Oct. 19, 1954 R. FRIEDLI, JR 2,692,072

POSITIONING AND STACKING DEVICE FOR ELONGATED ARTICLES

Filed Dec. 31, 1948 2 Sheets-Sheet 1

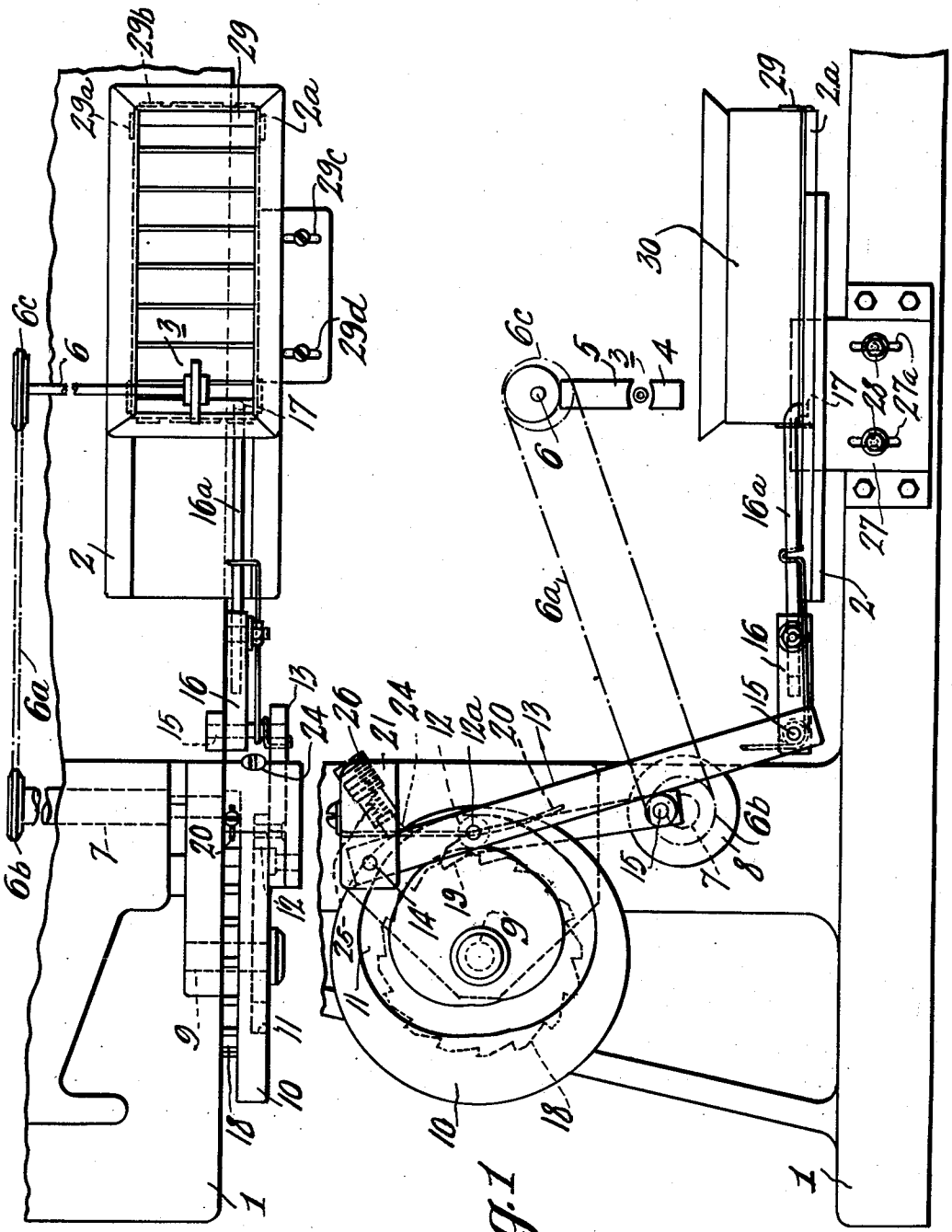


Fig. 2.

Fig. 1.

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Fig. 4.

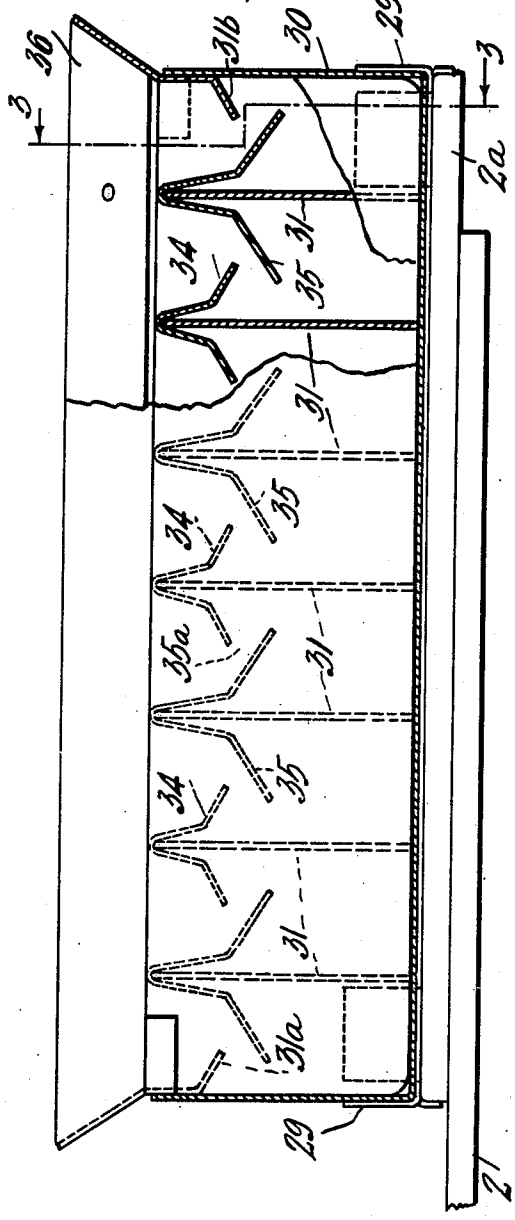
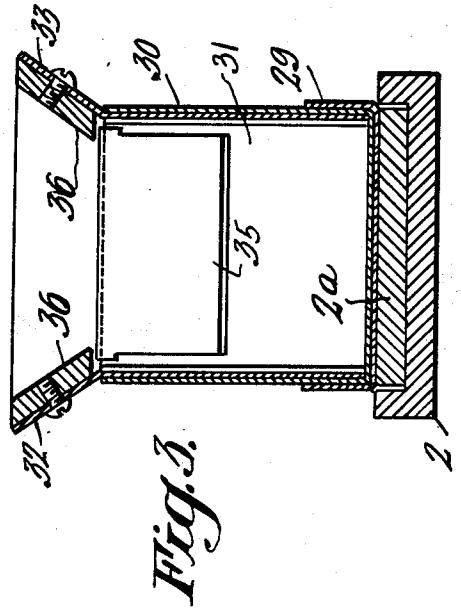


Fig. 3.



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POSITIONING AND STACKING DEVICE FOR ELONGATED ARTICLES

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10 Claims. (Cl. 226—14)

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This invention relates to a new and useful stacking and positioning device for elongated articles.

In the manufacture of small light weight elongated articles with unsymmetrical ends such as for example, cathode sleeves of the type having a tab at one end as used in electron discharge devices, trouble frequently develops in packing and positioning such articles to have the similar tab ends all lie in the same direction and not have them mixed with respect to their ends or have them lie in a criss-cross arrangement. The tendency of such criss-cross stacking is due primarily to the lightness and unsymmetrical ends whereas a larger, symmetrical and heavier article would not tend to stack as unevenly. For the convenience of shipping, compactness, and use in manufacture, it is desirable to have such articles all lie parallel and to be closely packed with the unsymmetrical ends all pointing in the same direction. The invention herein described provides an improved system of positioning and stacking such elongated articles.

An object of this invention is to provide an improved stacking and positioning device which is set above the open portion of a packing box or magazine to receive elongated articles from a mandrel of a machine particularly the type for fabricating such articles.

Another object of this invention is to provide a novel device which will accurately dispose in parallel relation fabricated articles having non-uniform ends in such a manner that the articles are positioned with similar ends all pointing in one direction.

Still another object of this invention is to provide a means for properly timing a step by step movement of the stacking device so that it lies directly under the ejection point of the fabricating machine at the time when elongated articles are cut off and permitted to drop into the magazine.

A feature of this invention is the improved arrangement of a stacking and positioning device in which the packing case or magazine is mounted on a carriage which moves progressively and intermittently with respect to an ejecting point on a fabricating machine. Within the packing case are located separating members which operate in conjunction with floating aligners positioned above the packing case. The fabricating machine operates the carriage through a ratchet, cam and crank arm to intermittently move the magazine or packing case back and forth in steps below the ejection point

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of the machine, the articles being automatically dropped after ejection from the cutting member of the machine into each section of the stacking and positioning device as determined by the respective floating aligners.

This invention will be more clearly understood by referring to the accompanying drawing in which:

Fig. 1 is a front elevation of the positioning and stacking device of this invention;

Fig. 2 is a plan view of Fig. 1;

Fig. 3 is an end elevation partly in section taken along the line 3—3 of Figure 4, and shows the magazine floating aligners and separating partitions and;

Fig. 4 is a side elevation partly in section, of the magazine of the invention.

Referring now in detail to the drawings with particular reference to Figs. 1 and 2, upon a base 1 of the fabricating machine there is located a guide or track member 2 which is centrally located beneath a cutting device 3 including an anvil 4 and a cutter 5. An operating or cutting shaft 6 is coupled to provide the proper relative movement with a main fabricating shaft 7 through any suitable means such as for example, a chain 6a and sprocket wheels 6b and 6c providing a 1 to 1 ratio between shafts 6 and 7 to cooperate with the cutting member 3. Or if desired a system of gears (not shown) may be substituted for the chain and sprockets. The main fabricating shaft 7 extends outward beyond the front of machine and has located in the front portion thereof an eccentric disc member 8. Located slightly above main shaft member 7 is a third shaft 9 which has a bearing in an upright on base 1 and has located thereon a cam-wheel member 10. The forward portion of the cam-wheel member 10 has cut therein a channel or groove cam 11 in which the pitch or slope line is approximately heart shaped. Located within the channel of cam 11 is a cam follower or roller 12 which is mounted to turn on a shaft 12a located on a pivoted arm 13. The arm 13 pivoted at a fixed point 14 on the machine, has located at the lower free end portion thereof a pivot pin 15. The pivot pin 15 has secured thereto connecting link members 16 and 16a of which member 16a engages an aperture 17 in a carriage 2a. The carriage 2a is arranged to slide back and forth in a step by step movement upon track 2. In the rear portion of cam-wheel 10 there is secured for rotation therewith a ratchet 18 which is provided with an engaging pawl 19 pivoted at one end to eccentric member 8 and the other end is

forced to engage the ratchet 18 by means of a spring tension member 20 retained at the upper end to a boss 21. The ratchet 18 provides an intermittent or step by step motion for cam-wheel 10 and also provides a certain amount of uneven interruption of motion causing vibration to the lever system linking with carriage 2a, which vibration rocks floating aligners to be described. The cam 11 after proper adjustment of timing, positions the carriage in predetermined relation to the cutting device 3.

To prevent cam wheel 10 from acting as a fly wheel an adjustable friction member 24 is arranged to contact the rim of cam wheel 10. Adjustment of the friction is maintained on member 24 by a spring 25 and a threaded stud 26 which members are retained in an aperture in boss 21 of the machine 1.

The magazine separating device which is shown in detail in Figs. 3 and 4 comprises a magazine 30 which serves as the packing box for shipping or storing the elongated articles. Supported within the bottom portion of the packing box is a removable separator member which comprises seven metal partitions 31 which are equally spaced to form eight separate compartments. Secured to the upper end of the partitions 31 are side comb members 32 and 33. These side comb members are slotted to receive and retain the partition members 31. Pivotally arranged on the top portion of each partition 31 between the combs 32 and 33 are a plurality of floating aligners comprising three small members 34 and four large members 35. These floating aligning members are shaped and arranged to float upon rounded top edges of partitions 31. A bar-like member 36 is secured to the comb 32 and a similar member is secured to comb 33, the members 36 being provided to prevent the floating aligning members from becoming detached from the top edges of the partitions referred to. The two ends of the side combs have secured thereto end funnel-shaped members 31a and 31b which tend to guide the elongated articles engaged thereby into desired parallel relation in the magazine. The intervening spaces between the floating aligners 34 and 35 are such as to funnel or guide the elongated articles in a position parallel to the partitions. The space 35a between the end of one aligner and the side of an adjacent floating aligner is such as to freely pass the articles which are fabricated. The partitions 31 separate the articles and position them parallel with each other so that they are closely packed with the unsymmetrical ends all pointing in the same direction so that upon removal of the separating device the articles will lie in desired parallel positions within the magazine 30.

In the manufacture of cathode sleeves it is desirable to make provisions for different lengths and different diameters of the sleeves. It is also desirable to pack the magazines with a larger and smaller number of sleeves. To take care of such conditions, there is provided on the forward portion of machine 1, a carriage elevating device 27 which is provided with a pair of parallel slots 27a. The adjustment of member 27 is provided by having a stud or threaded bolt 28 extend within the slots, and clamp the device to machine 1. The bolts are tightened when the elevating member is placed in its proper position relative to the cutting device 3. For example, when a shallow box is employed, the member 27 is raised to an upper position, that is, a position closer to the cutting member 3 indicated by the dotted lines. When a deeper box member is employed, the elevating member 27 is lowered to the position shown. To accommodate cathode sleeves of different lengths which of necessity require boxes of different widths, there is provided an adjustable and removable sub-base or box support 29. There are different sub-bases for different widths of boxes. The member 29 is preferably constructed of thin sheet brass having upwardly extending side and end members 29a and 29b respectively. These end and side members keep the packing box in proper alignment on carriage 2a relative to the cutting device 3. For the forward and backward adjustment of the magazine relative to the cutting device 3, two slots 29c and 29d are provided in sub-base or box support. The box support 29 is secured by bolts in its proper relative position upon the carriage 2a.

In the operation of this device the operator before starting the fabricating machine places upon the box support 29 a cardboard box, without its cover, which is of the proper dimensions to receive the cathode sleeves being fabricated. Next the operator places the separating device so that the partitions 31 rest upon the bottom of the cardboard box. The fabricating machine is then started in operation and when the cutting device 5 moves downward toward the anvil 4 the article or cathode sleeve is severed and drops in a central position and approximately parallel with the partitions 31. Operating simultaneously with the cutting member 5 and shaft 6 is the rotating shaft 7 coupled to shaft 6 by chain 6a and sprockets 6b and 6c. The shaft 7 progressively moves the carriage 2a and the separating device forward one step, or to the next partition through the action of cam 11 and ratchet 18 and then stops so that upon the severance of the next article the center of the partition will then dwell directly beneath the cutter 5. This progressive stepping forward is maintained by means of the action of pawl 19 engaging the ratchet wheel 18 which in turn rotates the cam 11. The shape of cam 11 is such as to progressively move backward and forward by step by step movement the carriage 2a upon track 2 the proper amount. The vibration caused by the action of pawl 19 and spring 20 shakes the floating aligners in box 30 so as to slightly increase the opening between adjacent aligners 34 and 35 thereby causing the articles within the magazine to fall in a parallel position with each other thus insuring uniform and compact assemblage of articles. The cycles of operations are continued until the magazine 30 is filled to the desired amount, then the separating device is removed and the cover placed on the box.

The cathode fabricating machine with which the stacking and positioning device is adapted to be used includes means, not shown, for feeding cathode sleeves horizontally in end butt relation after a severing thereof by the cutter 5 and associated anvil 4. The cathodes are fed in this manner to an ejection point of the machine directly above the magazine 30. As the cathodes successively emerge from the ejection point referred to, a leading end portion thereof will be unsupported. As the trailing end of a cathode reaches the ejection point, the weight of the unsupported leading end will cause this end to fall downwardly before the cathode is fully released by the machine. Therefore, when a cathode is fully released by the machine, it will assume

an axial position angularly spaced from the horizontal.

Thus, while the aligning members **34, 35** extend in parallel relation to the direction of feed of cathode sleeves in the machine aforementioned, the axial positions the sleeves assumed in falling from the machine disposes the sleeves in non-parallel relation to the aligning members. As a consequence, the sleeve may extend axially across adjacent alignment members and be restrained from falling through the space between the members. It should be noted that the space between adjacent aligning members is appreciably less than the length of cathode sleeves to be aligned and stacked. In fact, this space may be slightly less than the diameter of a cathode sleeve.

In view of this, the alignment members are required to perform two functions. Both of these functions are accomplished when the alignment members **34, 35** are caused to oscillate or vibrate on the partitions **31**. One of these functions is to rotate a falling sleeve to a horizontal position parallel with partitions **31**. This rotation results as a consequence of the co-action of adjacent alignment members **34, 35** when vibrated, which urges the sleeve into a horizontal position parallel with partitions **31**. The other function is to provide a passageway between adjacent alignment members to permit a sleeve oriented as aforementioned to drop into the magazine **30**. Such passageway is provided by oscillation of the alignment members, during which the space between the alignment members is successively enlarged and contracted. During the space enlargement portion of each cycle of oscillation, the space between adjacent alignment members is sufficiently large for the sleeve to fall therethrough.

Cathode sleeves of the type fabricated by the machine aforementioned are relatively light in weight and therefore would be incapable of imparting a required oscillation of the alignment members for a proper positioning of the sleeve by the force of its fall only. Thus, a sleeve delivered in angular position with respect to the portions **31**, would cause an initial oscillation of relatively small magnitude of the alignment members, which would gradually stop. It is possible that the sleeve may be only partly rotated into parallel relation with partitions **31** at the termination of the oscillation, and therefore would be restrained from passing into the magazine **30**. The feeding of a subsequent sleeve to the alignment members holding the aforementioned sleeve may result in a piling up of sleeves between said members. From the foregoing, it will be apparent that the feature of oscillating or vibrating the alignment members **34, 35**, other than by the fall of a cathode sleeve, is important for a proper positioning of cathode sleeves to assure a stacking thereof in parallel relation in the magazine **30**.

While the fall of a cathode sleeve into engagement with oscillating alignment members as aforedescribed results in a parallel disposition of the sleeves in magazine **30**, the positional relation of the magazine to the ejection point of the associated machine aforementioned, causes the sleeves to be oriented in the magazine with predetermined ends thereof, such as tabbed ends, disposed in adjacent positions. As will be noted in Figure 1, the ejection point **3** is relatively close to the magazine **30**. Therefore, as a sleeve is released at the ejection point and is caused to swing downwardly at its leading end before full release of its trailing end, it engages the alignment members **34, 35** shown in Figure 4, before the swinging movement involves an angular displacement of 90°. Therefore, as the falling sleeve strikes the alignment member, it is inclined towards a vertical plane including the ejection point aforementioned. This inclination of the sleeve provides a force urging the sleeve to horizontal position, with its trailing end adjacent the vertical plane aforementioned. All sleeves ejected by the machine respond in this fashion, so that the sleeves become oriented in parallel relation in the magazine **30** with predetermined ends thereof in adjacent relation.

The device of this invention has been successively employed by stacking and positioning cathode sleeves having a tab at one end thereof and used in thermionic tubes. However, this invention is capable of many other uses wherein the articles to be packed are preferably those of light weight and of unsymmetrical configuration.

While I have set forth a preferred embodiment of the invention and described it in detail with respect to said embodiment, I do not wish to be limited to the exact construction set forth but desire to include all modifications thereof that come within the scope of the appended claims.

I claim:

1. Apparatus for positioning and stacking elongated articles in a magazine for packing the articles, comprising a removable separator member to be placed in the magazine, said removable separator member having a plurality of parallel planar partitions and a plurality of floating aligners mounted for swinging movement on said partitions and forming variable slots to align and progressively pack said articles as they drop in the magazine, and means to move the magazine in a position below an ejection point on a machine for forming the articles, for causing said aligners to swing and to form said variable slots.

2. A device for positioning in parallel relation and stacking for storage a plurality of elongated articles having non-uniform ends in a packing box with an open top, comprising a removable separator member to be placed in the packing box, said removable separator member having a plurality of spaced floating aligners forming variable slots, a plurality of partitions adjacent each of said variable slots, there being a partition to form a compartment for each spaced variable slot in said removable separator member to align and stack said articles and to place them all with the non-uniform ends pointing in one direction within said packing box, and means to vibrate said aligners and to alternately move said packing box from one position to another in a step by step movement below and in phase with a forming member and relative to an ejection point of the forming member, for forming said variable slots and aligning and stacking said articles.

3. A positioning and stacking device which is arranged to be placed in a magazine to receive and retain light weight elongated articles, comprising two side members having inwardly sloping sides, a plurality of partitions spaced apart and extending downward from said sloping sides, and a plurality of floating aligning members positioned for swinging movement on said partitions, whereby intermittent movement of said positioning and stacking device and causes said aligning members to swing for positioning and stacking said articles in said magazine.

4. Apparatus according to claim 1 and wherein said floating aligners include vanes extending angularly from the planes of said partitions, two of said vanes being disposed between adjacent partitions and extending through a plane parallel to said adjacent partitions, said extending vanes defining a tortuous passageway to said magazine, whereby said extending vanes axially orient said articles for parallel delivery to said magazine.

5. A device for positioning in parallel relation and stacking for storage in a packing box a plurality of elongated articles, comprising a removable separator member adapted to be placed in said box, said removable separator member including a plurality of fixed vertical partitions having upper edges and a plurality of aligners mounted on said upper edges for swinging movement, said aligners having vanes forming parallel and variable slots between said partitions adapted to receive said articles only when said articles are axially horizontal, said aligners forming said variable slots when vibrated, and means to vibrate said aligners, whereby said articles are urged to axially horizontal positions for registry with said slots.

6. A device according to claim 5 and wherein said removable separator member includes means for preventing disengagement of said aligners from said upper edges of said partitions during said swinging movement of said aligners.

7. A device for positioning a plurality of elongated articles in parallel relation in a packing box; comprising a removable separator member adapted to be placed in said box and having two partitions defining a space for receipt of said articles, and aligners mounted on said partitions for swinging movement when vibrated, said aligners including vanes extending angularly across said space in overlapping relation and defining a slot having a width variable in response to swinging movements of said aligners for alternately blocking and permitting passage therethrough of said articles, whereby said articles are oriented in a predetermined axial position for parallel delivery to said packing box; and means to vibrate said aligners.

8. A positioning and stacking device comprising a removable separator member including two vanes extending angularly downward in overlapping relation into a receptacle, said vanes defining a slot, means for floatingly supporting said vanes, and means for vibrating said supporting means to cause said vanes to swing and to alternately reduce and increase the width of said slot, whereby elongated articles fed to said removable separator member are first urged to parallel relation with respect to said slot and then received by said slot for delivery to said receptacle in said parallel relation for parallel stacking of said articles in the receptacle.

9. A positioning and stacking device comprising a removable separator member including two vanes adapted to extend angularly downwardly into a receptacle, said vanes being disposed in spaced and overlapping relation and defining a horizontal slot, means supporting said vanes for swinging movement to and away from each other to alternately reduce and increase the width of said slot, and means for vibrating said supporting means to cause swinging movement of said vanes, whereby elongated articles fed to said separator member are first oriented axially in a horizontal plane and to extend in a predetermined direction and then discharged to said receptacle for parallel stacking of said articles in said receptacle.

10. A device for positioning in parallel relation and stacking for storage in a receptacle a plurality of elongated articles, comprising means for similarly axially orienting successive ones of said articles, and means for stacking said axially oriented articles in said receptacle while preserving the axial orientation thereof, said first named means including two relatively movable members defining a slot, said second named means comprising two vertical planar partitions having upper edges supporting said movable members for swinging movements, whereby said slot is successively narrowed and widened, said partitions being spaced from each other for providing a relatively narrow space in said receptacle for receipt of said articles, whereby said articles are stacked in said space and restrained from movements away from said axial orientation thereof.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,886,122	Rose	Nov. 1, 1932
1,928,541	Orstrom	Sept. 26, 1933
1,986,215	Orstrom	Jan. 1, 1935
2,031,005	Renfroe	Feb. 18, 1936
2,429,071	Pirie	Oct. 14, 1947
2,440,866	Malhiot	May 4, 1948