Dec. 8, 1931. A. J. DAVIS 1,835,207

BOTTLE CAPPER

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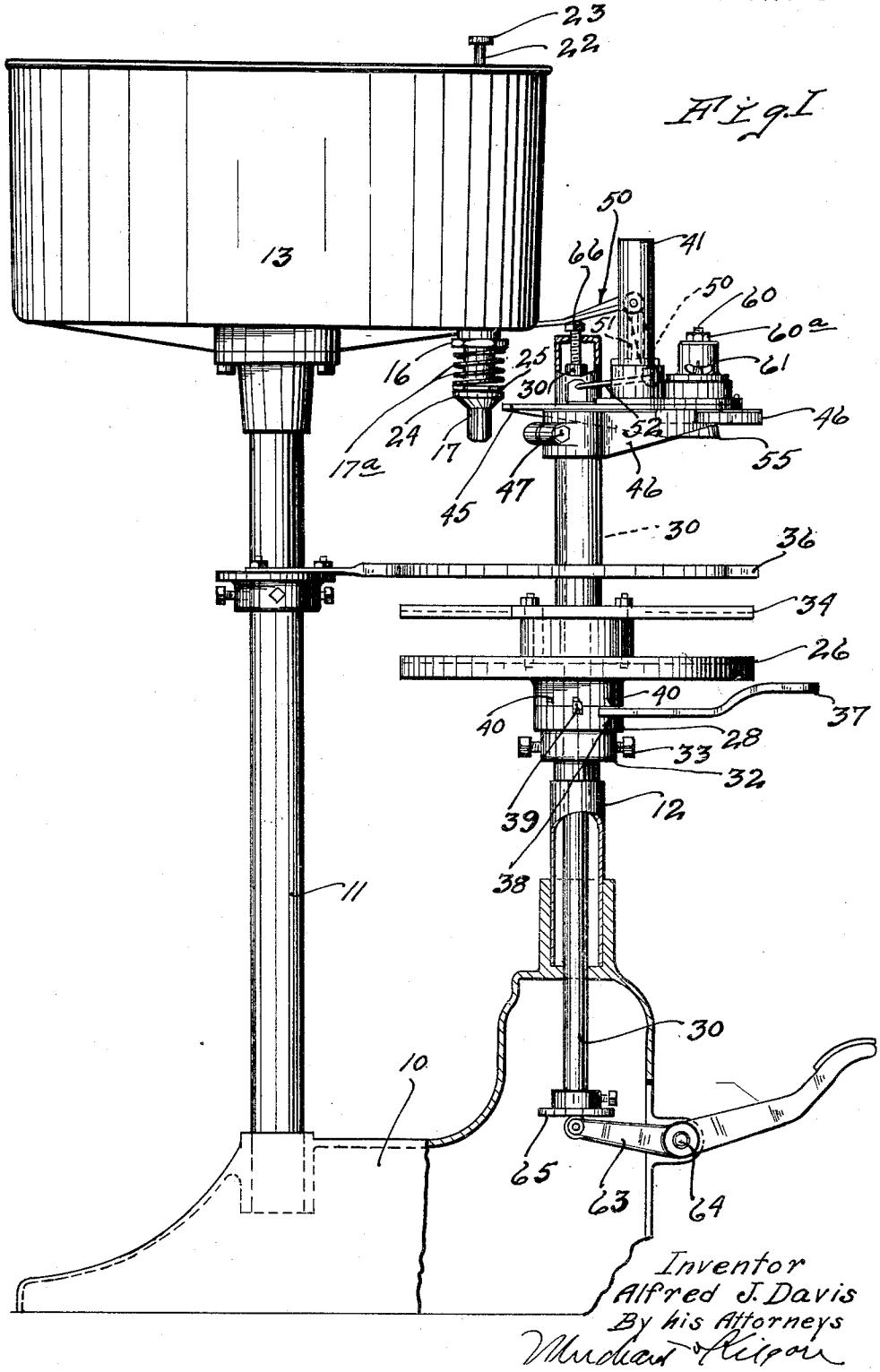


Fig. 1

Inventor
Alfred J. Davis
By his Attorneys
Murdock & Kilpatrick

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Fig. 3

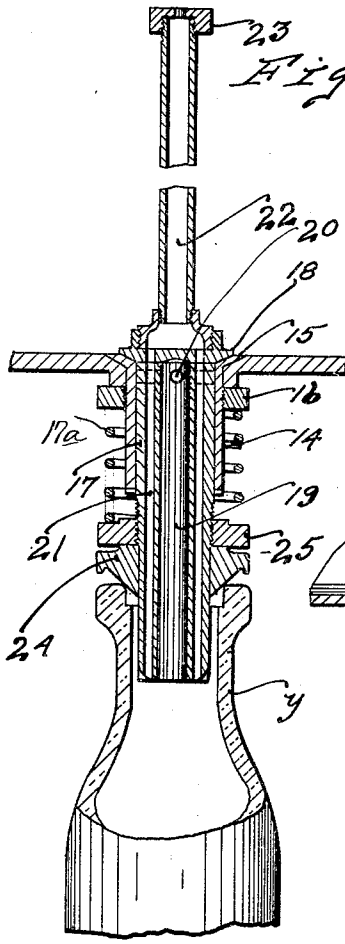


Fig. 4

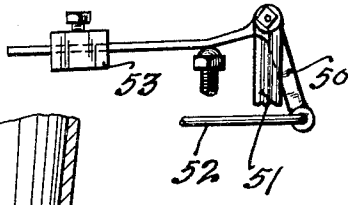


Fig. 2

Fig. 10

Inventor
Alfred J. Davis
By his Attorneys
Merchant & Gilpin

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Fig. 7

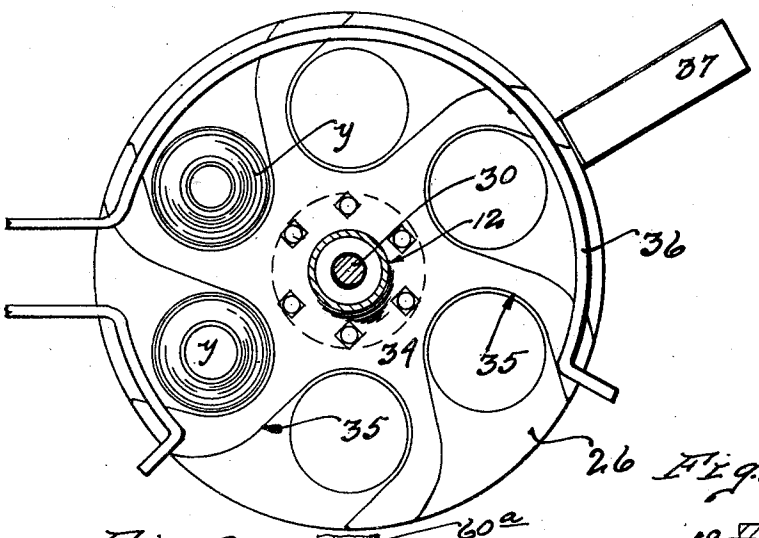


Fig. 8

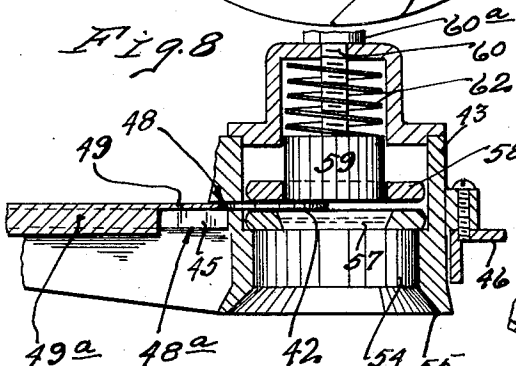
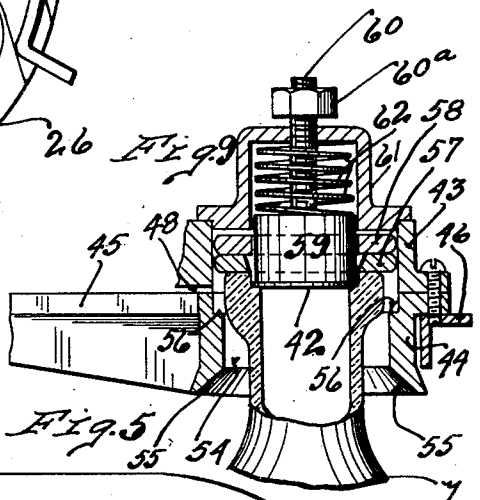


Fig. 9



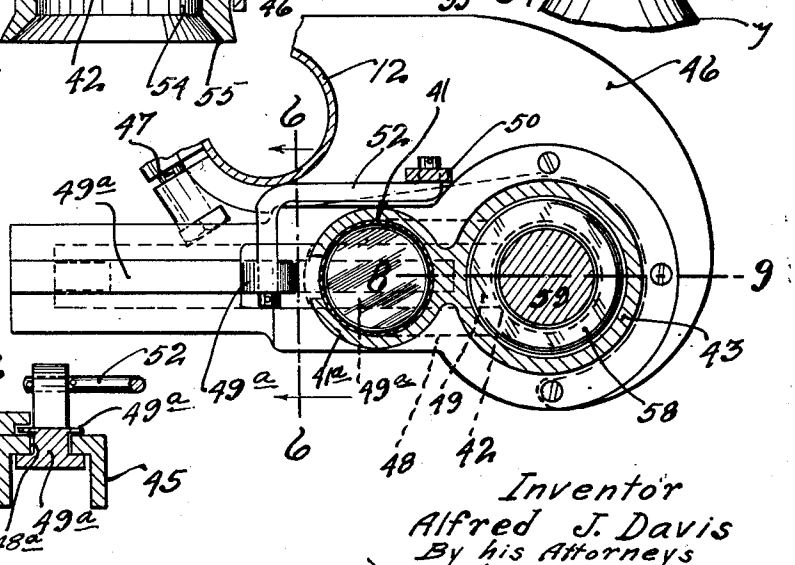


Fig. 6

Inventor
Alfred J. Davis
By his Attorneys
Whittemore & Hulbert

Patented Dec. 8, 1931 1,835,207

UNITED STATES PATENT OFFICE

ALFRED J. DAVIS, OF MINNEAPOLIS, MINNESOTA, ASSIGNOR OF ONE-FOURTH TO ANTON MAANUM, OF MINNEAPOLIS, MINNESOTA, AND ONE-FOURTH TO T. A. MAANUM, OF BRAHAM, MINNESOTA

BOTTLE CAPPER

Application filed May 24, 1929. Serial No. 365,671.

This invention relates particularly to combined bottle fillers and cappers and the invention is directed chiefly to the improvement of the bottle-capping mechanism, but includes also a novel form of bottle-filling nozzle. Devices of this character are generally used in filling milk bottles but are also used for other similar purposes. For the purpose of this case, the device will be described in its use for filling and capping milk bottles. Milk bottles, including, of course, cream-containing bottles, are almost universally capped with paper discs.

A commercial form of the improved device is illustrated in the accompanying drawings wherein like characters indicate like parts throughout the several views.

Referring to the drawings:

Fig. 1 is a view chiefly in left side elevation illustrating the invention but with some parts in vertical section;

Fig. 2 is a fragmentary view on a larger scale than in Fig. 1 showing certain of the parts in full side elevation as in Fig. 1, but with some parts in vertical section and some parts broken away;

Fig. 3 is a fragmentary vertical section taken on the line 3—3 of Fig. 2;

Fig. 4 is a fragmentary detail in left side elevation showing the counter-weighted arm for operating the cap-ejecting mechanism;

Fig. 5 is a horizontal section taken on the line 5—5 of Fig. 2;

Fig. 6 is a section on the line 6—6 of Fig. 5;

Fig. 7 is a horizontal section taken on the line 7—7 of Fig. 2;

Figs. 8 and 9 are fragmentary vertical sections taken on the line 8—9 of Fig. 5, but illustrating different positions of the parts; and

Fig. 10 is a section taken on the line 10—10 of Fig. 2.

The various parts of the device are, as shown, supported from a common hollow cast base 10 that rigidly supports two upright columns 11 and 12, both of which are preferably in the form of tubular pipes seated at their lower ends in said base. To the upper end of column 11 a milk-containing tank 13 is rigidly secured. This tank 13 at its bottom and at a point near its marginal portion is provided with a depending valve-seating sleeve 14 that is secured thereto with a liquid-tight joint, being, as shown, provided with a flaring upper end forming a valve seat 15 and below the bottom of the tank with a clamping nut 16. Working vertically through the sleeve 14 is a tubular bottle-filling valve 17, the upper end of which is formed with a valve head 18 that is normally seated with a liquid-tight joint against the flaring valve seat 15 by a coiled spring 17a.

Filling valve 17 is provided with an axial passage 19 that is closed at the top of the valve, but is provided with lateral ports 20 that open through the sides of the valve just below the valve head 18. Eccentric to the axial passage 19 valve 17 is provided with one or more small longitudinal air ducts 21 that lead to an air venting tube 22 that is secured to the top of the valve 17 and extends to a point that is always above the liquid level within the tank 13. As shown, the tube 22 is provided at its top with a cap 23 that has a small air vent.

The lower end of the valve 17 is adapted to be inserted into the neck of a milk bottle *y* and it is provided with the customary conical seating ring 24 preferably of rubber that will form a flat tight joint with the neck of the bottle under quite light pressure. The seating ring 24, as shown, is made adjustable by a follower nut 25 threaded on the exterior of the valve 17.

The milk bottles *y* are adapted to be supported in circumferential spaced arrangement on a disc-like table 26, the central hub 27 of which is rotatably mounted on the tubular column 12 and rests on a collar 28 which, by a diametrical pin 29, is carried by a plung-

er-acting shaft 30 that works axially through the tubular column 12. Normally, the pin 29 works through vertical slots 31 in opposite sides of the column 12 and the table-supporting ring 28 normally rests on a stop collar 32 which, by set screws 33, or otherwise is rigidly but adjustably secured to the column 12.

The bottles *y* are properly spaced on the table 26 by a spacing disc or plate 34 secured to the top of the hub 27 of table 26 and provided with bottle-receiving openings or large notches 35 of which there may be any number, but as shown are six in number.

The numeral 36 indicates segmental keeper straps shown as secured to the column 11 and overlying the spacing disc 34 surrounding the line of travel of the bottles and spaced at their outer ends to afford the desired entrance and removal passage. For imparting the proper step by step movements to the table 26 so as to position the bottles *y* successively under the filling valve 17 and under the capping device presently to be described, any suitable means may be provided, but as shown, I provided a lever 37 pivoted on the column 12, working through a notch 38 in the hub 28 and provided with a spring-pressed ratchet dog 39 that is engageable with ratchet notches 40 spaced in the bottom of the hub 27 to correspond to the spacing of the bottles. Also the notch 38 is of such circumferential extent that a maximum oscillation of the lever 37 permitted thereby will move the table 26 a step of movement representing the angular space between bottles.

Capping mechanism

The capping mechanism proper is mounted on the upper end of the column 12 normally above the position occupied by the upper end of the bottles contained on the table 26. This capping mechanism comprises a tubular magazine 41 that is open at its upper end to receive a stack of disc-like paper bottle-closing caps 42. At its lower end, the magazine 41 is rigidly seated in a tubular socket 41ª formed integral with the upper section 43 of a tubular capping head, the lower section 44 of which is formed integral with a guide bracket 45. Guide bracket 45 is rigidly supported by a heavy arm 46 which, at one end, surrounds and is rigidly but adjustably clamped to the column 12. As shown, the connection between the arm 46 and column 12 is made adjustable by splitting the end of said arm and providing the same with a clamping bolt 47.

A very shallow passageway 48, which is just deep enough to permit one cap 42 at a time to be removed from the bottom of the stack into the tubular capping head 43—44, leads from the bottom of the magazine 41 into the tubular capping head 43—44; and for forcing the cap from the bottom of the stack from the magazine into said capping head, a thin ejecting blade 49 which is preferably slightly thinner than the cap, is mounted for sliding movements in said shallow passageway 48 and in a deeper extension 48ª of the latter, see particularly Figs. 5 and 8. The blade 49, at its outer end, is formed integral with or otherwise secured to a crosshead 49ª. The crosshead 49ª works in the slot 48ª and is guided for straight-line movement by the guide bracket 45 in which said slot 48ª is formed.

Means for automatically imparting cap-ejecting movements to the blade 49 and crosshead 49ª is provided and, as shown, this means comprises a bell-crank 50 pivoted to a small upright standard 51 that rises from the socket 41ª. The lower end of the depending arm of the bell-crank 50 is connected by a link 52 to a lug on the top of the crosshead 49ª. The approximately horizontal arm of the bell-crank 50 is provided with an adjustable weight 53 which, as will hereinafter be noted, is of sufficient weight to cause blade 49 to move a cap 42 from the bottom of the stack into the tubular capping head 44.

The lower section 44 of the capping head is provided with a cylindrical bottle-aligning passage 54 that has a flaring bottom 55 and leads to an annular ring-supporting ledge 56 above which ledge the capping head has a bore of increased diameter to receive a pair of superimposed cap-aligning rings 57 and 58. When the rings are in normal position, the lower ring rests on the ledge 56 and the rings are then in position to receive a cap delivered between the same from the guide channel 48 under the action of ejecting plunger 49. The opening in the lower ring 57 is downwardly tapered and is of such diameter that it will receive and align a cap 42 and will hold the cap in position until force is applied thereto. For forcing the positioned cap from the lower ring and into the bottle neck, there is provided a relatively fixed pressing plunger 59 which, as shown, is secured to the lower end of a threaded stem 60 that extends through the top of a cap-like cover plate 61 and is provided at its upper end with an adjusting nut 60ª, see particularly Figs. 8 and 9. A heavy coiled spring 62 is compressed between the top of the cover plate 61 and the top of the plunger 59. The plunger 59 is of such diameter that it will pass through the openings in the two rings 57 and 58. The rings 57 and 58 are rounded at their outer edges so that the paper caps will be readily forced between the same and so that said rings will not catch in the cylindrical bore of the capping head.

For raising the plunger-acting shaft 30 and for lifting the table 26 with the bottles contained thereon, any suitable means may be provided but for that purpose, there is shown a foot-operated lever 63 working through an opening in the base 10 and pivoted thereto at

64. The inner end of this lever works against a flat head 65 applied to the extreme lower end of the shaft 30. Plunger-acting shaft 30 at its extreme upper end is provided with an adjustable tappet in the form of a screw 66 which, under upward movement, is engageable with weighted arm of bell-crank 50.

Summary of operation

Normally, the table 26 will, of course, be in its lowermost position and one bottle will stand under and in axial alignment with the tubular filling valve 17 and the other will stand under and in axial alignment with the aligning channel 54 of the capping head. When the operator steps on the treadle end of the lever 63, the table 26 with the bottles thereon will be raised and two operations will take place, to wit: the bottle aligned with the filling valve will be filled and the bottle aligned with the capping head will have a cap applied thereto. As to the filling operation, when the neck of the raised bottle engages and forms a tight joint with the pliable sealing ring 24, valve 17 will be raised and milk will flow from the tank first through the lateral ports 20 and then through the axial passage 19 and will be delivered downward into the bottle on the line of the axis thereof while the air displaced from the bottle will find free escape through the air ducts 21 and pipe 22.

In practice it has been found that this manner of filling bottles delivers the milk directly to the bottom of the bottle rather than against the sides thereof and eliminates the production of foam in the filling of the bottles by preventing commingling of the incoming milk with the outflowing air. Also the manner of delivery causes the bottles to be rapidly filled.

A description of the operation of applying the caps to the bottles may be begun by first assuming, which is a fact, that at the time the bottle-supporting table is raised, there is a cap 42 held in the downwardly tapered opening in the lower aligning ring 57. Hence, when the underlying bottle is raised its neck will first engage the bottom of ring 57 and will then lift the two rings 57 and 58 therewith, causing the cap in ring 57 to be forced against the cap-applying plunger 59 and under final upward movement of the bottle, said plunger will force the cap 42 through the lower rim and will properly seat the same in the bottle neck. The spring 62 is of sufficient strength to cause proper seating of the cap in the bottle neck but will yield to prevent breaking of bottle neck under final or slightly excessive upward movement of the bottle. Approximately the right adjustment of head 49^a for application to a cap may be made by adjustments to the nut 60^a on stem 60.

When the table 26 is dropped or lowered, the neck of the capped bottle is dropped out of the capping head and the aligning rings 57—58 dropped back to their lowermost positions with the lower ring 57 on the ledge 56. In such normal positions, the line between the two rings is horizontally aligned with the shallow cap-delivery channel 48. Under the previously noted initial upward movement of the table 26 and shaft 30, the tappet screw 66 engaged the weighted arm of bell-crank 50 and raised said weighted arm, thereby carrying the ejecting blade 49 to a position at the left or inward of the stack of caps 42 in the magazine 41; and under downward movement of said table and shaft 30, the weight 53 on arm of the bell-crank 50 becomes effective to cause the ejecting blade 49 to move the bottom cap from the stack and force the same between the aligning rings 57 and 58 until the delivered cap, as already described, drops slightly into the tapered passage of lower ring 57 where it will be held until removed in the capping operation above described.

As already stated after each filling and capping operation, lever 37 will be manipulated to deliver the next bottles under the filling and capping devices. In actual practice the efficiency of the mechanism described has been thoroughly demonstrated.

In the preferred form of the capping device described, the capping head remains stationary and the bottle-supporting shelf and bottles are moved vertically to apply the caps to the bottle necks and for convenience in the claims the mechanism will be described as operating as above stated, but it will, of course, be understood that the same action will be produced by a reversal of the operation, to wit: by supporting the bottles in stationary positions and moving the capping head and parts carried thereby downward onto the bottle necks; and in view of the statement just made, it should be understood that the claims are intended to and, in fact, do cover mechanism operating on the reverse plan above noted.

What I claim is:

1. In capping mechanism, a capping head having a bottle-aligning head with a cap passageway intermediate of its ends, a cap-aligning ring seated in the aligning passage of said head with freedom for vertical movements on either side of said cap passageway, but normally occupying a position to receive a cap, means for delivering the cap to said aligning ring, a cap-applying plunger mounted on said capping head to be passed through said aligning ring to apply the cap to the bottle neck.

2. In capping mechanism, a capping head having a bottle-aligning head with a cap passageway intermediate of its ends, a cap-aligning ring seated in the aligning passage of said head with freedom for vertical move-

ments on either side of said cap passageway, but normally occupying a position to receive a cap, means for delivering the cap to said aligning ring, a cap-applying plunger mounted on said capping head to be passed through said aligning ring to apply the cap to the bottle neck, said aligning ring having a downwardly tapered passage of a size to receive a cap and to frictionally hold the same until a pressure is applied thereto.

3. In bottle capping mechanism, a capping head having a bottle-neck-aligning passage formed with a ring-supporting ledge, superimposed aligning rings, the lower of which normally rests on said ledge, means for delivering a cap edgewise between said rings while supported by said ledge, a cap-applying plunger supported by said capping head in position to be passed through said rings, and means for moving a bottle upward through the aligning channel of said capping head to engage and raise said rings and cause the positioned cap to be applied in the bottle neck.

4. In bottle capping mechanism, a capping head having a bottle-neck-aligning passage formed with a ring-supporting ledge, superimposed aligning rings, the lower of which normally rests on said ledge, means for delivering a cap edgewise between said rings while supported by said ledge, a cap-applying plunger supported by said capping head in position to be passed through said rings, and means for moving a bottle upward through the aligning channel of said capping head to engage and raise said rings and cause the positioned cap to be applied in the bottle neck, said lower ring having a passage that is contracted at its lower portion so that the cap deposited therein will be frictionally held until acted upon by said plunger.

5. In capping mechanism, a capping head having a bottle-aligning head with a cap passageway intermediate of its ends, a cap-aligning ring seated in the aligning passage of said head with freedom for vertical movements on either side of said cap passageway, but normally occupying a position to receive a cap, means for delivering the cap to said aligning ring, a cap-applying plunger mounted on said capping head to be passed through said aligning ring to apply the cap to the bottle neck, said plunger being mounted in said head for yielding movements only under excessive axial pressure.

6. In bottle capping mechanism, a capping head having a bottle-neck-aligning passage formed with a ring supporting ledge, superimposed aligning rings, the lower of which normally rests on said ledge, means for delivering a cap edgewise between said rings while supported by said ledge, a cap-applying plunger supported by said capping head in position to be passed through said rings, and means for moving a bottle upward through the aligning channel of said capping head to engage and raise said rings and cause the positioned cap to be applied in the bottle neck, said plunger being mounted in said head for yielding movements only under excessive axial pressure.

7. In bottle-capping mechanism, a tubular capping head and a cap magazine associated in adjacent parallel arrangement, a shallow cap-delivery passage leading from the bottom of said magazine laterally into said capping head, a thin ejecting blade movable in said cap-delivery passage from a position to discharge a cap from the bottom of the magazine into said capping head, a pair of superimposed aligning rings loosely seated in said capping head in position to receive a cap delivered thereto from said delivery passage, and a plunger supported by said capping head in axial alignment with the passages through said aligning rings to be passed therethrough, and means for moving the bottle axially against the lower aligning ring to thereby raise the same and cause said plunger to seat the cap in the bottle neck.

8. In bottle-capping mechanism, a tubular capping head and a cap magazine associated in adjacent parallel arrangement, a shallow cap-delivery passage leading from the bottom of said magazine laterally into said capping head, a thin ejecting blade movable in said cap-delivery passage from a position to discharge a cap from the bottom of the magazine into said capping head, a pair of superimposed aligning rings loosely seated in said capping head in position to receive a cap delivered thereto from said delivery passage, and a plunger supported by said capping head in axial alignment with the passages through said aligning rings to be passed therethrough, and means for moving the bottle axially against the lower aligning ring to thereby raise the same and cause said plunger to seat the cap in the bottle neck, the passage in said lower aligning ring being of a size to receive and frictionally hold a cap aligned with the bottle neck until pressure is applied to the cap by said plunger.

9. The structure defined in claim 7 in further combination with means for operating said thin ejecting blade, comprising an axially movable shaft and an intermediate lever connected to said blade and subject to said shaft.

10. The structure defined in claim 8 in further combination with means for reciprocating said ejecting blade, comprising a vertically movable shaft, a bell-crank lever, one arm of which is subject to the vertical movements of said shaft and the other arm of which is connected to said blade, and yielding means operating to move said bell crank and blade in one direction.

In testimony whereof I affix my signature.

ALFRED J. DAVIS.