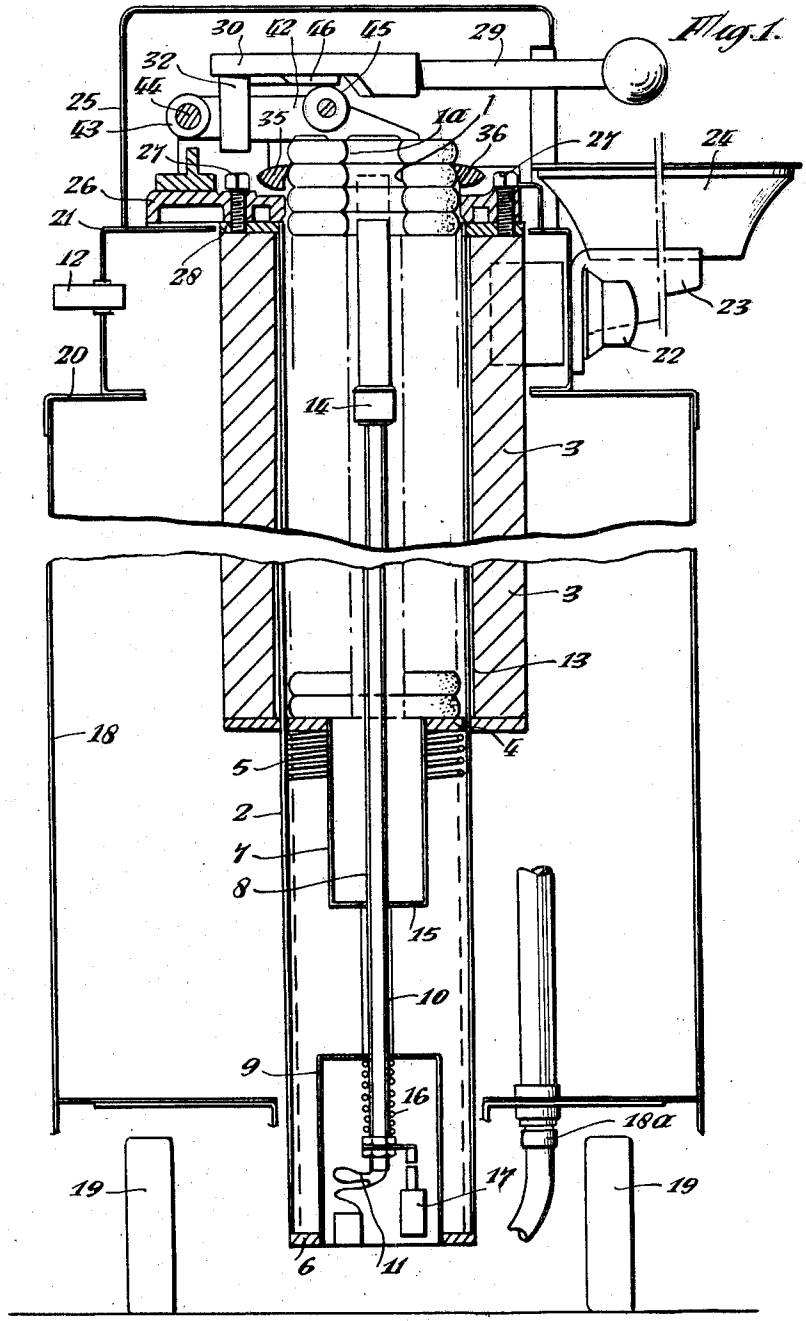
Sept. 25, 1962 N. T. RADCLIFFE ETAL 3,055,547

APPARATUS FOR INDIVIDUALLY DISPENSING HEAT-ACCUMULATIVE ELEMENTS

Filed April 21, 1960 3 Sheets-Sheet 1

Fig. 1.

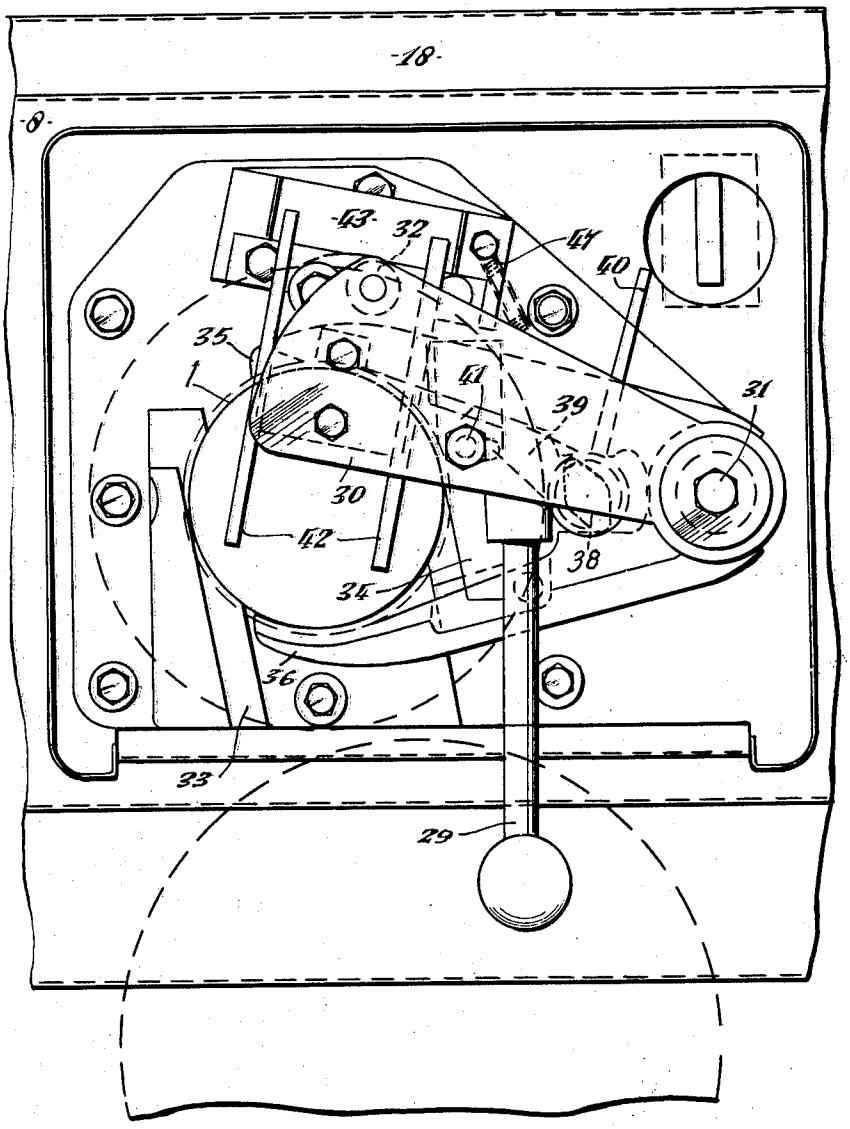


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Fig. 2.



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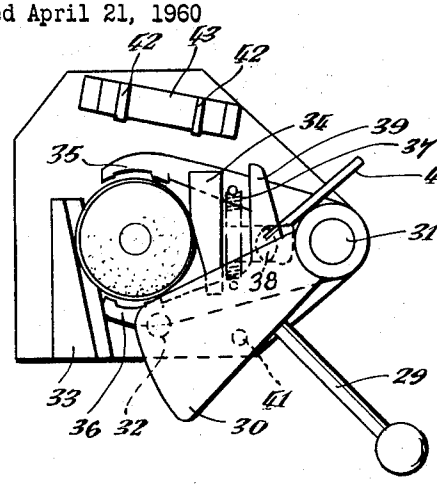


Fig. 3.

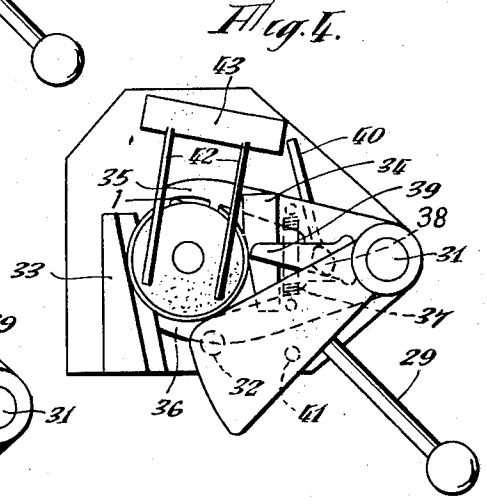


Fig. 4.

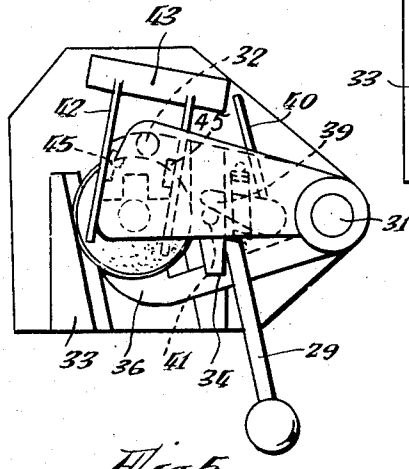


Fig. 5.

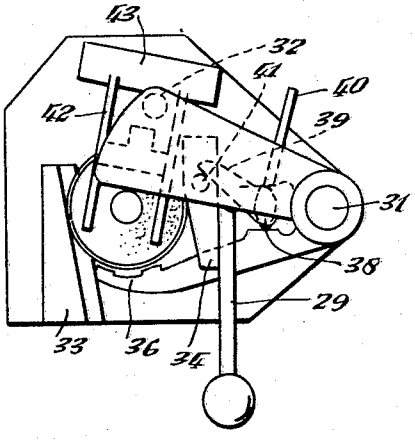


Fig. 6.

United States Patent Office 3,055,547
Patented Sept. 25, 1962

3,055,547

APPARATUS FOR INDIVIDUALLY DISPENSING HEAT-ACCUMULATIVE ELEMENTS

Nigel Trentham Radcliffe, Ardingly, and Herbert Ronald Flowers, Horley, England, assignors to Allied Ironfounders Limited, London, England, a British company

Filed Apr. 21, 1960, Ser. No. 23,845
Claims priority, application Great Britain Apr. 23, 1959
3 Claims. (Cl. 221—232)

This invention relates to apparatus for individually dispensing heat-cumulative disc-like elements maintained at a predetermined temperature for use in hot-plates for stabilizing the temperature of food-stuffs to enable meals to be served in fresh and palatable condition, for instance, in hospitals, hotels and other catering establishments.

It is well-known to use heat-accumulative elements or "pellets" in the form of circular discs of heat-accumulative material having high specific heat, e.g. aluminium alloy.

Various means have been proposed for individually dispensing such heat-accumulative elements. In one proposal, the elements are stored on edge in a container from which individual elements are dispensed as required by rolling down a delivery chute. In another proposal, the elements are stored in the form of a stack within a vertically extending tubular chamber, the "pellets" being individually dispensed from the stack by means of a slide member operable to withdraw said elements individually and in succession laterally from the bottom of the stack for delivery into a dish or hot-plate.

Particularly when used in hospitals, quietness and ease of operation are primary requirements. Delivery of said elements by rolling on edge inevitably involves "clatter" as they are delivered into the hot-plates. Withdrawing elements from the bottom of a vertical stack also may involve excessive noise and also possibly vibration due to the weight of the stack which drops bodily each time an element is withdrawn from the bottom. A further disadvantage of this latter arrangement is that the weight of the stack imposes frictional resistance to lateral withdrawal of an element from the bottom unless means are provided for supporting the weight of the stack while the lowermost element is withdrawn.

The present invention has for its object to provide improved apparatus whereby heat-accumulative elements in the form of circular discs of heat-accumulative material stores in the form of a stack may be individually dispensed from the stack with the minimum of noise and vibration.

According to the invention, apparatus for individually dispensing heat-accumulative disc-like elements is constructed and arranged so that elements are individually dispensed from a vertical stack by laterally discharging elements individually and in succession from the top of the stack.

According to the invention, moreover, apparatus for individually dispensing heat-accumulative disc-like elements comprises a vertically extending chamber in which a stack of elements is located, a vertically movable member supporting said stack, means for laterally discharging elements individually from the top of the stack for delivery into a dish or hot-plate, and means for elevating said member to bring elements in the stack successively to the discharge position.

In a preferred embodiment, the stack is elevated step by step by resilient means, e.g. spring means, means being provided for restraining upward movement of the stack during lateral discharge of the topmost element from the stack. Preferably the stack is elevated by the use of a spring of such rate in relation to the weight

of the elements as to give a substantially constant up thrust irrespective of the number of elements in the stack. Conveniently, the means for restraining upward movement of the stack comprises jaws engageable with the element at the top of the stack immediately below the delivery position, said jaws normally engaging the element under spring action and being operable by mechanism associated with an operating lever or member in such manner that on movement of said operating lever or member to one position, the jaws are opened to release the stack so that it can rise to position the uppermost element at the discharge position, while, on movement of the operating lever or member to another position, the jaws are closed to engage the succeeding element in the stack, and the uppermost element is discharged laterally from the top of the stack. Means may be provided for independently operating the jaws to open position to facilitate charging of the apparatus with a stack of elements. For the same purpose the uppermost element in the stack may be located at the discharge position by means of a pivoted member normally retained in a horizontal position by co-operation with the operating lever or member or part associated therewith and arranged so that when the operating lever or member is moved to an extreme position, the locating member may be swung up about its pivot so as not to obstruct insertion of elements into the apparatus when recharging the stack.

In a modification, the stack may be elevated in steps corresponding to the thickness of the elements by mechanical means.

The term "heat" employed in the expression "heat-accumulative" is a relative term and it will be understood that the elements may be employed to accumulate and store either "heat" or "cold," depending on the condition required.

The stack of elements inserted into the vertically extending tubular chamber may be pre-conditioned, i.e. either heated or cooled in separate apparatus for this purpose, in which case the dispensing apparatus according to the invention is provided with heating or cooling means for maintaining the stack of elements at the desired temperature. Alternatively, the thermal conditioning of the elements may be effected in the dispensing apparatus. For thermally conditioning or maintaining the desired temperature of the elements stacked in the dispensing apparatus, an annular space surrounding the stack accommodates heating or cooling means. For example, when the elements to be dispensed are to be heated to a preselected temperature, e.g. in the range of 400° F. to 500° F., the annular space may accommodate electric radiant heating elements preferably thermostatically controlled. Alternatively, heating may be effected by gas, in which case the annular space may form a flue for circulation of combustion gases from a burner, or accommodate gas burners. Electric induction heating or infra-red radiant heat may be employed.

When the elements dispensed require to be cooled, for example, to 30° F. or below, a refrigerating coil may be accommodated in a casing surrounding the chamber or a forced draught of cool air may be circulated through said annular space.

The temperature of the elements is preferably controlled by means of thermostat disposed in a stem extending vertically and centrally through the stack of elements, the elements being formed with a central hole. The stem also may be adapted to actuate switch means to indicate when the stack is nearly depleted or requires replenishing.

The dispensing apparatus according to the invention may be mounted in an external casing so that the upper delivery portion of the apparatus projects above said casing. The casing may be provided with suitable elec-

trical or pipe connections for heating or cooling means and may accommodate thermostat relays.

The invention includes a dispensing unit comprising two or more dispensing apparatus as above defined mounted in a common casing. The casing may be mounted on wheels so that the unit may be readily moved from place to place as required.

The invention is hereinafter described, by way of example, with reference to the accompanying diagrammatic drawings, in which:

FIG. 1 is a vertical section illustrating one embodiment of apparatus according to the invention for individually dispensing heat-accumulative disc-like elements;

FIG. 2 is a plan view showing a dispensing unit adapted to accommodate two dispensing apparatus, as shown in FIG. 1, only one apparatus being shown;

FIG. 3 is a detail plan view of the dispensing mechanism as positioned for loading elements into the apparatus to form a stack;

FIG. 4 is a view similar to FIG. 3, showing the mechanism after the loading operation is completed;

FIG. 5 is a view similar to FIG. 3 showing the mechanism with the operating lever in the normal or neutral position; and

FIG. 6 is a view similar to FIG. 3 showing the operating lever moved to a position in which the uppermost element in the stack is positioned for lateral discharge when the operating lever is again moved in the anti-clockwise direction.

In carrying the invention into effect according to one embodiment, as illustrated in the accompanying diagrammatic drawings, apparatus for individually dispensing heat-accumulative elements in the form of circular discs **1** of aluminium alloy each having a central hole **1***a* comprises a vertically disposed cylindrical tube **2** forming a chamber for the reception of a stack of elements **1**, the tube being surrounded by heat insulation **3**. The stack of elements **1** is supported on a vertically movable platform **4** supported by a spring **5** located in the lower part of the tube **2** between the platform **4** and a bottom member **6**, the spring **5** being of such rate in relation to the weight of the elements **1** that it will exert a substantially constant up-thrust irrespective of the number of elements in the stack. The platform **4** is provided with a depending hollow portion **7** which is slidable on a coaxial stem **8** located centrally with respect to the tube **2** by means of an upstanding hollow structure **9** supported on the bottom member **6**. A spacer sleeve **10** determines the lowermost position of the platform **4**. The stem **8** may house a thermostat connected by leads **11** to a suitable relay (not shown) controlling supply of electric current from main leads **12** to electrical heating elements disposed, for example, in an annular space **13** between the tube **2** and the surrounding insulation **3**. The upper part of the stem **8** is provided with an enlargement **14** forming a stop member which, when the stack of elements is nearly depleted, is engaged by the bottom **15** of the depending member **7**, whereupon the stem **8** is lifted against the action of a spring **16** to actuate a switch **17**, such as a microswitch operating a warning signal.

The dispensing apparatus is mounted in an external casing **18** which, as shown in FIG. 2, may accommodate two dispensing units side by side, or more than two units, if a larger capacity is required, the casing advantageously being mounted on wheels **19** for convenience in moving the unit from place to place. If the casing is provided with cooling coils, suitable pipe connections, such as indicated at **18***a*, may be provided. An upper part of the dispensing apparatus projecting above the top **20** of the casing **18** may be surrounded by a housing **21** which may accommodate the thermostatically controlled relay and may be provided with an "on-off" switch **22** at the front and also a platform **23** for supporting a hot-plate **24** to receive a heat-accumulative element **1**. The mechanism at the top for dispensing the elements **1** individually from the top of the stack may be accommodated in a removable cover **25**.

The mechanism for dispensing the elements **1** is mounted on a base structure **26** connected, as by means of bolts **27**, to a flange **28** from which the tube **2** is suspended. The mechanism comprises an operating lever **29** projecting from a plate **30** mounted to swing about a vertical pivot **31** on the base structure **26**, the plate **30** having a downwardly extending projection **32** adapted to engage behind the element **1** in the uppermost discharge position for its lateral discharge between guides **33**, **34** (FIG. 2) into the hot-plate **24**. In order to restrain the stack against upward movement under the influence of the spring **5** during lateral discharge of the uppermost element **1**, jaws **35**, **36** are arranged to grip the element **1** immediately below the uppermost element under the influence of a spring **37** (FIG. 3), the jaws being releasable by the action of a double-sided cam **38** (FIG. 6) provided with an operating arm **39** and actuating lever **40**. The plate **30** is provided with a downwardly projecting pin **41** adapted to co-operate with the cam operating arm **39**. When the jaws **35**, **36** are released and the stack of elements **1** is elevated by the spring **5**, the uppermost element **1** is positioned at the discharge level, as shown in FIG. 1, by engagement with the underside of spaced parallel arms **42**, **42** projecting from a member **43** mounted to swing about a horizontal pivot **44**. The arms **42** are provided with rollers **45**, **45** (FIGS. 1 and 5) which engage runways **46** on the underside of the plate **30** when the operating lever **29** is in the position shown in FIGS. 5 and 6.

The operation of the mechanism above described is as follows:

For loading elements **1** into the apparatus to form a stack, the operating lever **29** is moved anti-clockwise about its pivot **31** to an extreme position so that the plate **30** is clear of the top of the tube **2**. In this position the rollers **45** on the arms **42** are disengaged by the trackways **46** on the plate **30** and thus the member **43** provided with the arms **42** may be swung up through 90°, as shown in FIG. 3, out of the way. The cam lever **40** is moved clockwise so that the double-sided cam **38** shown in FIG. 6 is moved to dead centre position, thereby holding the jaws **35**, **36** open. Prior to the above operations, the cover **25** will have been removed and the top of the apparatus is now freely accessible for the insertion of elements **1** into the tube **2** to form a stack which is pushed down by hand against the upward thrust of the spring **5**. When fully loaded, the member **43** provided with the arms **42** is returned to the horizontal position and may be used as a gauge for height of the stack, while the cam lever **40** is moved anti-clockwise to release the jaws **35**, **36** which, thereupon, under the influence of the spring **37**, grip the element **1** immediately below the uppermost element positioned by the arms **42**. The operating lever **29** is urged to the neutral position shown in FIG. 5 by means of a spring **47** (FIG. 2), the power of which, however is not sufficient to cause the pin **41** to operate the cam arm **39** to free the jaws **35**, **36**. In the position of the operating lever **29** shown in FIG. 5, the rollers **45** are not in contact with the trackways **46** and thus the arms **42** are just resting on the top element **1** and are free to lift.

For dispensing an element **1**, the lever **29** is first moved clockwise to the position shown in FIG. 6. In this position, the pin **41** has engaged and operated the cam arm **39** so that the jaws **35**, **36** are opened, the rollers **45** on the arms **42** are engaging the trackways so as to position the uppermost element **1** at the discharge level, and the downward projection **32** on the plate **30** is spaced behind the edge of the uppermost element **1**. As the lever **29** is then returned in the anti-clockwise direction, the pin **41** first allows the cam arm **39** to return so that the jaws **35**, **36** grip the element **1** immediately below the uppermost element, the rollers **45** ride off the trackways **46** so as to relieve pressure of the arms **42** on the uppermost element

1, and the downward projection 32 then engages the edge of the uppermost element 1 and discharges it laterally between the guides 33, 34 into the hot-plate 24.

It will be understood that the jaws 35, 36 gripping the element 1 which is now the uppermost in the stack, restrain the stack against upward movement under the influence of the spring 5 until the operating lever 29 has again been moved clockwise, to the position shown in FIG. 6, in which the jaws 35, 36 are released to permit upward movement of the stack and in which the rollers 45 engage the trackways 46 to position the uppermost element 1 at the discharge level.

The operating lever 29 may be actuated by electrical, hydraulic or pneumatic means for automatically delivering an element into a hot plate as it is moved into position to receive the element.

The disc-like elements may be of any suitable shape other than circular, if desired.

It will be understood that the invention is not limited to the particular embodiment hereinbefore described. For example, instead of using a spring, elevation of the stack may be effected by fluid pressure using a suitable accumulator or other means to regulate the pressure according to the weight of elements in the stack. Furthermore, in a modification, the stack of heat-accumulative elements may be elevated in steps corresponding to the thickness of the elements by mechanical means.

We claim:

1. Apparatus for individually dispensing heat-accumulative disc-like elements comprising a vertically extending chamber in which a stack of elements is located, a vertically movable member supporting said stack, resilient means for elevating said member to bring elements in the stack successively to discharge position at the top of the stack, jaws arranged to be engageable with an element immediately below the discharge position at the top of the stack, vertical movement of such stack being restrained by said jaws so long as said jaws are in engagement with said element, spring means normally maintaining said jaws in engagement with said element, an operating member, means carried by said operating member for engaging an element at the discharge position and for discharging said element laterally from the top of the stack on movement of the operating member in one direction, and mechanism associated with the operating member and acting,

on movement of said operating member to one position, to open the jaws to release the stack so that it can rise to position the uppermost element at the discharge position, and, on movement of the operating member to another position, to close the jaws to engage the succeeding element in the stack while the uppermost element is discharged laterally from the top of the stack, characterized in that said mechanism comprises a pivotally mounted plate-like member provided with the operating member and having a projection engageable behind the uppermost element in the stack, a double-ended cam operable to open the jaws against the action of the spring means, a cam operating lever connected to said cam, a second projection on the plate-like member engageable with the cam operating lever, said projections being arranged on the plate-like member so that, on movement of the plate-like member in one direction from a neutral position, the second-mentioned projection engages the cam operating lever to operate the cam to open the jaws, while, on movement of the plate-like member in the opposite direction, the cam is returned by spring action to cause the jaws to grip the element immediately below the uppermost element, and the first-mentioned projection engages the edge of the uppermost element to discharge it laterally from the top of the stack.

2. Apparatus according to claim 1, wherein an auxiliary manually operable lever is provided for independently operating the cam to open the jaws to facilitate charging of the apparatus with a stack of elements.

3. Apparatus according to claim 1, wherein the uppermost element in the stack is located at the discharge position by means of a pivoted structure normally retained in horizontal position by co-operation with the plate-like member and arranged so that when said member is moved to an extreme position, the pivoted structure may be swung up about its pivot so as not to obstruct insertion of elements into the apparatus when re-charging the stack.

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