by the presser plungers 119, the caps upon each bar 20, as a result of the continued movement of the chains 13, are brought into operative relation to a mechanism which will apply and spread a small quantity of wax or other finishing composition to the exposed surface of the disks within the various shells 22. The spreading action of this mechanism is of secondary importance, since when the shells are passing through the heat and pressure mechanism of the machine, the surfacing materials will be made fluid and will be effectively spread throughout the entire surface of the disk.

The mechanism above described comprises a heated fount 129 adapted to contain the wax or other composition which is kept fluid as a result of the application of heat to this fount. Mounted within the fount are two feed rollers 130 and 131 by means of which the thin film of the wax or other composition is removed from the fount, distributed and applied to daubers, to be hereinafter referred to. A constant supply of the fluid wax or other composition is maintained within the fount 129 by means of a heated reservoir 132 having a constricted outlet opening 133 provided with a closure 134. Within the fount 129 is a projection 135 which will engage and open the closure 134 as the reservoir is mounted in relation to the fount 129. The reservoir 132 and fount 129 are heated by means of an electrical resistance device 136 carried by the reservoir 132, the heating of the fount and of the wax or other composition within same resulting from distribution and radiation of heat by the walls of this reservoir. Any other desired means of heating these parts, however, may be resorted to, an electrical resistance device being used merely to minimize the quantity of fumes about the machine.

The fount 129 is supported by brackets 137 from a cross bar 138, suitable adjusting screws 139 being provided for varying the position of said fount with relation to the rollers 130 and 131 in securing the desired quantity of the wax or other composition applied to said rollers.

The reservoir 132 is supported by brackets 140 cooperating with extensions 141 upon the fount 129, these brackets also being provided with adjusting screws 142 by which the reservoir may be raised or lowered for the purpose of controlling the level of the wax or other composition in the fount 129.

Beyond the fount 129 is a shaft 143 carrying a sequence of units corresponding in number with the number of openings 21 in each bar 20 each of said units having a sequence of radially extending arms 144 adapted to receive wax, or other composition, from the roller 131 and apply it to the exposed surface of a cork disk within each shell 22 upon each bar 20. The arms 144 each have a head 145 of slightly less diameter than the cork disks, it being desirable to slightly roughen the face of said heads so as to ensure their retaining sufficient wax to cause the desired quantity of wax to be applied to the disk, although the quantity to be so applied is not great.

Each of the units is preferably composed entirely of metal and heated from an electrical resistance device within the shaft 143 so as to prevent hardening of the wax, or other composition, after it is received from the roller 131 and before it is applied to the disks within the shells.

The shaft 143 is driven from one of the chains 13 by means of the sprocket wheel 146 carried by said shaft and meshing with one of the chains 13. Also carried by said shaft is the first gear of a gear train 147, the other gears of which are carried respectively by the arbors of the rollers 130 and 131.

The units for applying the wax, or other composition, to the face of the disk are positioned closely adjacent the mechanism for applying heat and pressure to the shells and their contained disks for the purpose of conditioning the adhesive so that it will readily set upon cooling, thus placing these units in a position where they are close to the high temperature zone in the machine, which will assist in keeping them warm, although I have found it desirable to employ an electrical resistance device, as above referred to, or some equivalent means, for directly heating these units, so as to assure uniformity in the product, even with a machine operating at high speeds.

The heat and pressure unit in the machine above referred to, includes therein an oven 148 heated in any desired manner as by means of gas flames from the burner system 149, the burners of which are positioned

between the upper and the lower reaches of the chains 13 so as to apply the heat to the bars 20 and to the bottom of the shells 22 on said bars, if the openings 21 extend entirely through said bars. The heating of the bars themselves while in the oven will materially assist in causing the desired application of heat to the metal shells, and prevent the rapid cooling of these bars while they are passing through the machine at points other than within the chamber 148. I also provide tracks for the ends of the bars within this chamber and supports therefor intermediate these tracks consisting of a number of parallel chains 150 passing about sprocket wheels 151 upon the shaft of the sprocket wheels 12 and adjacent the inlet of the oven 148, as shown in Figs. 1 and 9 of the drawings, these chains 149 engaging the bars 20 intermediate the openings 21 and being sufficiently taut to afford a suitable support for said bars.

Passing about two pairs of sprocket wheels 152 and 153 are sprocket chains 154 supporting between them cross bars 155 of substantially the same length, as the bars 20, and succeeding bars 155 being spaced apart substantially the same distance, as succeeding bars 20. Each of these bars 155 carries a sequence of spring housings 156 each having mounted therein a plunger 157 acted upon by a spring 158 having a normal tendency to force the plunger outwardly of the bar. Said spring 158 encircles the stem 159 of the plunger and the stem has a bearing in the top of its housing 156 and is provided with a stop pin 160 passing therethrough so as to limit the outward movement of the plunger. The head of the plunger is enlarged as shown, with the two-fold object of having it of substantially the same diameter as a disk within a shell 22, and affording space for the spring 158. The number of plungers 157 carried by each bar 156 corresponds with the number of openings 21 in each bar 20 and the arrangement of parts is such that as the lower reach of the chains 154 approaches the upper reach of the portion of the chains 13 entering the oven, the various plungers 157 of each bar will be so positioned as to enter the caps upon the bar 20, the springs 158 being tensioned as a result of the engagement of the plungers with the cork cushions and being compressed to an extent to develop the desired pressure, which may run as high as twenty to twenty-five pounds. The engagement of the plungers 157 with the caps will impart the desired feeding movement to the chains 154 and to the various bars and plungers carried thereby, and will synchronize this movement with that of the chains 13.

As heretofore stated, the oven 148 may be of any desired length to permit the elimination of the moisture from the adhesive used in properly conditioning the adhesive to make it sufficiently tacky to secure the desired bond.

At the delivery end of the machine and of the oven 148, as each row of plungers 157 is automatically disengaged from caps upon a bar 20 as a result of the divergences in the paths of the chains 13 and the chains 154, an ejector mechanism becomes operative to force the shells 22 and their contained disks carried by said bar from the openings 21 in the bar so as to deliver them to a belt conveyor upon which the shells will rest with the disk exposed upwardly, in order to permit the operator, whose duty it is to inspect the completed shell, to clearly observe the condition of the cork, or cork composition disk, while within the shell, during that period while the otherwise completed caps will be subjected to a low temperature for the purpose of finally setting the adhesive.

The ejector mechanism above referred to, in the form of the invention shown, comprises a rock shaft 161 having a series of cranks 162 secured thereto, each crank being acted upon by a spring 163. Pivoted to each crank is a thrust finger 164 having a cam 165 riding upon a sleeve 166 secured to the shaft of the sprocket wheels 12. The purpose of this cam is to impart a slight upward movement to its finger 164 simultaneous with its movement longitudinally of the machine by its crank 162. The finger 164 is held in engaging relation with the sleeve 166 by the spring 167.

Also carried by the shaft for the sprocket wheels 12, is a toothed striker wheel 168 acting upon an anti-friction roller carried by a crank arm 169 upon the shaft 161, thus ensuring a timely actuation of the fingers 164 so as to cause said fingers to have movement through the openings 21 of each bar 20 as this bar comes within operative range of said fingers. The end of the fingers 164 may be formed in any desired manner to avoid mutilation of the decoration upon the shells 21, with which it engages.

In Fig. 9 I have illustrated the operation of the ejector mechanism, a row of shells 22 with their contained cemented disk having been thrust from a bar 20 and being about to pass upon a slide-way 170 along which they pass to an inclined portion of a conveyor belt 171, by which the caps are conveyed to a horizontal reach of said belt shown, which serves as an inspecting table at 172. Said belt 171 passes about end rollers 173 and 174 and an intermediate guide roller 175, at the point where the belt passes from an inclined to a horizontal, plane. The belt is driven from the shaft of the sprocket wheels 12 by the chain and sprocket mechanism 176, the arrangement of

which is such that the lineal traverse of the belt will be so proportioned with relation to that of the cross bars 20 and the chains 13 carrying same, as to cause succeeding rows of caps deposited upon said belt, to be in fairly close juxtaposition.

One face of the striker wheel 168 is provided with a sequence of cams 177 acting upon a rock lever 178, the function of which is to actuate a shift mechanism so as to cause the caps delivered from one bar 20 to be staggered in relation to the caps delivered from the preceding bar, thus permitting a closer nesting of the caps upon the belt 171. This shift mechanism comprises a sequence of vertically extending guide plates 179 pivotally supported from a cross bar 180 above the slideway 170, said plates also being pivotally connected with a shift bar 181 pivotally connected with the rocking lever 178.

There is one cam 177 to two teeth of the striker member 168, since both movements of the rocking lever 178 are utilized in shifting the guide plates 179.

Adjacent the delivery end of the belt 171 is a discharge chute 182 along which the caps pass to a suitable container in which they are removed from adjacent the machine.

The operation of the herein described machine is substantially as follows:—

When starting a run of the machine, and from time to time during the continuance of the run, metal shells 22 are delivered in bulk to the hopper 23, and cushion disks are delivered in bulk to the hopper 99.

In the continued description of the operation of the machine, I will first refer to the functioning of the mechanism for delivering the shells, and then to that of the mechanism for delivering the cushion disks, and then follow with a description of the action of the various mechanisms in the machine with relation to the shells delivered to one bar 20 and the disks delivered within said shells, it being understood that while such shells and such disks carried by any bar 20 are acted upon successively by these mechanisms, some of these mechanisms are operative with relation to the shells and disks upon one bar 20, while others of said mechanisms are simultaneously operative upon shells and disks upon others of said bars, thus securing a continuous operation of the machine, notwithstanding that successive operations are required upon the shells and their contained disks upon each bar 20.

The power for operating the metal shell hopper and its appurtenances is preferably derived from a source independent of that for operating the sprocket chains 13, thus permitting a brief stoppage of the movable parts of the hopper mechanism, in case of the clogging of any of the chutes or of the outlet openings of the hopper, without interfering with the operation of the machine, and permitting the operator to hand-agitate such shells in order to cause a resumption in the feeding movement of the shells from said hopper.

As the shafts 33 are rotated, the cranks 32 carried thereby will rapidly oscillate the side walls or the members 24 in opposite directions, and thus keep in agitation shells falling from the hopper between the stationary end walls of this member so that they will assume a more or less flatwise position in relation to the sides of said member 24, and thus slide into the constricted outlet openings 25. In passing through the said openings 25, the position of the fluted edge of each shell and the wedge-shaped partition dividing the outlet chutes 28 and 29, will determine into which group of chutes 30 or 31 the shells will slide. As each shell assumes an inclined position, it will free itself from the selectors 26 or 27 and descend by gravity through a chute 30 or 31. These shells will accumulate in these chutes for substantially the full length of the chutes, since the capacity of the shell hopper and its mechanism is such as to deliver shells at least as rapidly as they are used in the machine. There being four outlet openings 25 upon each side of the hopper, and eight such chutes 30 and 31, it will be apparent that each opening 21 of each bar 20 will receive a shell from a chute 30 or 31, particularly as the outlet of each chute 30 or 31 of each group terminates in a position where a shell passing therefrom will enter one of said openings.

Since the bars 20 are brought successively into operative relation to the outlets of the various chutes 30 and 31, it is apparent that means must be provided whereby the escape of shells 22 from said chutes will be prevented, excepting when a bar is in position to receive same. It is for this reason that the pins 38 and 39 are provided, one set of such pins as 39 being so positioned as to engage the lowermost shell in each chute when it is in its lowermost position, and the other row of which 38, is adapted to engage the succeeding shells in the various chutes when the lowermost shell is released by the elevation of the pins 39. This escapement mechanism is actuated by the lever 37 and the connections between same and the lever 45 and the striker member 47, operative upon said last named lever. This mechanism is so set, and the striker wheel 47 is so constructed, that the lever 37 will be actuated to raise the pins 38 substantially simultaneously with a bar 20 coming into a position where it will receive shells, and to lower said pins 38 immediately following the escape of the lowermost shells in said chutes, so as to prevent the succeeding shells from also escaping from the chutes. In this manner the desired intermittent delivery

of shells is secured, the dwell between the delivery movements being merely sufficient to compensate for the distance between the centers of the openings 21 of succeeding bars 20.

As the shells pass from the chutes 30 and 31, and shells will pass simultaneously from the chutes in each group upon the same bar 20, they will automatically seat themselves in the openings 21 of said bar, but there is always a possibility that they may be slightly askew with relation to the bar, and it is for this reason that I provide the presser roller 36 which will readjust the shells with relation to the openings 21 and force them within the openings, although said openings will be large enough to receive the shells without developing any material frictional pressure between them and the walls of the openings.

Adverting to the action of the cork or composition cork disk hopper and it appurtenances, the disks are delivered in bulk to the hopper 99 and will pass therefrom in bulk to the chamber 92. The opposite oscillatory movement of the parts 97 and 98 of the shield within said chamber will agitate the cork disks in the upper part of the chamber in a manner to cause them to slide down the inclined faces of said shield in opposite directions, and pass between the edges thereof and the side walls of the chamber 90, falling substantially edgewise upon the oscillatory bottom 93 of said chamber. The disks will fall along the full length of said shield so as to be in a position where they will readily slide toward the numerous circular outlet openings 95 and pass through the nipples 111 projecting downwardly about said opening into the short oscillatory tube lengths 110, through which they will pass flatwise into the main tubular chutes 90, so as to furnish an adequate supply of disks in each tube, to permit the operation of the machine at high speed. The violent agitation resulting from the oscillatory movement of the bottom 93 will not only tend to keep the disks flat, or substantially so, but will result in an irregular movement of the disks which will ensure their being delivered to all of the tubes 110 and 90.

The disks will descend in the tube by gravity as the lowermost disk in each tube is removed by the disk delivery mechanism.

The particular construction of the shell feeding mechanism and the cork disk hopper is not material to the invention of my present application, except in so far as it is required to provide such mechanisms as will simultaneously deliver metal shells to each opening 21 in each bar 20, and deliver a cork disk to each shell thus delivered. While I have referred to the necessity for simultaneously delivering metal shells to the openings in each bar and cork disks to each shell upon the bar, I have referred rather to such an operation with a reasonable degree of certainty since the occasional failure to so deliver a shell or so deliver a disk will not seriously interfere with the operation of the machine nor its output capacity.

While the machine is in operation, the chains 13 receive continuous movement and carry with them the various closely adjacent bars 20, so that while the operations of the various other mechanisms in the machine, excepting the heat and pressure mechanism, will be intermittent the dwell between succeeding operations, will be so small as not to be appreciable, the machine, to all intents and purposes being a continuously operating machine.

I have heretofore described how, as each bar passes the discharge end of the various groups of the chutes 30 and 31, it receives metal shells from these chutes, which shells are readjusted when required by the roller 36. After passing this roller 36, and I now refer merely to some particular bar 20, this bar with a continued movement of the chains 13, passes below the paste fount 48 and below the shaft 61. As the bar approaches this shaft one of the daubers 64, which has previously picked up a small quantity of adhesive from the distributing roller 50, enters the shell with a rolling action and applies a spot of adhesive to the inner top of the shell and spreads it about in a thin film. The dauber with the continued rotation of the shaft 61 and movement of the bar 30, leaves the shell with a rolling action so as to have no tendency to carry the shell with it or disturb the position of the shell with relation to the bar 20. Since there is one dauber unit for each shell upon the bar 20, it is apparent that each shell upon said bar will simultaneously receive its supply of adhesive. Since the peripheral speed of the dauber unit coincides with the lineal speed of the bar, there will be only the rolling and pressing action above referred to. By forming each dauber of elastic material, as described, it will yield and accommodate itself to any irregularity in the surface of the shell or to any slight variance in the thickness of different shells upon the succeeding bars 20.

The adhesive used in the paste fount 48 may have the consistency of printer's ink or be slightly more fluid, the use of the rollers 49 and 50 securing the effective working of the adhesive and the daubers effectively picking up this adhesive and applying it to the shells.

I have found this construction highly desirable since it permits a reduction in the quantity of liquid employed to ensure the effective application of the adhesive, and minimizes the likelihood of the production

of imperfect caps, due to a failure or partial failure of the adhesive applying mechanism.

The shaft 61 is rotating continuously while the chains 13 are in motion and as a bar 20 passes the shaft 61, and the daubers 64 operative upon the shells thereon, leave said shells, the succeeding daubers 64 will approach their operative position and engage the shells upon the succeeding bar 20 as it approaches said shaft 61. The spacing of the daubers 64 of each unit, as heretofore described, is such that succeeding daubers upon each unit, will co-operate with the shells upon succeeding bars.

While the machine is in operation the shaft 68 will be continuously rotating and as each pocket 70 of each disk delivery unit passes the tube 90 associated therewith, the column of disks in the tube will descend by gravity and the lowermost disk will drop upon a plunger head 72 in said pocket and be engaged by the tooth 71 rearwardly of the pocket in the direction of movement of the wheel 69. With the continued movement of the wheel, the disks thus received by corresponding pockets on different units from the tubes 90, will be conveyed from substantially the upper vertical center of the wheel to substantially the lower vertical center thereof, the shield 77 co-operating with each of said wheels preventing the escape of the disk from the pocket and defining its path of movement as described. Particular reference is had to Fig. 6 as clearly illustrating this mode of operation of the machine.

As each pocket 70 of each wheel 69 approaches the lower vertical center of the wheel, a bar 20, moving at the same speed as the peripheral speed of the wheel, approaches this vertical center so that it will be in a position to receive the disks as they drop from the pockets. The plunger 72 is provided to ensure the timely delivery of the disk to the shell positioned to receive it, and this plunger will be reciprocated by the arm 79 acting upon the enlarged head 75, of the plunger substantially simultaneously with the plunger reaching the lower vertical center of the wheel. This arm acts with relation to each plunger carried by the wheel, the movement of the arm 79 being rapid and that of the plunger merely sufficiently great to ensure the disk entering the shell.

Each wheel 69 will operate in the same manner and at the same time with relation to different shells upon the same bar, all of these disk delivery units being the same in construction, in arrangement and in the timing of their operations as the others.

The spacing of the various ratchet teeth 71 upon each wheel 69 coincides with the spacing of the openings in succeeding bars 20, so that as the shells upon each bar receive their disks, a disk is approaching the lower vertical center of the wheel at the same speed as the succeeding bar approaches said centers, so that the succeeding bars will receive disks from succeeding pockets in the feeding mechanisms for the cork disk as they pass this mechanism.

While in using an adhesive of heavy consistency, which is possible with a machine embodying my present invention, the drying out of the moisture from the adhesive requires less time than with a more fluid adhesive, the travel of the bars 20 and the shells thereon between the point where they receive the adhesive and the point where they receive the disks, during which time the adhesive is exposed to the air, will prove beneficial in securing a quick bonding action between each disk and its shell, although the interval be short. This condition, however, is not relied upon for securing the desired bonding action, the result being merely incidental to the operation of the machine and the shortening of the machine being more desirable than the lengthening of the space between the adhesive applying and the cork disk distributing mechanisms.

After receiving the cork disks from the wheels 69, or other means for conveying the disks from the various tubes 90 and depositing them within the shells 22 upon a bar 20, the disks in the shells upon the bar are acted upon by the plungers 119, which plungers enter the shell and have movement therewith and at the same speed thereas, while at the same time having movement toward the inner top of the shell so as to press the disk firmly against same and in close contact with the adhesive. This plunger action will serve to effectively spread the adhesive, if such is required, although the quantity of adhesive used is so small, and the manner of applying it is such, that there is little likelihood of the presence of adhesive in globular form within the shell.

Since the plungers 119 are engaged with the disks in the various shells upon a bar 20 with a pressure exerted through the springs 125, it is apparent that said plungers will adjust themselves to variances between different shells and their contained disks, and thus have no tendency to interfere with any of the shells, or mutilate them in any way. In fact this plunger mechanism will apply substantially uniform pressure to the shells and disks upon all of the bars 20.

Unlike the daubers of the adhesive applying and the pockets of the cork disk delivery mechanisms, the same plungers 119 act upon the disks and shells in succeeding bars 20, the engaging and disengaging movement of the plungers, their travel with the disks and shells upon one bar, and their return movement so as to co-operate with the

succeeding bar, resulting from the four-way movement of the fittings 114 heretofore described.

The manner of supporting the lower cross bar 120 and the springs 123 acting thereon will permit these plungers to adapt themselves to any variance in the speed of travel of said plungers 119 and the chains 13 and the bars 20 carried thereby, although the timing of the cranks 113 upon the shaft 112 with relation to the speed of the chains 13 will ensure approximate coincident movement of the plungers and the bars 20 while the plungers are engaged with the disks in the shells, thereon.

After the disks have thus been firmly pressed within the shells 22 upon a bar 20, the bar with its contained shells and disks passes beneath the wax or wax composition fount 132 and approaches the shaft 143.

While the chains 13 are in movement, this shaft is constantly rotated, so that the enlarged heads 145 of the radially extending arms 144 carried by this shaft, by engagement with the feed roller 131, will have received sufficient wax or other composition in a fluid state, so that as the bar 20 approaches the lower vertical center of said shaft 143, a head 145 will come into rolling contact with a disk in a shell upon said bar 20, the heads 145 upon the arms 144 of the other units having the same action with relation to the other disks in other shells upon said bar. The heating of the various dauber units upon said shaft, and of the fount 129 will ensure the wax, or other composition, being sufficiently fluid to ensure its proper distribution by the rollers 130 and 131 and its application in sufficiently fluid state by the heads 145 to the exposed surface of the cork disk.

The arms 144 are spaced apart a distance coinciding with the spacing between the openings in succeeding bars 20 so that the action of this mechanism with relation to the disks in shells upon succeeding bars will be the same as that heretofore described with relation to the application of adhesive to the shells 21 by the daubers 64. There is this difference, however, that while the daubers 64 are flexible, because they cooperate with an unyielding body, the shells 22, the heads 145 and the arms 144 may be rigid and of metal, since this facilitates their being maintained at the desired temperature to avoid the solidification of the wax or other composition, and the material upon which they act is itself sufficiently flexible to compensate for those slight variances in different shells and disks.

When the wax, or other composition, has been thus applied to the exposed surface of the disks in the various shells upon a bar 20, the cap is in condition to be subjected to the final heat, pressure and cooling action for the purpose of rapidly conditioning the adhesive so as to secure the desired bonding action, and of setting it, so as to secure the desired permanency in the bond.

The various mechanisms heretofore described co-operate with the shells, with or without their contained disks, while passing in a straight line along the upper reach of the chains 13, this reach being upon a horizontal plane, in the form of the invention shown, although I do not consider this arrangement essential to the invention, since any variances in the path of the bars 20 would merely require corresponding adjustments in other mechanisms of the machine, and the chains 13 may be guided so as to be caused to follow any desired path.

In the form of the invention shown, after the disks receive wax from the heads 145 of the wax applying mechanism, they enter the oven 148 receiving support intermediate the chains 13 and the side guides for the bars, from the chains 150.

The chains 154 receive movement as a result of the engagement of the presser plungers 157 with the shells upon a plurality of bars 20, thus ensuring the travel of the bars 155 carried by said chains, at the same speed as that of the bars 20. Consequently as each bar 20 approaches the lower vertical center of the sprocket wheel 152, the bars 155 positioned about the periphery of these wheels, will converge toward said bar 20 and come to a parallel position in relation thereto at the lower vertical center of said wheel. The plungers 157 upon a bar 155 engage the disks within the shells upon said bar 20 as they are approaching this lower vertical center, so as to tension the springs 158 acting upon said plungers to an extent to develop the desired pressure to maintain the pressure and the desired intimate contact between the two surfaces to be bonded together, to wit: the inner surface of the disk and the inner top of the shell 22, while the caps are subjected to the oven temperature. When this pressure is applied in the manner described, it will be continued so long as the lower reach of the chains 154 and the bars 155 carried thereby, and the upper reach of the chains 13 and the bars 20 carried thereby, remain in parallel relation, or until these bars diverge as they pass about the sprocket wheels 151 and 12 respectively.

Pressure is applied to the cork disks and therethrough to the metal shells 22 as each bar 20 enters the oven 148 and the pressure is relieved as each bar leaves said oven. The desired heat for expediting the drying out of the moisture in the adhesive is applied to the bars 20 and to the face of the shells 22 in the event that the openings 21 extend

entirely through said bars 20, by the gas burner system 149, which is preferably used because this affords greater facility in developing a temperature sufficiently high to secure the desired rapid drying out of the moisture in the adhesive. The chain supports 150 are used for the purpose of minimizing wear upon the bar 20, since these chains travel with said bars.

After each bar and its contained caps has traversed the full length of the oven 148, the adhesive between the disk and the inner top of the shell is sufficiently dried to form a tight bond between these parts, although it is necessary thereafter to cool the caps in order to finally set this adhesive. Hence, as the chains 13 and the bars 20 carried thereby pass downwardly about the wheels 12 and away from the chains 154 and bars 155, the caps are in condition to be ejected from the openings 21 in said bars 20. When the downward movement of the chains 13 and bars 20 has been sufficient to afford the necessary clearance for the movement of the caps outwardly of the bars, the striker member 168 will act upon the crank 169 the rock shaft 161 and the cranks 162 carried thereby, against the tension of the spring 163, in a manner to thrust the fingers 164 through the openings 21 and thus force the caps from said opening onto the slideway 170 and between the guide plates 179. As the fingers 164 receive this movement, the cam 165 thereon will impart a slight upward movement to the fingers simultaneously with their movement under the control of the cranks 162. The fingers 164 are maintained in engagement with the sleeve 166 by the springs 167. This movement of the fingers 164 is a short movement and is repeated as each bar 20 carried by the chains 13 reaches a position where said fingers may act upon the caps carried thereby.

The caps thus ejected will pass down the inclined slideway 170 between the guide plates 179 to upon the upper reach of the inclined portion of the belt 171, the movement of which belt will cause said caps to be positioned thereon with the cork, or composition cork disk presented upwardly.

Prior to the ejection of the caps from a succeeding bar 20, the face cam 177 will act upon the rocking lever 178 and the shift bar 181 in a manner to change the position of the guide plates 179 so as to direct the caps from this succeeding bar to a point intermediate that at which the caps of the preceding row were delivered, thus permitting a close nesting of the caps upon said conveyor belt 171 as shown more particularly in Fig. 10 of the drawings. This will minimize likelihood of the caps in one row disturbing those in the adjoining row, as to the belt 171, and at the same time permit a slower movement of said belt and thus facilitate inspection of the caps thereon as they are passing along the horizontal reach 172, or inspecting table portion, of said belt.

As the belt passes around the roller 173, the caps remaining thereon after inspection will be delivered to the discharge chute 182 along which they will descend and fall into a basket, box, or other receptacle, in which they are conveyed to the shipping room.

In the machine shown in the accompanying drawings, the organization of the machine is such as to cause the various mechanisms to operate simultaneously upon eight caps, this having been found to be a desirable number in order to permit the necessary careful inspection of the caps in order to prevent the delivery of imperfect caps to the purchaser. Such imperfect caps may result not solely from failure of the mechanisms in the machine to function properly, but from imperfect shells, as well as imperfect bonding of the disks in the shells, or imperfections in the disks themselves result in rejection of caps by the inspectors, and inspection prior to the delivery of the completed caps is relied upon solely to detect such imperfections, irrespective of the point at which they may develop.

It is apparent that the number of openings 21 in each bar 20 may be increased or decreased without departing from the spirit and scope of the invention, and that any variation in the number of such openings will necessitate a corresponding change in the number of units in the shell feeding, adhesive applying, disk delivery, disk presser and wax applying mechanisms, as well as in the number of plungers 157 carried by the bars 155 respectively.

By providing for simultaneous assembling of the constituent parts of eight caps while upon each bar, the output of a machine will be approximately ten times that of the ordinary assembling machine with the same number of operators, which will thus not only result in an increased capacity output in the machine, but such an increase without any material increase in the labor cost upon the machine.

A machine embodying my invention employs in each of the mechanisms acting upon the shells, or the cork disks before and after its deposit within the shells, a plurality of units, these units being so associated and combined as to be operative from the same source of power as to each mechanism, and through the same member, thus avoiding any possible loss of accuracy in the timing of any unit with relation to the remaining units of any mechanism. Furthermore, each of these units in its functioning must be synchronized with the succession of bars 20 with relation to the other mechanism in the machine, and with each other, which is es-

sential in securing the desired capacity output of the machine. In this manner duplication of mechanisms is avoided, and the whole machine acts as a unitary structure, notwithstanding the production of a multiplicity of caps with each cycle of operations.

Notwithstanding the increased output capacity of the machine, it occupies but little more floor space than the ordinary commercial assembling machines producing one cap at a time, and the completed caps are all brought closely together so as to facilitate inspection while upon the inspecting table 172.

While, when the machine is functioning perfectly, a shell will be delivered within each opening 21 in each bar 20, if a shell should fail to be so delivered within any opening upon any bar, this will not effect the operation of any of the mechanisms in the machine, nor will it result in the fouling of the machine, since the daubers 64 and wax applying heads 145 will simply enter these openings and will not deposit any adhesive or any wax on any part of the machine about the opening. In fact "skipping" in the delivery of shells, which is a frequent occurrence in all assembling machines, will result in a lower percentage loss from this cause in the herein described machine than in the ordinary single cap assembling machine, since such skipping as compared with the increased output of the machine will be lower than in the ordinary machines, not only on account of the manner of feeding the shells, but because of there being less likelihood of all of the feed chutes failing to function at the same time, than in the case of a single chute. In other words, if one of the chutes fails to function during one or two cycles of the machine, or even more frequently, this effects only one-eighth of the capacity output of the machine, and not the entire capacity output.

In a machine constructed as herein described, it is possible to impart continuous movement to the bars 20 in relation to the various mechanisms in the machine, at a fairly high speed, since all of the mechanisms are so constructed as to be capable of acting upon said bars while they are in motion. This continuous traverse permits a desired increase in the capacity output of the machine, as compared with an intermittent actuation of said bars and said mechanisms, and such intermittent actuating is both unnecessary and undesirable, and if employed, would have no beneficial results.

It is not my intention to limit the invention to the precise details of construction shown in the drawings, it being apparent that the various mechanisms may be modified and refined without departing from the spirit and scope of the invention. I believe it to be broadly new to provide a bottle cap assembling machine in which the shells are delivered to, and carried by a bar, and in which the shells upon each bar are simultaneously acted upon by units in different mechanisms operating upon the shells or other parts of the cap in each row at the same time as to each mechanism, and in which all of said units have exactly the same movement as all other units in each mechanism.

Having described the invention, what I claim as new and desire to have protected by Letters Patent, is:—

1. A bottle cap assembling machine embodying therein a sequence of adjacent, similar carrier members each adapted to receive and convey a group of metal shells, a shell feeding mechanism adapted to simultaneously deliver a group of shells to each of said carrier members, a mechanism adapted to thereafter apply adhesive to each shell upon each carrier member, a mechanism adapted to deposit a disk upon the adhesive within each shell, means adapted to force said disks within the respective shells, means subjecting the shells and the adhesive therein to an elevated temperature, a pressure mechanism operative upon the disks and the shells upon the several carrier members while the adhesive therein is heated, and an actuating mechanism whereby said carrier members are successively, and progressively, brought into the operative relation to said other mechanisms, and said mechanisms are actuated in synchronism with the movement of said members.

2. A bottle cap assembling machine embodying therein a sequence of adjacent, similar carrier members each adapted to receive and convey a group of metal shells, a shell feeding mechanism adapted to simultaneously deliver a group of shells to each of said carrier members, a mechanism adapted to thereafter apply adhesive to each shell upon each carrier member, a mechanism adapted to deposit a disk upon the adhesive within each shell, means adapted to force said disks within the respective shells, means subjecting the shells and the adhesive therein to an elevated temperature, a pressure mechanism operative upon the disks and the shells upon the several carrier members while the adhesive therein is heated, means intermediate said last named means and said pressure mechanism whereby the exposed surface of each disk has a wax composition deposited thereon, and an actuating mechanism whereby said carrier members are successively, and progressively, brought into the operative relation to said other mechanisms, and said mechanisms are actuated in synchronism with the movement of said members.

3. A bottle cap assembling machine embodying therein a sequence of adjacent,

similar carrier members each adapted to receive and convey a group of metal shells, a shell feeding mechanism adapted to simultaneously deliver a group of shells to each of said carrier members, means adapted to engage and readjust any displaced shells upon each of said members, a mechanism adapted to thereafter apply adhesive to each shell upon each carrier member, a mechanism adapted to deposit a disk upon the adhesive within each shell, means adapted to force said disks within the respective shells, means subjecting the shells and the adhesive therein to an elevated temperature, a pressure mechanism operative upon the disks and the shells upon the several carrier members while the adhesive therein is heated, and an actuating mechanism whereby said carrier members are successively, and progressively, brought into the operative relation to said other mechanisms, and said mechanisms are actuated in synchronism with the movement of said members.

4. A bottle cap assembling machine embodying therein a sequence of adjacent, similar carrier members each adapted to receive and convey a group of metal shells, a shell feeding mechanism adapted to simultaneously deliver a group of shells to each of said carrier members, a mechanism adapted to thereafter apply adhesive to each shell upon each carrier member, a mechanism adapted to deposit a disk upon the adhesive within each shell, means adapted to force said disks within the respective shells, means subjecting the shells and the adhesive therein to an elevated temperature, a pressure mechanism operative upon the disks and the shells upon the several carrier members while the adhesive therein is heated, means whereby said pressure mechanism is made inoperative with relation to the disks and shells upon each carrier member, a belt conveyor beyond said last named means, an ejecting mechanism adapted to remove the shells and disks from each member and to deliver them upon said belt conveyor, and an actuating mechanism whereby said carrier members are successively, and progressively, brought into the operative relation to said other mechanisms, and said mechanisms are actuated in synchronism with the movement of said members.

5. A bottle cap assembling machine embodying therein a plurality of sprocket chains, a sequence of similar bars carried closely adjacent each other by said chains and each having a plurality of openings therein adapted to receive metal shells, a shell feeding mechanism adapted to simultaneously deliver a shell to each opening in each bar, a mechanism adapted thereafter to apply adhesive to each shell upon each bar, a mechanism adapted to deposit a disk upon the adhesive within each shell, means adapted to force said disks within the respective shells, means subjecting the shells and the adhesive therein to an elevated temperature, a pressure mechanism operative upon the disks and shells upon the several bars while the adhesive therein is heated, and an actuating mechanism operative upon said chains and upon said mechanisms respectively, whereby said bars are successively, and progressively, brought into the operative relation to said other mechanisms, and said mechanisms are actuated in synchronism with the movement of said bars.

6. A bottle cap assembling machine embodying therein a sequence of adjacent, similar carrier members each adapted to receive and convey a group of metal shells, a hopper for metal shells, a plurality of chutes leading from adjacent said hopper to adjacent the path of movement of said members, means whereby shells are delivered one at a time from said hopper to each of said chutes, means adjacent the delivery end of each of said chutes whereby one shell at a time is permitted to escape from each chute and to pass upon one of said members, a mechanism adapted to thereafter apply adhesive to each shell upon each carrier member, a mechanism adapted to deposit a disk upon the adhesive within each shell, means adapted to force said disks within the respective shells, means subjecting the shells and the adhesive therein to an elevated temperature, a pressure mechanism operative upon the disks and the shells upon the several carrier members while the adhesive therein is heated, and an actuating mechanism whereby said carrier members are successively, and progressively, brought into the operative relation to said other mechanisms, and said mechanisms are actuated in synchronism with the movement of said members.

7. A bottle cap assembling machine embodying therein a sequence of adjacent, similar carrier members each adapted to receive and convey a group of metal shells, a hopper for metal shells, a plurality of chutes leading from adjacent said hopper to adjacent the path of movement of said members, means whereby shells are delivered one at a time from said hopper to each of said chutes, an escapement mechanism comprising two members adjacent the delivery end of each chute, said members being adapted to alternately engage the lowermost shell in a chute and the next succeeding shell, means operative upon said escapement mechanism whereby as each carrier member is in operative relation with said chute, the lowermost shell will be permitted to escape from each chute, and all other shells therein will be held against movement, and immediately thereafter said mechanism will be actuated to permit the advance of shells in said chutes, but prevent their escape therefrom, a

mechanism adapted to thereafter apply adhesive to each shell upon each carrier member, a mechanism adapted to deposit a disk upon the adhesive within each shell, means adapted to force said disks within the respective shells, means subjecting the shells and the adhesive therein to an elevated temperature, a pressure mechanism operative upon the disks and the shells upon the several carrier members while the adhesive therein is heated, and an actuating mechanism whereby said carrier members are successively, and progressively, brought into the operative relation to said other mechanisms, and said mechanisms are actuated in synchronism with the movement of said members.

8. A bottle cap assembling machine embodying therein a sequence of adjacent, similar carrier members each adapted to receive and convey a group of metal shells, a hopper for metal shells, a plurality of chutes leading from adjacent said hopper to adjacent the path of movement of said members, means whereby shells are delivered one at a time from said hopper to each of said chutes, bars extending above all of said chutes, a plurality of pairs of pins carried by said bars adjacent the discharge end of each chute and spaced apart to cause the depression of one of said pins to operatively engage the lowermost shell in a chute and the depression of the other of said pins to engage the shell next above it, levers carrying said bars, means whereby said levers are actuated as each carrier member approaches the discharge ends of said chutes, first to disengage a pin of each pair from the lowermost shell and engage the other pin with the next upper shell in a chute, and then to disengage said last named pin from said upper shell and bring said first named pin into engagement therewith as it approaches the discharge end of the chute, a mechanism adapted to thereafter apply adhesive to each shell upon each carrier member, a mechanism adapted to deposit a disk upon the adhesive within each shell, means adapted to force said disks within the respective shells, means subjecting the shells and the adhesive therein to an elevated temperature, a pressure mechanism operative upon the disks and the shells upon the several carrier members while the adhesive therein is heated, and an actuating mechanism whereby said carrier members are successively, and progressively, brought into the operative relation to said other mechanisms, and said mechanisms are actuated in synchronism with the movement of said members.

9. A bottle cap assembling machine embodying therein a sequence of adjacent, similar carrier members each adapted to receive and convey a group of metal shells, a shell feeding mechanism adapted to simultaneously deliver a group of shells to each of said carrier members, an adhesive applying mechanism comprising an adhesive fount, a plurality of units each comprising a sequence of radially extending resilient daubers, means co-operating with said fount and said daubers whereby adhesive is applied to said daubers, and a rotatable support for said units, a mechanism adapted to deposit a disk upon the adhesive within each shell, means adapted to force said disks within the respective shells, means subjecting the shells and the adhesive therein to an elevated temperature, a pressure mechanism operative upon the disks and the shells upon the several carrier members while the adhesive therein is heated, and an actuating mechanism whereby said carrier members are successively, and progressively, brought into the operative relation to said other mechanisms, and said mechanisms are actuated in synchronism with the movement of said members.

10. A bottle cap assembling machine embodying therein a sequence of adjacent, similar carrier members each adapted to receive and convey a group of metal shells, a shell feeding mechanism adapted to simultaneously deliver a group of shells to each of said carrier members, an adhesive applying mechanism comprising a fount for the adhesive, feeding rollers therein, a rotatable shaft and a sequence of dauber units carried thereby and rotatable therewith, each of said units consisting of a plurality of radially extending daubers each having a flexible head adapted to engage said distributing rollers and apply adhesive to each shell upon succeeding carrier members, a mechanism adapted to deposit a disk upon the adhesive within each shell, means adapted to force said disks within the respective shells, means subjecting the shells and the adhesive therein to an elevated temperature, a pressure mechanism operative upon the disks and the shells upon the several carrier members while the adhesive therein is heated, and an actuating mechanism whereby said carrier members are successively, and progressively, brought into the operative relation to said other mechanisms, and said mechanisms are actuated in synchronism with the movement of said members.

11. A bottle cap assembling machine embodying therein a sequence of adjacent, similar carrier members each adapted to receive and convey a group of metal shells, a shell feeding mechanism adapted to simultaneously deliver a group of shells to each of said carrier members, a mechanism adapted to thereafter apply adhesive to each shell upon each carrier member, a disk delivery mechanism consisting of a hopper for disks, a plurality of vertically extending chutes, means whereby disks delivered in bulk to said hopper are delivered one at a time to

said chutes respectively, and a plurality of units receiving disks from said chutes respectively and conveying them so that they may be delivered to metal shells upon said carrier members respectively, each unit consisting of a wheel having a sequence of sockets about its periphery and a thrust shoulder rearwardly of each socket, means retaining disks upon said wheels respectively, and means whereby disks are forced therefrom and simultaneously delivered to different shells upon each member, means adapted to force said disks within the respective shells, means subjecting the shells and the adhesive therein to an elevated temperature, a pressure mechanism operative upon the disks and the shells upon the several carrier members while the adhesive therein is heated, and an actuating mechanism whereby said carrier members are successively, and progressively, brought into the operative relation to said other mechanisms, and said mechanisms are actuated in synchronism with the movement of said members.

12. A bottle cap assembling machine embodying therein a sequence of adjacent, similar carrier members each adapted to receive and convey a group of metal shells, a shell feeding mechanism adapted to simultaneously deliver a group of shells to each of said carrier members, a mechanism adapted to thereafter apply adhesive to each shell upon each carrier member, and a disk delivery mechanism consisting of a hopper for disks, a plurality of vertically extending chutes, means whereby disks delivered in bulk to said hopper are delivered one at a time to said chutes respectively, and a plurality of units receiving disks from said chutes respectively and conveying them so that they may be delivered to metal shells upon said carrier members respectively, each unit consisting of a wheel having a sequence of sockets about its periphery and a thrust shoulder rearwardly of each socket, means retaining disks upon said wheels respectively, a plunger seated in, and slidably mounted in relation to, each socket, a spring acting thereon, and means whereby each of said plungers is actuated to eject a disk from its socket into a shell, means adapted to force said disks within the respective shells, means subjecting the shells and the adhesive therein to an elevated temperature, a pressure mechanism operative upon the disks and the shells upon the several carrier members while the adhesive therein is heated, and an actuating mechanism whereby said carrier members are successively, and progressively, brought into the operative relation to said other mechanisms, and said mechanisms are actuated in synchronism with the movement of said members.

13. A bottle cap assembling machine embodying therein a sequence of adjacent, similar carrier members each adapted to receive and convey a group of metal shells, a shell feeding mechanism adapted to simultaneously deliver a group of shells to each of said carrier members, a mechanism adapted to thereafter apply adhesive to each shell upon each carrier member, and a disk delivery mechanism consisting of a hopper for disks, a plurality of vertically extending chutes, means whereby disks delivered in bulk to said hopper are delivered one at a time to said chutes respectively, and a plurality of units receiving disks from said chutes respectively and conveying them so that they may be delivered to metal shells upon said carrier members respectively, each unit consisting of a wheel having a sequence of sockets about its periphery and a thrust shoulder rearwardly of each socket, means retaining disks upon said wheels respectively, a plunger seated in, and slidably mounted in relation to, each socket, a spring acting thereon, a rock shaft extending adjacent all of said units, a plurality of arms thereon positioned in engaging relation with said plungers respectively, and means whereby said rock shaft is actuated as each plunger upon each unit comes into the operative relation thereto, means adapted to force said disks within the respective shells, means subjecting the shells and the adhesive therein to an elevated temperature, a pressure mechanism operative upon the disks and the shells upon the several carrier members while the adhesive therein is heated, and an actuating mechanism whereby said carrier members are successively, and progressively, brought into the operative relation to said other mechanisms, and said mechanisms are actuated in synchronism with the movement of said members.

14. A bottle cap assembling machine embodying therein a sequence of adjacent, similar carrier members each adapted to receive and convey a group of metal shells, a shell feeding mechanism adapted to simultaneously deliver a group of shells to each of said carrier members, a mechanism adapted to thereafter apply adhesive to each shell upon each carrier member, a mechanism adapted to deposit a disk upon the adhesive within each shell, a movable frame, means imparting a four-way movement to said frame, a plurality of plungers carried by and movable with said frame and adapted to simultaneously force all the disks delivered by said last named mechanism to within the shells and in engaging relation with the adhesive therein, means subjecting the shells and the adhesive therein to an elevated temperature, a pressure mechanism operative upon the disks and the shells upon the several carrier members while the adhesive therein is heated, and an actuating mecha-

nism whereby said carrier members are successively, and progressively, brought into the operative relation to said other mechanisms, and said mechanisms are actuated in synchronism with the movement of said members.

15. A bottle cap assembling machine embodying therein a sequence of adjacent, similar carrier members each adapted to receive and convey a group of metal shells, a shell feeding mechanism adapted to simultaneously deliver a group of shells to each of said carrier members, a mechanism adapted to thereafter apply adhesive to each shell upon each carrier member, a mechanism adapted to deposit a disk upon the adhesive within each shell, a movable frame, means imparting a four-way movement to said frame, upper and lower parallel bars supported from said frame, a sequence of plungers slidably mounted in said bars respectively and adapted to force disks delivered by said last named mechanism to within said shells in engaging relation with the adhesive therein, springs normally acting to thrust said plungers respectively toward said carrier members, means limiting the operative effect of said springs upon said plungers whereby said plungers are yieldably engaged with said disks, means subjecting the shells and the adhesive therein to an elevated temperature, a pressure mechanism operative upon the disks and the shells upon the several carrier members while the adhesive therein is heated, and an actuating mechanism whereby said carrier members are successively, and progressively, brought into the operative relation to said other mechanisms, and said mechanisms are actuated in synchronism with the movement of said members.

16. A bottle cap assembling machine embodying therein a sequence of adjacent, similar carrier members each adapted to receive and convey a group of metal shells, a shell feeding mechanism adapted to simultaneously deliver a group of shells to each of said carrier members, a mechanism adapted to thereafter apply adhesive to each shell upon each carrier member, a mechanism adapted to deposit a disk upon the adhesive within each shell, a movable frame, means imparting a four-way movement to said frame, upper and lower parallel bars supported from said frame, a sequence of plungers slidably mounted in said bars respectively and adapted to force disks delivered by said last named mechanism to within said shells in engaging relation with the adhesive therein, rods carried by said frame upon which the lower of said guide bars is slidably mounted, a spring acting between said lower guide bar and said frame whereby said plungers are adapted to have movement with said carrier members independently of said frame, means subjecting the shells and the adhesive therein to an elevated temperature, a pressure mechanism operative upon the disks and the shells upon the several carrier members while the adhesive therein is heated, and an actuating mechanism whereby said carrier members are successively, and progressively, brought into the operative relation to said other mechanisms, and said mechanisms are actuated in synchronism with the movement of said members.

17. A bottle cap assembling machine embodying therein a sequence of adjacent, similar carrier members each adapted to receive and convey a group of metal shells, a shell feeding mechanism adapted to simultaneously deliver a group of shells to each of said carrier members, a mechanism adapted to thereafter apply adhesive to each shell upon each carrier member, a mechanism adapted to deposit a disk upon the adhesive within each shell, a movable frame, means imparting a four-way movement to said frame, upper and lower parallel bars supported from said frame, a sequence of plungers slidably mounted in said bars respectively and adapted to force disks delivered by said last named mechanism to within said shells in engaging relation with the adhesive therein, springs normally acting to thrust said plungers respectively toward said carrier members, means limiting the operative effect of said springs upon said plungers whereby said plungers are yieldably engaged with said disks, rods carried by said frame upon which the lower of said guide bars is slidably mounted, a spring acting between said lower guide bar and said frame whereby said plungers are adapted to have movement with said carrier members independently of said frame, means subjecting the shells and the adhesive therein to an elevated temperature, a pressure mechanism operative upon the disks and the shells upon the several carrier members while the adhesive therein is heated, and an actuating mechanism whereby said carrier members are successively, and progressively, brought into the operative relation to said other mechanisms, and said mechanisms are actuated in synchronism with the movement of said members.

18. A bottle cap assembling machine embodying therein a sequence of adjacent, similar carrier members each adapted to receive and convey a group of metal shells, a shell feeding mechanism adapted to simultaneously deliver a group of shells to each of said carrier members, a mechanism adapted to thereafter apply adhesive to each shell upon each carrier member, a mechanism adapted to deposit a disk upon the adhesive within each shell, means adapted to force said disks within the respective shells, means subjecting the shells and the adhesive therein to an

elevated temperature, a pressure mechanism operative upon the disks and the shells upon the several carrier members while the adhesive therein is heated, a wax fount intermediate said last named means and said pressure mechanism, means for heating the contents of said fount, feed rollers therein, a plurality of rotary units co-operating with said feed rollers and adapted to deposit wax composition upon the surface of each disk carried by each carrier member, and an actuating mechanism whereby said carrier members are successively, and progressively, bought into the operative relation to said other mechanisms, and said mechanisms are actuated in synchronism with the movement of said members.

19. A bottle cap assembling machine embodying therein a sequence of adjacent, similar carrier members each adapted to receive and convey a group of metal shells, a shell feeding mechanism adapted to simultaneously deliver a group of shells to each of said carrier members, a mechanism adapted to thereafter apply adhesive to each shell upon each carrier member, a mechanism adapted to deposit a disk upon the adhesive within each shell, means adapted to force said disks within the respective shells, means subjecting the shells and the adhesive therein to an elevated temperature, a pressure mechanism operative upon the disks and the shells upon the several carrier members while the adhesive therein is heated, a wax fount intermediate said last named means and said pressure mechanism, means for heating the contents of said fount, feed rollers in said fount, a rotatable shaft, a plurality of units carried by said shaft co-operating with said feed rollers, and adapted to deposit wax upon the exposed surface of disks in shells upon each carrier member, each of said units consisting of a plurality of radially extending metallic daubers, means for heating all of said units, means rotating said shaft in synchronism with the movement of said carrier members, whereby succeeding daubers of said units will be operative upon disks upon succeeding carrier members, and an actuating mechanism whereby said carrier members are successively, and progressively, brought into the operative relation to said other mechanisms, and said mechanisms are actuated in synchronism with the movement of said members.

20. A bottle cap assembling machine embodying therein a plurality of sprocket chains, a sequence of similar bars carried closely adjacent each other by said chains and each having a plurality of openings therein adapted to receive metal shells, a shell feeding mechanism adapted to simultaneously deliver a shell to each opening in each bar, a mechanism adapted thereafter to apply adhesive to each shell upon each bar, a mechanism adapted to deposit a disk upon the adhesive within each shell, means adapted to force said disks within the respective shells, means subjecting the shells and the adhesive therein to an elevated temperature, a pressure mechanism consisting of a plurality of sprocket chains, the lower reaches of which are parallel with the upper reaches of said first named sprocket chains and adjacent thereto, a sequence of similar bars carried by said last named sprocket chains spaced in relation to each other a distance coinciding with the spacing of said first named bars upon said first named sprocket chains, a plurality of spring pressed plungers carried by each of said bars and adapted to co-operate with the shells and the disks therein upon each of said first named bars, and an actuating mechanism operative upon said chains and upon said mechanisms respectively, whereby said bars are successively, and progressively, brought into the operative relation to said other mechanisms, and said mechanisms are actuated in synchronism with the movement of said bars.

21. A bottle cap assembling machine embodying therein a plurality of sprocket chains, a sequence of similar bars carried closely adjacent each other by said chains and each having a plurality of openings therein adapted to receive metal shells, a shell feeding mechanism adapted to simultaneously deliver a shell to each opening in each bar, a mechanism adapted thereafter to apply adhesive to each shell upon each bar, a mechanism adapted to deposit a disk upon the adhesive within each shell, means adapted to force said disks within the respective shells, means subjecting the shells and the adhesive therein to an elevated temperature, a pressure mechanism consisting of a plurality of sprocket chains, the lower reaches of which are parallel with the upper reaches of said first named sprocket chains and adjacent thereto, a sequence of similar bars carried by said last named sprocket chains spaced in relation to each other a distance coinciding with the spacing of said first named bars upon said first named sprocket chains, a plurality of spring pressed plungers carried by each of said bars and adapted to co-operate with the shells and the disks therein upon each of said first named bars, a heating system adjacent the bars carrying said plungers whereby the shells and disks while subjected to pressure from plungers, will also be subjected to heat, and an actuating mechanism operative upon said chains and upon said mechanisms respectively, whereby said bars are successively, and progressively, brought into the operative relation to said other mechanisms, and said mechanisms are actuated in synchronism with the movement of said bars.

22. A bottle cap assembling machine em-

bodying therein a plurality of sprocket chains, a sequence of similar bars carried closely adjacent each other by said chains and each having a plurality of openings therethrough, whereby each bar is adapted to receive and convey a group of metal shells, a shell feeding mechanism adapted to simultaneously deliver a group of shells to each of said carrier members, a mechanism adapted to thereafter apply adhesive to each shell upon each carrier member, a mechanism adapted to deposit a disk upon the adhesive within each shell, means adapted to force said disks within the respective shells, means subjecting the shells and the adhesive therein to an elevated temperature, a pressure mechanism operative upon the disks and the shells upon the several carrier members while the adhesive therein is heated, means whereby said pressure mechanism is made inoperative with relation to the disks and shells upon each carrier member, a belt conveyor beyond said last named means, a plurality of fingers arranged respectively in alinement with an opening in each of said bars, an actuating mechanism whereby all of said fingers are simultaneously thrust outwardly through all of the openings in each bar to remove assembled caps therefrom and deliver them upon said belt conveyor, and an actuating mechanism operative upon said chains and upon said mechanisms respectively, whereby said bars are successively, and progressively, brought into the operative relation to said other mechanisms, and said mechanisms are actuated in synchronism with the movement of said bars.

23. A bottle cap assembling machine embodying therein a plurality of sprocket chains, a sequence of similar bars carried closely adjacent each other by said chains and each having a plurality of openings therethrough, whereby each bar is adapted to receive and convey a group of metal shells, a shell feeding mechanism adapted to simultaneously deliver a group of shells to each of said carrier members, a mechanism adapted to thereafter apply adhesive to each shell upon each carrier member, a mechanism adapted to deposit a disk upon the adhesive within each shell, means adapted to force said disks within the respective shells, means subjecting the shells and the adhesive therein to an elevated temperature, a pressure mechanism operative upon the disks and the shells upon the several carrier members while the adhesive therein is heated, means whereby said pressure mechanism is made inoperative with relation to the disks and shells upon each carrier member, a belt conveyor beyond said last named means, a rock shaft, an actuating mechanism therefor, a plurality of cranks upon said shaft, a finger pivotally connected with each crank, said fingers being adapted respectively to pass outwardly through an opening in each bar and remove an assembled cap therefrom to upon said belt conveyor, and an actuating mechanism operative upon said chains and upon said mechanisms respectively, whereby said bars are successively, and progressively, brought into the operative relation to said other mechanisms, and said mechanisms are actuated in synchronism with the movement of said bars.

24. A bottle cap assembling machine embodying therein a plurality of sprocket chains, a sequence of similar bars carried closely adjacent each other by said chains and each having a plurality of openings therethrough, whereby each bar is adapted to receive and convey a group of metal shells, a shell feeding mechanism adapted to simultaneously deliver a group of shells to each of said carrier members, a mechanism adapted to thereafter apply adhesive to each shell upon each carrier member, a mechanism adapted to deposit a disk upon the adhesive within each shell, means adapted to force said disks within the respective shells, means subjecting the shells and the adhesive therein to an elevated temperature, a pressure mechanism operative upon the disks and the shells upon the several carrier members while the adhesive therein is heated, means whereby said pressure mechanism is made inoperative with relation to the disks and shells upon each carrier member, a belt conveyor beyond said last named means, a rock shaft, an actuating mechanism therefor, a plurality of cranks upon said shaft, a finger pivotally connected with each crank, said fingers being adapted respectively to pass outwardly through an opening in each bar and remove an assembled cap therefrom to upon said belt conveyor, a cam carried by each of said fingers, means with which said cams respectively co-operate whereby they receive a simultaneous reciprocatory and oscillatory movement, and an actuating mechanism operative upon said chains and upon said mechanisms respectively, whereby said bars are successively, and progressively, brought into the operative relation to said other mechanisms, and said mechanisms are actuated in synchronism with the movement of said bars.

25. A bottle cap assembling machine embodying therein a plurality of sprocket chains, a sequence of similar bars carried closely adjacent each other by said chains and each having a plurality of openings therethrough, whereby each bar is adapted to receive and convey a group of metal shells, a shell feeding mechanism adapted to simultaneously deliver a group of shells to each of said carrier members, a mechanism

adapted to thereafter apply adhesive to each shell upon each carrier member, a mechanism adapted to deposit a disk upon the adhesive within each shell, means adapted to force said disks within the respective shells, means subjecting the shells and the adhesive therein to an elevated temperature, a pressure mechanism operative upon the disks and the shells upon the several carrier members while the adhesive therein is heated, means whereby said pressure mechanism is made inoperative with relation to the disks and shells upon each carrier member, a belt conveyor beyond said last named means, a plurality of fingers arranged respectively in alinement with an opening in each of said bars, an actuating mechanism whereby all of said fingers are simultaneously thrust outwardly through all of the openings in each bar to remove assembled caps therefrom and deliver them upon said belt conveyor, a slide-way adapted to receive assembled caps ejected from said bars and terminating adjacent said belt conveyor, a shift mechanism comprising a sequence of vertically extending guide plates pivotally supported above said slide-way, means whereby pivotal movement laterally of the machine is imparted to said plates as each bar approaches said ejector mechanism, and an actuating mechanism operative upon said chains and upon said mechanisms respectively, whereby said bars are successively, and progressively, brought into the operative relation to said other mechanisms, and said mechanisms are actuated in synchronism with the movement of said bars.

26. A bottle cap assembling machine embodying therein a plurality of sprocket chains, a sequence of similar bars carried closely adjacent each other by said chains and each having a plurality of openings therethrough, whereby each bar is adapted to receive and convey a group of metal shells, a shell feeding mechanism adapted to simultaneously deliver a group of shells to each of said carrier members, a mechanism adapted to thereafter apply adhesive to each shell upon each carrier member, a mechanism adapted to deposit a disk upon the adhesive within each shell, means adapted to force said disks within the respective shells, means subjecting the shells and the adhesive therein to an elevated temperature, a pressure mechanism operative upon the disks and the shells upon the several carrier members while the adhesive therein is heated, means whereby said pressure mechanism is made inoperative with relation to the disks and shells upon each carrier member, a belt conveyor beyond said last named means, a plurality of fingers arranged respectively in alinement with an opening in each of said bars, an actuating mechanism whereby all of said fingers are simultaneously thrust outwardly through all of the openings in each bar to remove assembled caps therefrom and deliver them upon said belt conveyor, a slideway adapted to receive assembled caps ejected from said bars and terminating adjacent said belt conveyor, a shift mechanism comprising a sequence of vertically extending guide plates pivotally supported above said slideway, a shift bar pivotally connected with each of said plates, a rocking lever pivotally connected with said shift bar, a cam operative upon said lever, whereby pivotal movement laterally of the machine is imparted to said plates as each bar approaches said ejector mechanism, and an actuating mechanism operative upon said chains and upon said mechanisms respectively, whereby said bars are successively, and progressively, brought into the operative relation to said other mechanisms, and said mechanisms are actuated in synchronism with the movement of said bars.

27. A bottle cap assembling machine embodying therein a plurality of sprocket chains, a sequence of similar bars carried closely adjacent each other by said chains and each having a plurality of openings therein adapted to receive metal shells, a shell feeding mechanism adapted to simultaneously deliver a shell to each opening in each bar, an adhesive applying mechanism comprising an adhesive fount, a plurality of connected units, each comprising a sequence of radially extending resilient daubers, means co-operating with said fount and said daubers whereby adhesive is applied to said daubers, and means for rotating said daubers at a peripheral speed coinciding with the lineal speed of said chains, means adapted to deposit and force disks within and upon the adhesive in the respective shells upon each bar, means subjecting the shells and the adhesive therein to an elevated temperature, a pressure mechanism operative upon the disks and the shells upon the several bars while the adhesive is heated, and an actuating mechanism operative upon said chains whereby said bars are successively, and progressively, brought into the operative relation to said other mechanisms, said means for delivering and forcing the disks within the shells and said pressure mechanism respectively.

28. A bottle cap assembling machine embodying therein a plurality of sprocket chains, a sequence of similar bars carried closely adjacent each other by said chains and each having a plurality of openings therein adapted to receive metal shells, a shell feeding mechanism adapted to simultaneously deliver a shell to each opening in each bar, an adhesive applying mechanism comprising an adhesive fount, a plurality of connected units, each comprising a sequence of radially extending resilient daubers,

means co-operating with said fount and said daubers whereby adhesive is applied to said daubers, and means for rotating said daubers at a peripheral speed coinciding with the lineal speed of said chains, a disk delivery mechanism consisting of a hopper for disks, a plurality of vertically extending chutes, means whereby disks delivered in bulk to said hopper are delivered one at a time to said chutes respectively, and a plurality of units receiving disks from said chutes respectively and conveying them so that they may be delivered to metal shells upon said carrier members respectively, each unit consisting of a wheel having a sequence of sockets about its periphery and a thrust shoulder rearwardly of each socket, means retaining disks upon said wheels respectively, and means whereby disks are forced therefrom and simultaneously delivered to different shells upon each bar, means subjecting the shells and the adhesive therein to an elevated temperature, a pressure mechanism operative upon the disks and the shells upon the several bars while the adhesive is heated, and an actuating mechanism operative upon said chains whereby said bars are successively, and progressively, brought into the operative relation to said other mechanisms, said means for delivering and forcing the disks within the shells and said pressure mechanism respectively.

29. A bottle cap assembling machine embodying therein a plurality of sprocket chains, a sequence of similar bars carried closely adjacent each other by said chains and each having a plurality of openings therein adapted to receive metal shells, a shell feeding mechanism adapted to simultaneously deliver a shell to each opening in each bar, an adhesive applying mechanism comprising an adhesive fount, a plurality of connected units, each comprising a sequence of radially extending resilient daubers, means co-operating with said fount and said daubers whereby adhesive is applied to said daubers, and means for rotating said daubers at a peripheral speed coinciding with the lineal speed of said chains, means adapted to deposit and force disks within and upon the adhesive in the respective shells upon each bar, means subjecting the shells and the adhesive therein to an elevated temperature, a pressure mechanism operative upon the disks and the shells upon the several bars while the adhesive is heated, a wax fount intermediate said last named means and said pressure mechanism, means for heating the contents of said fount, feed rollers therein, a plurality of rotary units co-operating with said feed rollers and adapted to deposit wax composition upon the surface of each disk carried by each bar, means for rotating said rotary units at a peripheral speed coinciding with the lineal speed of said bars, and an actuating mechanism operative upon said chains whereby said bars are successively, and progressively, brought into the operative relation to said other mechanisms, said means for delivering and forcing the disks within the shells and said pressure mechanism respectively.

30. A bottle cap assembling machine embodying therein a plurality of sprocket chains, a sequence of similar bars carried closely adjacent each other by said chains and each having a plurality of openings therein adapted to receive metal shells, a shell feeding mechanism adapted to simultaneously deliver a shell to each opening in each bar, an adhesive applying mechanism comprising an adhesive fount, a plurality of connected units, each comprising a sequence of radially extending resilient daubers, means co-operating with said fount and said daubers whereby adhesive is applied to said daubers, and means for rotating said daubers at a peripheral speed coinciding with the lineal speed of said chains, means adapted to deposit and force disks within and upon the adhesive in the respective shells upon each bar, means subjecting the shells and the adhesive therein to an elevated temperature, a pressure mechanism operative upon the disks and the shells upon the several bars while the adhesive is heated, a wax fount intermediate said last named means and said pressure mechanism, means for heating the contents of said fount, feed rollers therein, a plurality of rotary units co-operating with said feed rollers and adapted to deposit wax composition upon the surface of each disk carried by each bar, each of said units consisting of a plurality of radially extending metallic daubers, means for heating all of said units, means for rotating said rotary units at a peripheral speed coinciding with the lineal speed of said bars, and an actuating mechanism operative upon said chains whereby said bars are successively, and progressively, brought into the operative relation to said other mechanisms, said means for delivering and forcing the disks within the shells and said pressure mechanism respectively.

31. A bottle cap assembling machine embodying therein a plurality of sprocket chains, a sequence of similar bars carried closely adjacent each other by said chains and each having a plurality of openings therein adapted to receive metal shells, a shell feeding mechanism adapted to simultaneously deliver a shell to each opening in each bar, a mechanism adapted to thereafter apply adhesive to each shell upon each bar, a mechanism adapted to deposit a disk upon the adhesive within each shell, a movable frame, means imparting a four-way movement to said frame, a plurality of plungers

carried by and movable with said frame and adapted to simultaneously force all the disks delivered by said last named mechanism to within the shells and in engaging relation with the adhesive therein, connections between said plungers and said frame whereby said plungers are permitted to have movement with any bar independently of said frame, means subjecting the shells and the adhesive therein to an elevated temperature, a pressure mechanism operative upon the disks and the shells upon the several bars while the adhesive therein is heated, and an actuating mechanism whereby said bars are successively, and progressively, brought into the operative relation to said other mechanisms, and said mechanisms are actuated in synchronism with the movement of said bars.

32. A bottle cap assembling machine embodying therein a plurality of sprocket chains, a sequence of similar bars carried closely adjacent each other by said chains and each having a plurality of openings therein adapted to receive metal shells, a shell feeding mechanism adapted to simultaneously deliver a shell to each opening in each bar, an adhesive applying mechanism comprising an adhesive fount, a plurality of connected units, each comprising a sequence of radially extending resilient daubers, means co-operating with said fount and said daubers whereby adhesive is applied to said daubers, and means for rotating said daubers at a peripheral speed coinciding with the lineal speed of said chains, a disk delivery mechanism consisting of a hopper for disks, a plurality of vertically extending chutes, means whereby disks delivered in bulk to said hopper are delivered one at a time to said chutes respectively, a plurality of units receiving disks from said chutes respectively and conveying and depositing said disks in metal shells upon each bar, means subjecting the shells and the adhesive therein to an elevated temperature, a pressure mechanism operative upon the disks and the shells upon the several bars while the adhesive is heated, and an actuating mechanism operative upon said chains whereby said bars are successively, and progressively, brought into the operative relation to said other mechanisms, said means for delivering and forcing the disks within the shells and said pressure mechanism respectively.

33. A bottle cap assembling machine embodying therein a plurality of sprocket chains, a sequence of similar bars carried closely adjacent each other by said chains and each having a plurality of openings therein adapted to receive metal shells, a shell feeding mechanism adapted to simultaneously deliver a shell to each opening in each bar, including therein a hopper for metal shells, a plurality of chutes leading from adjacent said hopper to adjacent the path of movement of said bars, means whereby shells are delivered one at a time from said hopper to each of said chutes, and means adjacent the delivery end of each of said chutes, whereby one shell at a time is permitted to escape from each chute and to pass to the openings in a bar, and movement of the remaining shells in each chute is prevented, an adhesive applying mechanism comprising an adhesive fount, a plurality of connected units, each comprising a sequence of radially extending resilient daubers, means co-operating with said fount and said daubers whereby adhesive is applied to said daubers, and means for rotating said daubers at a peripheral speed coinciding with the lineal speed of said chains, means adapted to deposit and force disks within and upon the adhesive in the respective shells upon each bar, means subjecting the shells and the adhesive therein to an elevated temperature, a pressure mechanism operative upon the disks and the shells upon the several bars while the adhesive is heated, and an actuating mechanism operative upon said chains whereby said bars are are successively, and progressively, brought into the operative relation to said other mechanisms, said means for delivering and forcing the disks within the shells and said pressure mechanism respectively.

In witness whereof I have hereunto affixed my signature, this 10th day of March 1924.

CHARLES E. McMANUS.