Dec. 10, 1929. A. SCHMIDT 1,739,422

FEEDER FOR CUP SHAPED BODIES

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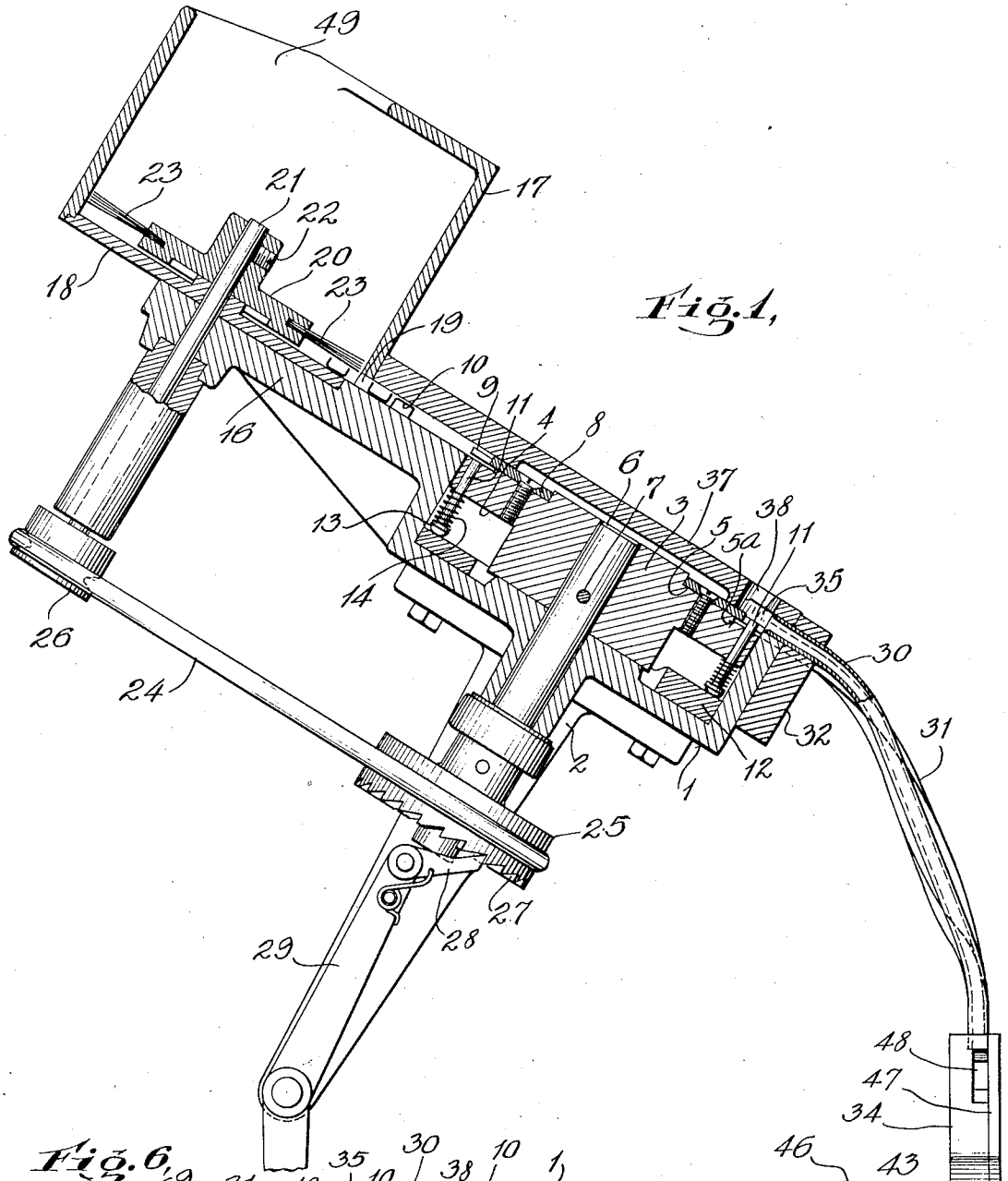


Fig. 1.

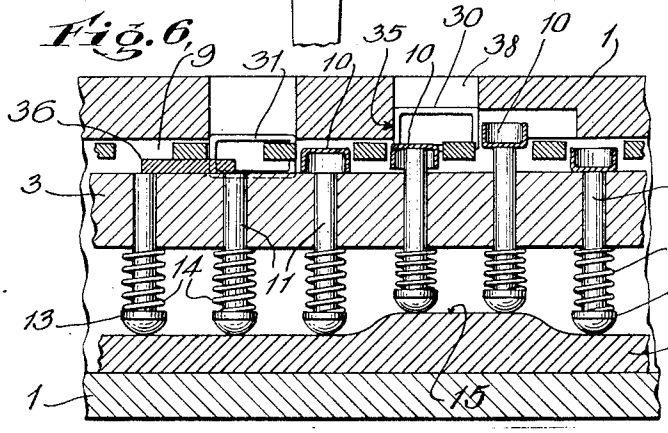


Fig. 6.

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Fig. 2.

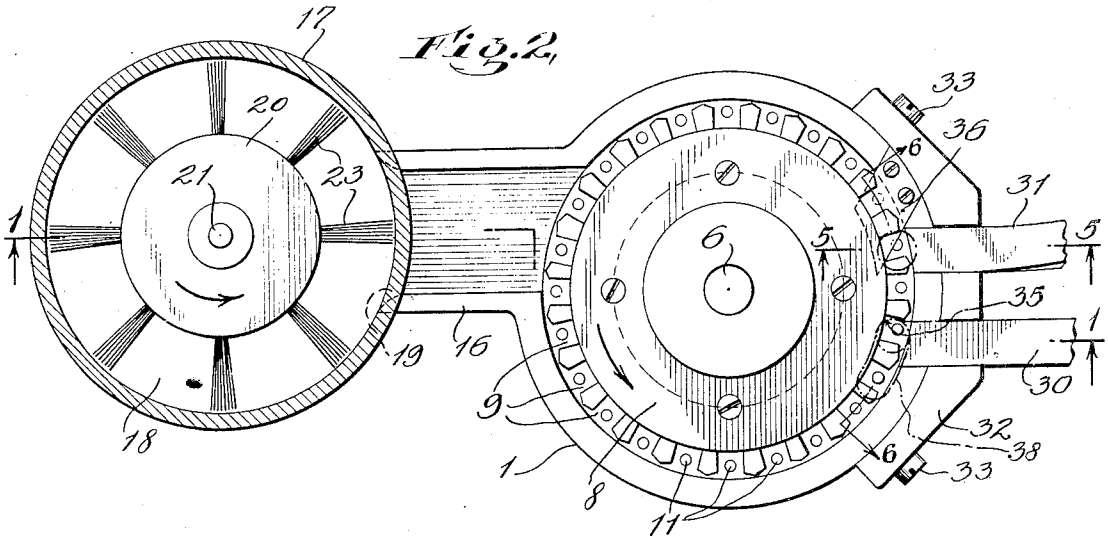


Fig. 3.

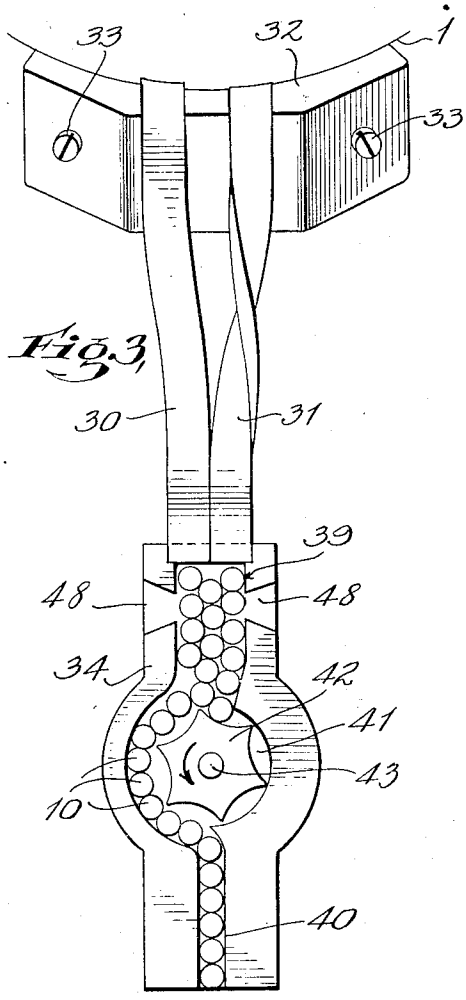


Fig. 4.

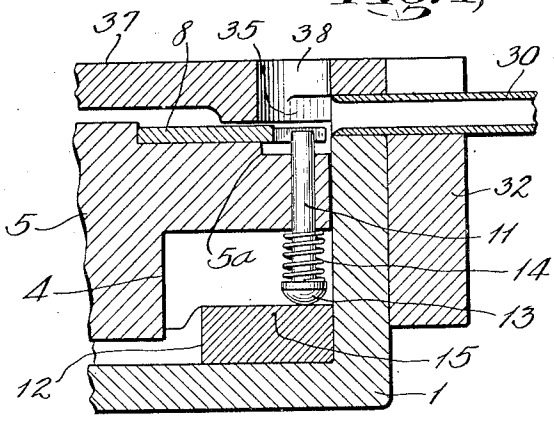
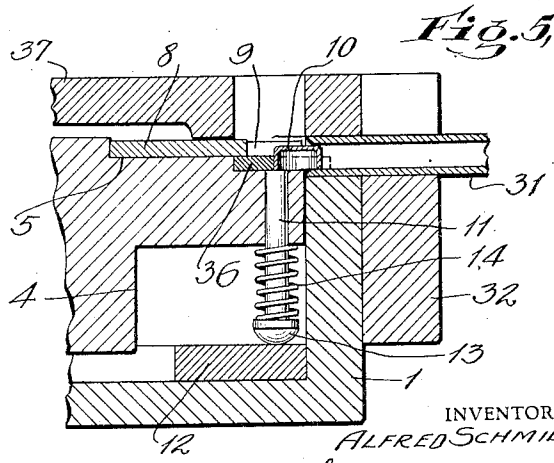


Fig. 5.



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FEEDER FOR CUP-SHAPED BODIES

Application filed February 3, 1927. Serial No. 165,746.

This invention is an improvement in feeders for cup shaped bodies, and more particularly in mechanism for successively feeding in the same relative position individual caps from a heterogeneous mass.

In machines for applying caps or flanged covers to other articles, as for instance in the assembling of batteries, applying eyelets, capping bottles, cans and the like, the articles, that is the caps, covers or eyelets must enter the machine in a predetermined relation, that is with the cavities of all of the members in the same direction.

One of the primary objects of the present invention is the provision of mechanism which enables individual caps to be fed from a heterogeneous mass in a predetermined relation, and with all of the caps similarly placed.

Another object is the provision in such mechanism of means whereby articles of such character, as for instance caps, may be assembled in a file with their cavities facing upward or facing downward, as may be desired.

Another object is the provision in such mechanism of means to primarily position and move the caps in either the position eventually desired, or in a symmetrical position, so that by simple reversal of the symmetrically placed caps, all will be delivered in similar relation.

Another object is the provision in such mechanism of means to positively reverse the position of inverted or abnormally positioned caps.

Another object is the provision of means for delivering from a plurality of files of similarly positioned caps a single file.

With these and other objects in view the invention consists in the construction and novel combination of parts fully described hereinafter, illustrated in the accompanying drawings, and pointed out in the claims appended hereto, it being understood that various changes in the form, proportion, size and minor details of construction within the scope of the claims, may be resorted to without departing from the spirit of the invention.

In the drawings forming a part hereof:

Figures 1, 5 and 6 are sections on the lines 1—1, 5—5 and 6—6, respectively of Figure 2.

Figure 2 is a top plan view with the cover plate removed.

Figure 3 is a front view of the receiving receptacle and the discharge chutes.

Figure 4 is an enlarged detail in section, similar to Fig. 5, substantially on the line 1—1 of Figure 2.

The present embodiment of the invention includes a substantially cup shaped casing 1, which is supported by a T shaped bracket 2, which may be secured to a fixed support, such for instance as the machine to which the device is to feed caps, and the arrangement of the bracket is such that the casing 1 is supported with its plane inclined at an angle of about 45°.

A feed wheel is journaled in the casing, the wheel comprising a disc 3 rabbeted peripherally on its lower face as indicated at 4, and also rabbeted at its periphery on its upper face as indicated at 5 and 5^a. The rabbet 5^a is outside of the rabbet 5, and of greater depth, as clearly shown in Figures 1 and 4. The wheel is secured to a shaft 6 journaled at the axis of the casing, in any suitable manner, as for instance by a cross pin 7 as shown. A ring 8 is secured in the rabbet 5, and the periphery of the ring extends over the rabbet 5^a, and it is notched or toothed at the said rabbet, providing a plurality of radial recesses 9, each of a size to receive a cap 10 loosely, but insufficient to receive at the same time two caps, either as to depth or width. When in the recesses the caps rest on the rabbet 5^a.

As the wheel is rotated in a step by step manner by mechanism to be presently described, the caps which are fed singly to the recesses with their ends parallel, by other mechanism to be described, are moved over a path of about 180° to one or the other of a pair of delivery chutes through which the caps pass from the wheel. The caps fed to the wheel have their ends parallel, but some have the cavities downward and others the cavities upward. Since it is desired in the present instance to deliver the caps with the cavities upward, or outward as viewed in Fig.

3, those caps in the wheel which occupy this position are described as normally positioned, while those which have the cavities downward are described as inverted.

At each recess a plunger 11 is provided, mounted for movement parallel with the axis of rotation of the wheel, the said plungers extending entirely through the wheel, and moving at their lower ends on a cam ring 12 held in the bottom of the casing 1. The lower ends of the plungers are headed as shown at 13, the heads being rounded so that they slide over the ring with little or no friction, and the plungers are normally biased toward the bottom of the casing, and toward the lowermost positions by springs 14 which encircle the plungers between the heads and the wheel. The upper face of the cam ring 12 is plane, except at one point to be later mentioned, where it has a raised cam portion 15, for lifting the plungers. This portion is of a height sufficient to move the plungers far enough to lift an inverted cap substantially flush with the top of the ring 8.

The casing 1 has a trough or channel shaped extension 16, the long axis of which is parallel with a secant of the wheel. This channel is of a depth to receive a cap or a number of caps with their ends parallel, and a substantially cylindrical magazine 17 is supported by the extension at the upper and outer end of the channel. The bottom 18 of the magazine is held in a rabbet in the upper face of the extension 16, and the body portion thereof has an outlet 19 of a height sufficient to pass a cap, when the end thereof is parallel with the bottom of the passage, and of a width corresponding substantially to that of the passage, so that the caps may feed freely from the magazine through the outlet into the channel.

A wheel is mounted in the magazine, the wheel including a hub 20 which is secured to a shaft 21, by means of a screw 22 or the like, and the shaft is journaled at the axis of the magazine, in the bottom thereof, and in the extension 16. The hub has radial spokes 23 in the form of tufts of bristles, each tuft held in a radial opening in the hub. The tufts are so placed with respect to the hub, and the hub is so proportioned, that as the wheel rotates, the tufts are swept about the outlet of the magazine above the bottom a sufficient distance to sweep away all of the caps except in a layer on the bottom which rest thereon with their ends parallel, as clearly indicated in Fig. 1. That is the wheel insures that the caps will be fed to the outlet 19 in a position to pass easily therethrough.

The shaft 21 is driven from the shaft 6 by means of a belt 24, which engages registering pulleys 25 and 26 on the shafts 6 and 21 respectively. The lower face of the pulley 25 has ratchet teeth 27, which are engaged by a pawl 28 on a pawl arm 29. The pawl arm is pivoted to the bracket 2, and the end of the arm remote from the pawl is connected to a moving part of the machine which utilizes the caps, to be swung thereby at regular intervals. In practice the swinging of the arm is co-ordinated with the operation of the machine, so that a selected number of caps are fed from the wheel 3 in a selected time. The proportions of the pulleys 25 and 26 are also such that movement is imparted to the wheel 20 over a definite arc at each forward movement or step of the wheel 3.

A pair of discharge chutes 30 and 31 is supported near the lower part of the wheel. On each side of the center at said lowest part, the side wall of the casing 1 is notched to receive the ends of the chutes, which are supported at their upper ends by an arc shaped bracket 32, secured to the side wall of the casing in any suitable manner, as for instance by the screws 33. The chutes are of a size to allow the passage of single caps, that is of caps with ends parallel and in alinement one behind the other. Both chutes deliver at their lower ends to a receptacle 34 to be later described in detail, and this receptacle as shown in Fig. 1 is arranged vertically, the chutes being curved to provide an easy passage from the casing 1 to the receptacle.

The chute 31 is at a lower level than the chute 30, the said chute 31 being at the level of the rabbet 5^a, so that a cap 10 may slide from the rabbet directly into the mouth of the chute. The chute 30 on the contrary is spaced high enough so that to enter the mouth thereof a cap must be lifted substantially to the upper face of the ring 8, and the cam portion 15 of the cam ring 12 is just below the chute, and extends on both sides thereof, so that as the plungers near the chute they are lifted until their upper ends are substantially flush with the upper face of the ring 8, and are held in this lifted position until the plungers pass the chute.

The normally positioned caps, in the present instance those with the cavities upward, are deflected from the recesses at the chute 30 by a beveled surface 35 on the wall of an opening 38 in the cover plate 37. Usually the caps will slide off the plungers by gravity, but this surface 35 is provided to ensure the removal of the caps. The inverted caps are deflected into the chute 31 by means of the blade 36. This blade is secured to the side wall of the casing 1 just beyond the chute, and that edge of the blade adjacent to the chute or facing the mouth thereof, is inclined as shown in Fig. 2.

Just before the caps pass in front of the chute, they engage the near edge of the blade and are gradually deflected into the chute. Thus normally positioned caps are discharged into the chute 30, and inverted caps into the chute 31. From the chutes they pass into

the common receptacle 34 before mentioned. A suitable cover 37 is provided for the casing 1, the cover having an extension closing the top of the channel 16. The cover has an opening 38 above the discharge chutes, so that access to the caps is enabled at this point, in case it should be at any time necessary.

The common receptacle 34 has a longitudinal extending channel on its upper face, and this channel consists of three parts or sections, a relatively wide section 39 with substantially parallel side walls at the top, a relatively narrow section 40 with substantially parallel side walls at the bottom, and an intermediate portion 41 which is of an irregular shape, the side walls thereof being formed upon curves of different radius.

A wheel 42 is mounted in the section 41. This wheel is secured to a shaft 43 journaled in a boss in the receptacle and the end of the shaft remote from the wheel is provided with a pulley 45, which may be connected by a belt 46 with a suitable moving part of the machine utilizing the caps. The wheel 42 is a toothed or star wheel. The side walls of the section 41 are as before stated, arcs of unequal radius. The points of the wheel 42 move closely adjacent to the wall formed on the arc of shorter radius, and in spaced relation to the wall formed on the arc of larger radius. The arrangement is such that a single line of caps may pass along this last named wall, between it and the points or teeth of the wheel, but they cannot pass on the other side.

The teeth of the wheel extend into the relatively wide section 39 of the channel as the wheel rotates, and with every movement of the wheel the caps in this relatively wide section are agitated, so that there can be no jamming of caps at the wheel. Thus a single line or file of caps is fed past the wheel into the section 40 of the passage, which is wide enough to enable the passage of the file, but not wide enough to enable any substantial staggering of the individual caps. The arrangement provides for the feeding of successive caps at the bottom of the receptacle.

The casing 34 is provided with a suitable cover 47, and it has lateral passages 48 near its upper end, through which an excess of caps may overflow to prevent any jamming. If for any reason the flow of caps from the passage 40 is interfered with, the agitation of the caps in the section 39 of the passage due to the turning of the wheel will agitate and loosen the collection of caps above the wheel, and any excess thereof will be worked out through the overflow passages 48.

In operation a mass of heterogeneous arranged caps is placed in the magazine, through the opening 49 at the top thereof. When the machine which utilizes the caps is started the pawl carrier 29 is oscillated at regular intervals. With each complete oscillation the ratchet wheel 25 is moved a distance of one tooth, that is a distance sufficient to bring a cap opposite the mouth of the chute 30, the arrangement and the connection of the parts being such that at each movement of the wheel a cap is positioned before the recess. The wheel 20 is moved at each movement of the wheel 25, and over a greater distance, since the wheel 26 is smaller than the wheel 25. The movement of the wheel 20 ensures that the caps will pass out at the outlet 19 in the position shown in Fig. 1, some normally positioned, with cavities upward, and some inverted, with cavities downward.

As the caps pass down the channel of the extension 16, they are successively fed into recesses of the wheel 3. It will be noticed referring to Fig. 2, that as the wheel 3 rotates the caps collected in the channel of the extension 16 will be moved toward the magazine by the teeth of the wheel 3. That is there will be a movement toward the magazine of this mass of caps at each movement of the wheel 3, and the caps will be kept loosened in the channel and in proper assemblage for feeding to the wheel.

As the successive caps approach the mouth of the chute 30, those which are normally positioned are lifted by the plungers 11, as shown in Fig. 6 to the level of the chute 30. Those which are inverted are not lifted to such level, because the ends of the plungers are of an area to extend into the open cavities, and the distance of the lift of the plungers is approximately equal to the depth of the caps, so that such caps are not lifted. The normally positioned caps are however lifted, and are deflected from the ends of the plungers by the deflector 35 into the chute 30.

The inverted caps pass on, and when they have reached the chute 31, the plungers have descended, and have withdrawn from the caps, so that there is nothing to prevent them from being deflected by the blade 36 into the chute 31. Thus all of the normally positioned caps are discharged into the chute 30, while the inverted caps pass on to the chute 31 into which they are discharged.

The segregated sets of caps pass down the respective chutes into the common receptacle, but the inverted caps as they pass down the chute 31 are reversed, the said chute being twisted spirally on its longitudinal axis a half turn, so that each cap as it slides down the chute is reversed. Hence all of the caps are delivered into the common receptacle in similar relation. From the receptacle they are fed singly to the machine which utilizes them in the manufacture of other articles.

It will be apparent from the descripton and drawings, that if it is desired to deliver the articles with the cavities downward, the chute 30 will be twisted instead of the chute 31. While the machine is shown as handling caps, it is apparent that it will operate equally well with cup shaped bodies of every char-

acter as well as with rings flanged at one end, such as eyelets. Any cylindrical article having at one end means to be engaged by a form of plunger, thereby to lift the article may be handled in a similar manner. The invention contemplates the displacement from a file of normally and symmetrically positioned articles of the symmetrically placed articles and the reversal of the position thereof in the final delivery.

What is claimed as new is:

1. In a machine for feeding individual concavo-convex articles such as caps in similar relation from a heterogeneously arranged mass, means for advancing a file of heterogeneously placed articles in normal or inverted position, means to deflect the normally positioned articles from the advancing means, means moving with the advancing means to lift the inverted articles to a higher level, and means to discharge them at such level.

2. In a machine for feeding individual concavo-convex articles such as caps in similar relation from a heterogeneously arranged mass, continuously moving means for advancing a file of articles heterogeneously arranged in normal or inverted position, means to deflect the normally positioned articles from the advancing means, means to lift the inverted articles to a higher level, means to discharge them at such level, a common receiver for the articles, and means between the deflecting means for the inverted articles and the receiver for reversing the position of said articles.

3. In a machine for feeding individual concavo-convex articles such as caps in similar relation from a heterogeneously arranged mass, means for advancing a file of articles heterogeneously arranged in normal and inverted position, means to deflect the normally positioned articles from the advancing means, means moving with the advancing means to lift the inverted articles to a higher level, and means to discharge them at such level, the lifting means engaging the ends of the inverted articles.

4. In a machine for feeding individual concavo-convex articles such as caps in similar relation from a heterogeneously arranged mass, means for advancing a file of articles heterogeneously arranged in normal and inverted position, means to deflect the normally positioned articles from the advancing means, means moving with the advancing means to lift the inverted articles to a higher level, and means to discharge them at such level, the lifting means including plungers engaging within the area of the ends of the articles a distance less than the height of the articles.

5. A machine for feeding individual caps in similar relation from a heterogeneous mass, including in combination, a magazine for the caps, means for delivering from the magazine a mass of caps in normal and inverted position, means for receiving and advancing from the mass a succession of single caps, a discharge chute for the normally positioned caps, a discharge chute for the inverted caps arranged at a higher level, and means to divert the caps of each set into the appropriate chute, including means moving with the advancing means operated by the movement thereof to lift the symmetrically placed caps to the level of the appropriate chute, said means engaging within the normally positioned caps.

6. A machine for feeding individual caps in similar relation from a heterogeneous mass, including in combination, a magazine for the caps, means for delivering from the magazine caps in mass and in normal or inverted position, continuously moving means for receiving and advancing from the mass a succession of single caps, a discharge chute for the normally positioned caps, a discharge chute for the inverted caps arranged at a higher level, and means to divert the caps of each set into the appropriate chute, including means moving with the advancing means and operated by the movement of the advancing means to lift the inverted caps to the level of the apropriate chute, said means engaging within the normally positioned caps, the last named chute twisted on its long axis to reverse the position of the caps before delivery.

7. In a machine for feeding individual concavo-convex articles such as caps in similar relation from a heterogeneous mass, a feed wheel having peripheral notches in its upper face, each of an area and depth to receive a single article with its axis perpendicular to the plane of the wheel, means to feed articles heterogeneously positioned in normal or inverted position to the recesses, means to discharge normally positioned articles, and means to discharge inverted articles at a higher level, including a plunger at each notch movable axially of the wheel, of an area to extend into a normally positioned article a depth insufficient to lift the articles to the higher level, and means to lift the plungers in succession.

8. In a machine for feeding individual concavo-convex articles such as caps in similar relation from a heterogeneous mass, a feed wheel having peripheral notches in its upper face, each of an area and depth to receive a single article with its axis perpendicular to the plane of the wheel, means to feed articles to the recesses in normal and inverted position, means to discharge normally positioned articles, means to discharge inverted articles at a higher level, including a plunger at each notch movable axially of the wheel, of an area to extend into a normally positioned article a depth insufficient to lift the article to the higher level, means

to lift the plungers in succession, a common receptacle for receiving the delivered articles, and means operated by the travel of the inverted articles from the feed wheel to the receptacle for reversing the position of such articles.

9. In a machine for feeding individual concavo-convex articles such as caps in similar relation from a heterogeneous mass, a feed wheel having peripheral notches in its upper face, each of an area and depth to receive a single article with its axis perpendicular to the plane of the wheel, means to feed articles to the recesses in normal and inverted position, means to discharge normally positioned articles, means to discharge inverted articles at a higher level, including a plunger at each notch movable axially of the wheel, of an area to extend into a normally positioned article a depth insufficient to lift the article to the higher level, means to lift the plungers in succession, a common receptacle for receiving the delivered articles, and means operated by the travel of the inverted articles from the feed wheel to the receptacle for reversing the position of such articles, said means comprising a chute of a cross-section to transmit a file of single articles, and twisted on its long axis a half turn.

10. In a machine for feeding individual caps in similar relation from a heterogeneous mass, a magazine for the caps having an inclined bottom and an outlet at the bottom for a plurality of files of caps, a brush mounted to sweep over the bottom past the outlet and spaced from the bottom the height of the caps to sweep from the bottom layer superincumbent caps, and to ensure the delivery from the outlet of a mass of caps in either normal or inverted position and in a common plane.

11. In a machine for feeding individual caps in similar relation from a heterogeneous mass, a magazine for receiving the caps, said magazine having an inclined bottom and an outlet for a plurality of files of caps at the bottom, a brush mounted to sweep over the bottom and spaced therefrom the height of a cap, and a feed wheel at the outlet having peripheral recesses on its upper face, each for receiving a single cap, the periphery of the wheel moving into the outlet to agitate the caps therein.

12. In a machine for feeding individual caps in similar relation from a heterogeneous mass, a magazine for receiving the caps, said magazine having an inclined bottom and an outlet for a plurality of files of caps at the bottom, a brush mounted to sweep over the bottom and spaced therefrom the height of a cap, a feed wheel at the outlet having peripheral recesses on its upper face, each for receiving a single cap, the periphery of the wheel moving into the outlet to agitate the caps therein, a common receptacle for receiving the caps from the feed wheel, and means in connection therewith for delivering a file of caps from the receptacle.

13. In a machine of the class described, a receptacle for the caps, said receptacle having a channel for the caps relatively wide at the inlet end to receive a plurality of files and relatively narrow at the outlet end to deliver a single file of caps, and a toothed wheel between said wide and narrow portions moving in substantial contact with one wall of the passage and spaced apart from the other wall to enable the passage of the file of caps.

14. In a machine of the class described, a receptacle for the caps, said receptacle having a channel for the caps relatively wide at the inlet end to receive a plurality of files and relatively narrow at the outlet end to deliver a single file of caps, and a toothed wheel between said wide and narrow portions moving in substantial contact with one wall of the passage and spaced apart from the other wall to enable the passage of the file of caps, the teeth of the wheel extending into the relatively wide portion to agitate the caps as the wheel rotates, said receptacle having lateral overflow outlets in the relatively wide portion for the purpose specified.

15. In a machine of the class described, means to advance a file of concavo-convex articles in normal or inverted position, means to discharge the normally positioned and the inverted articles at different levels operated by the movement of the articles, said means at different levels, and means moving with the advancing means to lift one set to the higher level without disturbing the position of the other set.

16. In a machine of the class described, means to advance a file of concavo-convex articles in normal or inverted position, means to discharge the normally positioned and the inverted articles at different levels operated by the movement of the articles, said means at different levels, and means moving with the advancing means to lift one set to the higher level without disturbing the position of the other set, said means adapted to engage within the concavities of the articles of one set, whereby the level of such articles is not changed.

17. In a machine of the class described, means to advance a file of concavo-convex articles in normal or inverted position, means to discharge the normally positioned and the inverted articles at different levels operated by the movement of the articles, said means at different levels, and means moving with the advancing means to lift one set to the higher level without disturbing the position of the other set, said means adapted to engage within the concavities of the articles of one set, whereby the level of such articles is not changed, and means to invert the articles of one set whereby all are delivered in similar relation.

18. In a machine of the class described, a magazine for caps having a plurality of discharges, one for discharging caps with their openings downward, and the other for discharging caps with their openings upward, the discharge for the last named caps being at a higher level than that for the first named caps, and means moving with and engaging the caps to lift those with the openings upward to the higher level, said means engaging within the openings of the caps with the openings downward.

19. A machine of the class described, comprising means to advance a file of articles such as caps, means to deliver successive articles to the advancing means in sets of normally positioned and inverted articles, a plurality of means moving with the advancing means to discharge the articles of the respective sets at different levels, and means for receiving the discharged articles and for reversing the position of the articles of one set.

20. A machine of the class described comprising means to advance a file of sets of concavo-convex articles such as caps, means to deliver successive articles to the advancing means with all of the articles in normal or inverted position, means moving with the advancing means to separately discharge the articles of the respective sets, and means in connection with the discharging means to reverse the position of the articles of one set, so that all are delivered in similar relation.

21. In a machine of the class described, means for advancing sets of concavo-convex articles, such as caps, arranged heterogeneously in normal and inverted positions over a horizontal path, a plurality of deflectors positioned to deflect the articles from the advancing means as they are moved past the deflectors, one of said deflectors being at a higher level, and means moving with the articles to lift the inverted articles to the deflector at the higher level, said means engaging the closed ends of the inverted caps, and moving into the open ends of the normally-positioned caps.

22. A machine of the class described, comprising continuously moving means to advance a file of sets of normally positioned and inverted articles such as caps over a fixed path, means moving with the advancing means over the fixed path to separately discharge the articles of the respective sets, means to reverse the position of the articles of one set so that all are delivered in similar relation, a common receiver for the articles, and means in connection therewith to deliver the articles from the receiver in a single file of individual articles.

Signed at New York, in the county of New York and State of New York this 1st day of February, A. D. 1927.

ALFRED SCHMIDT.