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3,567,216

AUTOMATIC LEVELLING DEVICE FOR A FEEDING UNIT ON AN OFFSET
PRINTING MACHINE OR THE LIKE

Filed Dec. 13, 1968

2 Sheets-Sheet 1

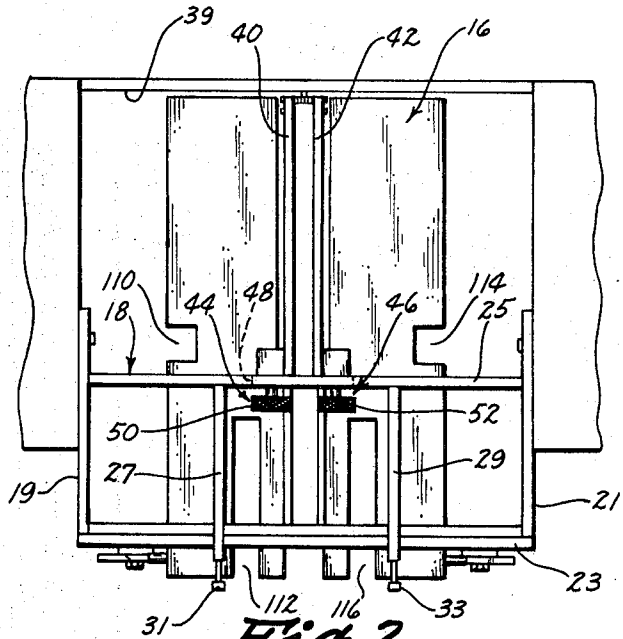
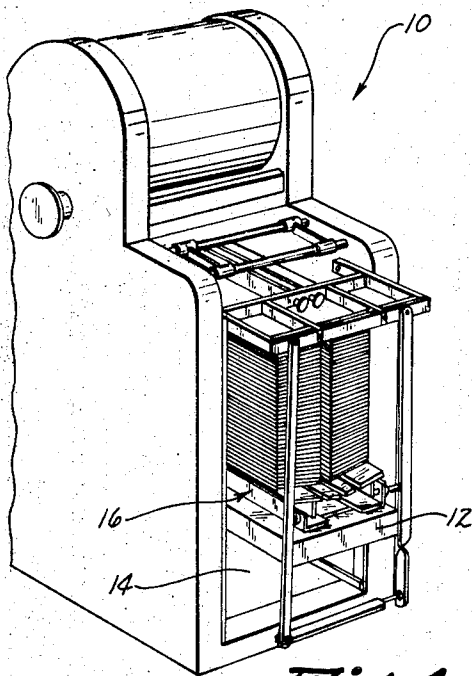


Fig. 2

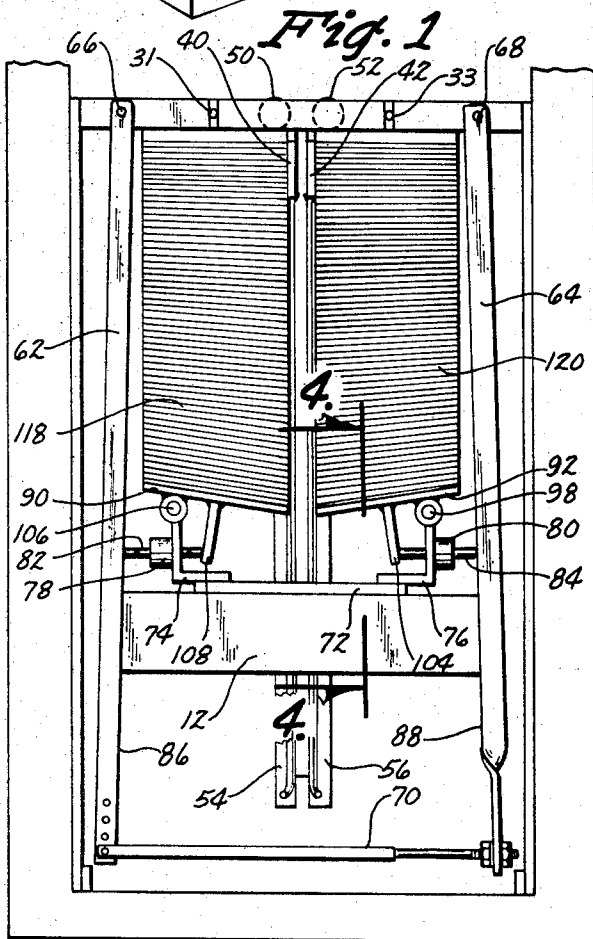


Fig. 3

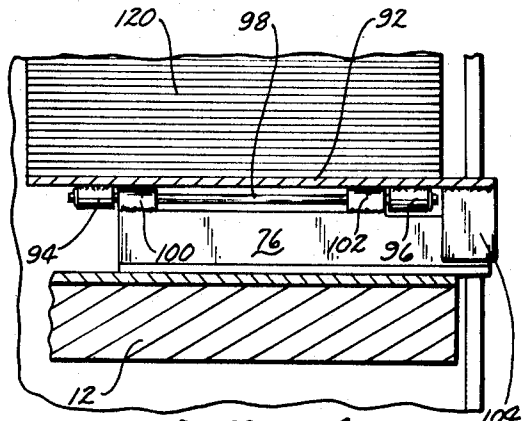


Fig. 4

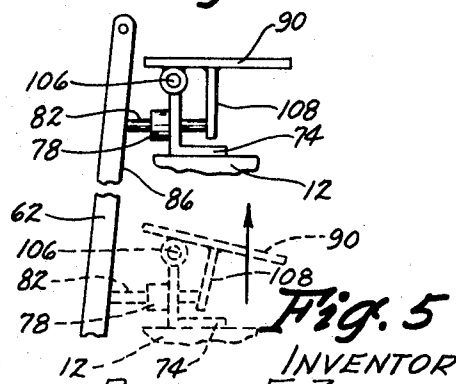


Fig. 5

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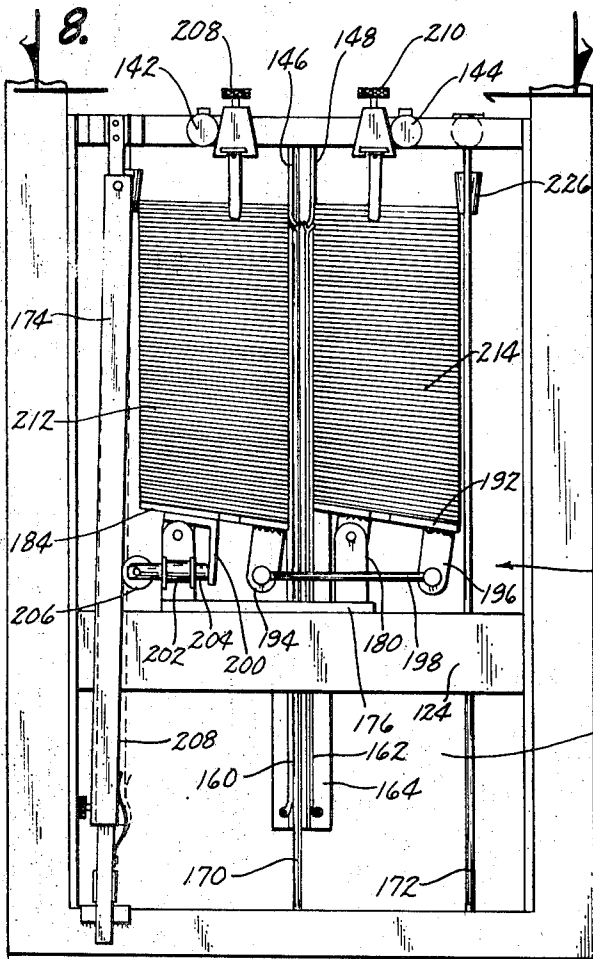


Fig. 6

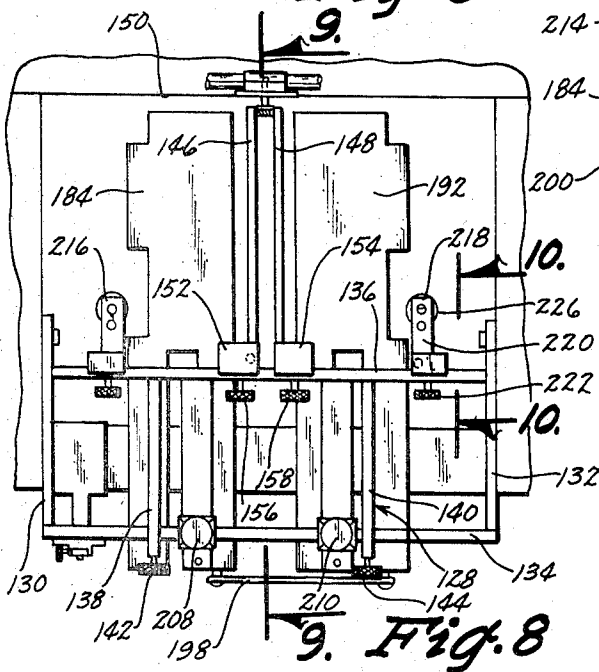


Fig. 8

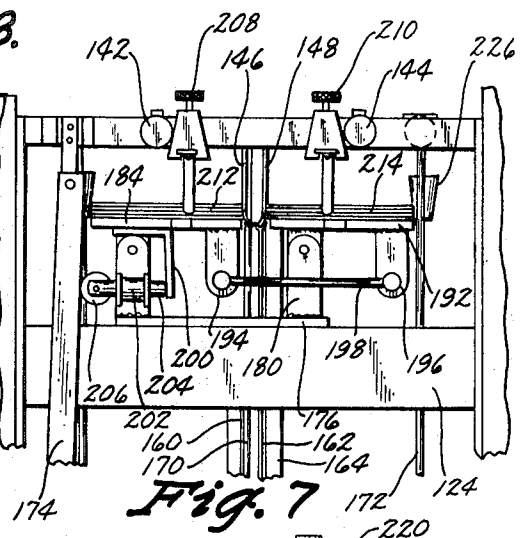


Fig. 7

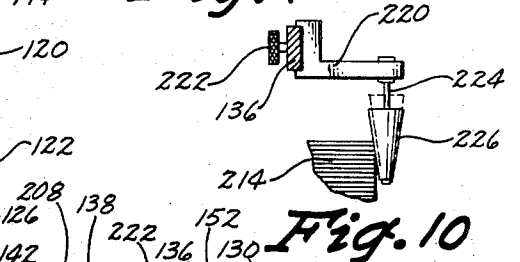


Fig. 10

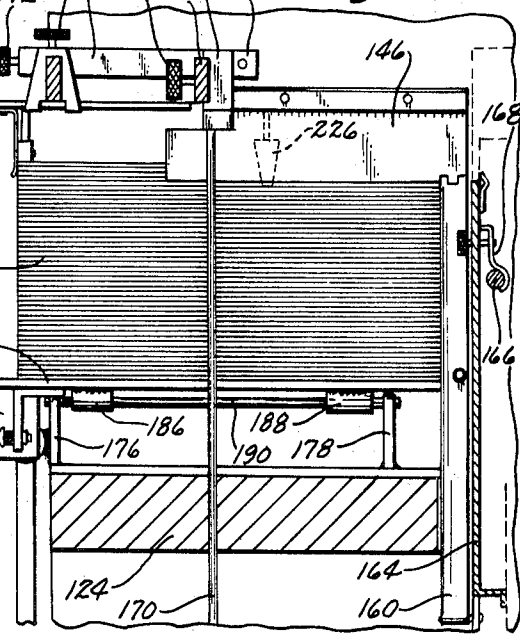


Fig. 9

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AUTOMATIC LEVELLING DEVICE FOR A FEEDING UNIT ON AN OFFSET PRINTING MACHINE OR THE LIKE

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4 Claims

ABSTRACT OF THE DISCLOSURE

An automatic stock levelling device for the feeding unit on an offset printing machine or the like including a vertically disposed frame means adapted to be detachably secured to the machine at the feed end thereof. A support means is vertically movably mounted in the frame means and is progressively raised during the printing operation by the machine feed tray. A pair of pivotal stock support plates are pivotally mounted about a horizontal axis on the support means and are automatically maintained at an angle to the horizontal sufficient to maintain the top of the stock material in a level condition. A pair of substantially vertically disposed spaced apart guide elements are pivotally secured at their upper ends to the frame means and are positioned at opposite sides of the support plates. The distance between the upper ends of the guide elements is less than the distance between the lower ends thereof. Each of the support plates are operatively connected to one of the guide elements by a pin means extending therebetween so that the plates will be progressively pivoted towards the horizontal as the feed tray progressively raises the support means due to the decreasing distance between the guide elements. The progressive pivotal movement of the plates to the horizontal insures that the upper stock member will be in a level condition regardless of the amount of stock on the plates. A modified form of the device is also disclosed and includes a pair of pivotal stock support plates which are pivotally mounted about a horizontal axis on the support means and which are automatically maintained at an angle to the horizontal sufficient to maintain the top of the stock material in a level condition. A single inclined guide element is mounted on the machine at one side of the stock support plates. One of the stock support plates has a cam follower mechanism movably mounted thereon which engages the guide element to cause the stock support plate to be progressively pivotally moved to a horizontal condition as the machine feed tray is raised during the printing operation. A linkage means interconnects the stock support plates to co-ordinate the pivotal movement thereof. Means is also provided to provide the proper tension on the stock material and consists of a substantially inverted cone-shaped member which is vertically movable and rotatably mounted adjacent one side of the stock positioned on the stock support plates.

The feeding of stock materials having an irregular thickness is a problem which has plagued the printing industry for some time. For example, envelopes on one long side have two thicknesses of material while on the opposite side, there are three thicknesses, the closure flap being the third thickness. When a large number of envelopes are stacked, the stack will not be level and thus creates a problem in top feeding the envelopes into an offset printing machine or the like. Additionally, the conventional feeding units for offset printing machines can accommodate only one stack of envelopes. The automatic levelling unit of this invention is especially well

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adapted for use with an offset printing machine such as is manufactured by the A. B. Dick Company but is suited for application in other fields where feeding of materials of irregular thickness occurs.

Therefore, it is a principal object of this invention to provide an automatic levelling device for a feeding unit.

A further object of this invention is to provide an automatic stock leveling device for a printing machine feeding unit or the like.

A further object of this invention is to provide an automatic stock levelling device for an offset printing machine feeding unit which accommodates two stacks of envelopes.

A further object of this invention is to provide an automatic stock levelling device for an offset printing machine feeding unit wherein the upper stock member will be maintained in a level condition regardless of the amount of stock on the feeding unit.

A further object of this invention is to provide an automatic stock levelling device which is adjustable.

A further object of this invention is to provide a means for maintaining proper tension on the stock positioned on the stock support plates to insure efficient feeding of the stock material.

A further object of this invention is to provide an automatic levelling device for the feeding unit of an offset printing machine which is economical to manufacture, durable in use and refined in appearance.

These and other objects will be apparent to those skilled in the art.

This invention consists in the construction, arrangements, and combination of the various parts of the device, whereby the objects contemplated are attained as hereinafter more fully set forth, specifically pointed out in the claims, and illustrated in the accompanying drawings in which:

FIG. 1 is a partial perspective view of an offset printing machine having the levelling device secured thereto;

FIG. 2 is a top plan view of the levelling device of this invention;

FIG. 3 is a front elevational view of the levelling device mounted on the offset printing machine;

FIG. 4 is a partial enlarged sectional view as seen along lines 4-4 of FIG. 3;

FIG. 5 is a partial front elevational view of one of the pivotal support plates and its relationship with its respective side element, the broken lines illustrating the support plate in a lowered position;

FIG. 6 is a front elevational view of a modified form of the levelling device mounted on the offset printing machine;

FIG. 7 is a fragmentary front elevational view similar to that of FIG. 6 illustrating the feed tray of the machine in a raised condition with respect to that of FIG. 6;

FIG. 8 is a partial top elevational view as would be seen on lines 8-8 of FIG. 6;

FIG. 9 is a sectional view as seen along lines 9-9 of FIG. 8; and

FIG. 10 is an enlarged sectional view as would be seen along lines 10-10 of FIG. 8.

With respect to the embodiment of FIGS. 1-5, the numeral 10 generally designates a conventional offset printing machine such as manufactured by the A. B. Dick Company which includes a feed tray 12 which is raised with respect to the opening 14 during the printing operation. The levelling device of this embodiment is generally designated by the reference numeral 16 and includes an upper frame means 18 detachably secured to machine 10. Machine 10 includes a pair of supports 19 and 21 having a support means 23 secured thereto and extending therebetween as best seen in FIG. 2. Frame means 18 includes

a transverse frame member 25 having spaced apart frame members 27 and 29 secured thereto and extending horizontally transversely therefrom. The opposite outer ends of frame member 25 is notched to permit frame member 25 to be removably supported on supports 19 and 21. Frame members 27 and 29 have notches formed therein which extend upwardly into the bottom side thereof adjacent their outer ends so that the support means 23 can be removably received thereby. Bolts 31 and 33 threadably extend inwardly into the ends of frame members 27 and 29 respectively, the inner ends of which are adapted to engage the support means 23 to maintain the frame means 18 on the machine 10. The numerals 35 and 37 generally designate opposite walls of the machine defining the opening 14 to which the supports 19 and 21 are secured by any convenient means such as bolts or the like.

A pair of spaced apart, movable vertical plates 40 and 42 are positioned between frame member 25 and the wall 39 of the machine 10 and have adjustment bolt assemblies 44 and 46 secured to their upper outer ends respectively thereof by any convenient means. The adjustment bolt assemblies 44 and 46 each include an elongated bolt portion which extends outwardly through a slot 48 formed in frame member 25. The plates 40 and 42 are selectively maintained in a fixed position with respect to frame member 25 and wall 39 by thumb nuts 50 and 52 which are threadably mounted on the bolt portions of the adjustment bolt assemblies 44 and 46 respectively. The numerals 54 and 56 generally refer to vertically disposed angles which are secured to the lower inner ends of plates 40 and 42 respectively and which extend downwardly therefrom. Preferably, the lower ends of angles 54 and 56 are pivotally secured about a horizontal axis to a suitable support means on the machine 10.

The numerals 62 and 64 generally designate a pair of spaced apart substantially vertically disposed guide elements which are pivotally connected at their upper ends to support means 23 by pins 66 and 68 respectively. The lower ends of the guide elements 62 and 64 are interconnected by an adjustment bolt assembly 70 which can be adjusted to vary the distance between the lower ends of the guide elements. A flat plate 72 is suitably mounted on the tray 12 and has a pair of elongated angles 74 and 76 secured thereto by any convenient means at opposite sides thereof. Collars 78 and 80 are secured to the angles 74 and 76 respectively by any convenient means such as welding or the like as seen in FIG. 3. The angles 74 and 76 and the collars 78 and 80 are adapted to have actuating cam pins 82 and 84 slidably extending therethrough. As seen in FIG. 3, the outer ends of the pins 82 and 84 engage the inner surface of 86 and 88 of the guides 62 and 64 respectively. Support plates 90 and 92 are pivotally connected to the upper ends of the angles 74 and 76 in the manner illustrated in FIG. 4. As seen in FIG. 4, plate 92 has a pair of spaced apart tubes 94 and 96 secured to its under side by welding or the like adapted to receive a rod 98 extending therethrough. Angle 76 is provided with a pair of spaced apart collars 100 and 102 secured thereto and extending upwardly therefrom which are also adapted to receive the rod 98 to effect the pivotal connection between the angle 76 and the plate 92. A tab 104 is welded to the under side of plate 92 and extends downwardly therefrom and is engaged by the inner ends of the pin 84 as seen in FIG. 3. As seen in FIG. 3, a rod 106 pivotally interconnects the angle 74 and the plate 90. As also seen in FIG. 3, a tab 108 extends downwardly from plate 90 to engage the inner end of pin 82. Plate 90 is provided with slots 110 and 112 formed therein while plate 92 is provided with slots 114 and 116 provided therein which are adapted to receive guide elements on the machine 10. The numeral 118 generally refers to a plurality of envelopes mounted on the plate 90 while the numeral 120 generally refers to a plurality of envelopes mounted on the plate 92.

In operation, the tray 12 would be lowered to a suitable

position to facilitate the placement of the envelopes 118 and 120 on the plates 90 and 92 respectively and such position would necessarily depend upon the amount of envelopes which were placed on the plates. The broken lines in FIG. 5 illustrate the relationship of the guide 62 and the support plate 90 when the tray 12 is in a lowered position while the solid lines in FIG. 5 illustrate the relationship between the component parts when the tray 12 has been raised from the position seen in broken lines. Thus, when a large number of envelopes are placed on the plates 90 and 92, the tray 12 would necessarily be lowered to accommodate the same. The pivotal relationship of the plates 90 and 92 with respect to the tray 12 will be changed depending upon the positioning of the tray 12 with respect to the guides 62 and 64. For example, as the tray 12 is raised, the pins 82 and 84 which ride along the inner surfaces 86 and 88 of guides 62 and 64 respectively will be moved inwardly through the collars 78 and 80 respectively to cause the plates 90 and 92 to be moved upwardly to a more nearly horizontal position. Thus, the pivotal support plates are disposed at an angle to the horizontal sufficient to maintain the top envelope in a level condition regardless of the number of envelopes which are placed on the plates 90 and 92. The support plates 90 and 92 are automatically pivoted towards the horizontal as the tray 12 is moved upwardly by the machine 10 during the printing operation of the envelopes. The plates 40 and 42 serve as guides for the envelopes and the relationship therewith may be adjusted through the use of the thumb screws 50 and 52.

The modified form of the embodiment is illustrated in FIGS. 6-10 and is generally designated by the reference numeral 120. The numeral 122 generally designates a conventional offset printing machine such as illustrated in FIGS. 1-5 and which includes a feed tray 124 which is raised with respect to the opening 126 during the printing operation. Levelling device 120 includes an upper frame means 128 detachably secured to the machine 122. Machine 122 includes a pair of supports 130 and 132 having a support means 134 secured thereto and extending therebetween as best seen in FIG. 8. Frame means 128 includes a transverse frame member 136 having spaced apart frame members 138 and 140 secured thereto and extending horizontally transversely therefrom. The opposite outer ends of frame member 136 is notched to permit frame member 136 to be removably supported on supports 130 and 132. Frame members 138 and 140 have notches formed therein which extend upwardly into the bottom thereof adjacent their outer ends so that support means 134 can be removably received thereby. Bolts 142 and 144 threadably extend inwardly into the ends of frame members 138 and 140 respectively, the inner ends of which are adapted to engage the support means 134 to maintain the frame means 128 on the machine 122.

A pair of movable vertical plates 146 and 148 are positioned between wall 150 of machine 122 and frame member 136 and have adjustment bolt assemblies 152 and 154 secured to the upper ends thereof adjacent the outer ends thereof by any convenient means. The adjustment bolt assemblies 152 and 154 include an elongated bolt portion which extends outwardly through a slot formed in frame member 136. The plates 146 and 148 are selectively maintained in a fixed position with respect to frame member 136 by thumb nuts 156 and 158 which are threadably mounted on the bolt portions of the adjustment bolt assemblies 152 and 154 respectively. The numerals 160 and 162 refer to guides which are detachably secured to the lower inner ends of plates 146 and 148 respectively and which extend downwardly therefrom. The lower ends of guides 160 and 162 are pivotally connected to a plate means 164 which is detachably secured to the machine 122 in the manner illustrated in FIG. 9. As seen in FIG. 9, the upper end of plate 164 is detachably connected to the shaft 166 of the machine 122 by a clamp means 168.

The numerals 170 and 172 generally refer to guide

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rods which extend upwardly from the lower end of the machine 122 through the feed tray 124 and which are detachably secured to the frame member 136. An inclined guide element 174 is secured at its upper end to the support means 134 and has its lower end detachably secured to the machine 122 as best illustrated in FIG. 6. A flat plate 176 is suitably mounted on the tray 124 and has a pair of spaced apart ears 176 and 178 secured thereto adjacent one side thereof which extend upwardly therefrom as illustrated in FIG. 9. Plate 176 also has a pair of spaced apart ears 180 and 182 (not shown) which are secured thereto adjacent the other side thereof and which extend upwardly therefrom. As seen in FIG. 9, a stock support plate 184 has a pair of tubes 186 and 188 secured to the under side thereof which pivotally receive a rod 190 extending therethrough. The opposite ends of rod 190 are received by the ears 176 and 178 to effect the pivotal connection between the plate 184 and the ears 176 and 178. A stock support plate 192 is pivotally connected to the upper ends of the ears 180 and 182 in a manner identical to the pivotal connection of the plate 184 with the ears 176 and 178. As illustrated in FIGS. 6 and 7, plates 184 and 192 have ears 194 and 196 secured to the lower ends thereof which extend downwardly therefrom and which are interconnected by a link arm 198 pivotally connected thereto and extending therebetween. Plate 184 is also provided with a bracket 200 secured to the under side thereof and extending downwardly therefrom. The numeral 202 refers to a hollow tube rigidly secured to the ear 176 and having a shaft 204 slidably mounted therein. One end of shaft 204 has a cam roller 206 rotatably mounted thereon adapted to engage the inner edge 208 of the guide element 174. The other end of the shaft 208 engages the bracket 200 as illustrated in FIGS. 6 and 7.

A pair of detachable assemblies 208 and 210 are provided on the support means 134 and include resilient means thereon adapted to apply suitable pressure on the uppermost envelope on the plates 184 and 192 to insure proper feeding of the envelopes into the machine. The envelopes on the plate 184 are generally designated by the reference numeral 212 while the envelopes on the plate 192 are designated by the reference numeral 214. A pair of spaced apart assemblies 216 and 218 are detachably secured to the frame member 136 adjacent opposite sides of the envelopes 212 and 214 respectively (FIG. 6) and are adapted to apply a proper lateral pressure to the envelopes, regardless of variations in the width thereof, to insure proper feeding of the envelopes into the machine. Inasmuch as the assemblies 216 and 218 are identical, only assembly 218 will be described in detail. Assembly 218 includes a bracket 220 which is detachably secured to the frame member 136 by a thumb screw 222. A shaft 224 is secured to the free end of the bracket 220 and extends downwardly therefrom. An inverted conical-shaped spool 226 is rotatably mounted on the shaft 224 and is vertically movable thereon as best illustrated in FIG. 10. As seen in FIG. 10, the spool 226 engages the sides of the uppermost envelopes 214 to apply lateral pressure or tension thereon to the left as viewed in FIG. 10 so that the envelopes will be maintained in a proper relationship against the plate 148. The conical shape of the spool 226 together with its vertical movement on the shaft 224 permits the spool 226 to automatically compensate for any variance in the widths of the individual elements. It has been found that the widths of the envelopes can vary and it has been heretofore impossible to apply uniform pressure on the envelopes to insure proper feeding thereof into the machine.

In operation, the tray 124 will be lowered to a suitable position to facilitate the placement of the envelopes 212 and 214 on the plates 184 and 192 respectively and such position would necessarily depend upon the amount of envelopes which were placed on the plates. FIG. 6 illustrates the relationship of the plates 184 and 192 when

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the tray 124 has been raised somewhat from the lower end of the machine and FIG. 7 illustrates the relationship of the component parts when the tray 124 has been almost raised to its upper limit. Thus, when a large number of envelopes are placed on the plates 184 and 192, the tray 124 would necessarily be lowered to accommodate the same. The pivotal relationship of the plates 184 and 192 with respect to the tray 124 will be changed depending upon the positioning of the tray 124 with respect to the guide 174. For example, as the tray 124 is raised, the cam roller 206 will ride along the inner surface 208 of the guide 174 which will cause the shaft 204 to be slidably moved inwardly through the tube 208 which will cause the bracket 200 to plate 184 to be progressively pivoted to a horizontal condition. Plate 192 will be simultaneously pivoted with respect to the plate 184 due to the interconnection therebetween by the link arm 198. Thus, the pivotal support plates 184 and 192 are disposed at an angle to the horizontal sufficient to maintain the top envelope in a level condition regardless of the number of envelopes which are placed on the plates 184 and 192. The support plates 184 and 192 are automatically pivoted towards the horizontal as the tray 124 is moved upwardly by the machine 10 during the printing operation of the envelopes. The plates 146 and 148 serve as guides for the envelopes and the relationship therewith may be adjusted through the use of the thumb screws 156 and 158.

Thus it can be seen that a unique automatic levelling device has been provided to permit the feeding of stock materials having an irregular thickness wherein the uppermost stock material is maintained in a level condition to assure that the stock material will be fed to the machine in a uniform and efficient manner. While the device has been described as being especially well adapted for use with an offset printing machine such as manufactured by the A. B. Dick Company, it should be noted that the device could be applied in other fields where feeding of materials of irregular thickness occurs. It can also be seen that a unique means has been provided to insure that the proper tension is applied to the stock material to insure efficient feeding operations thereof. Thus it can be seen that the device accomplishes at least all of its stated objectives.

Some changes may be made in the construction and arrangement of my Automatic Leveling Device for a Feeding Unit on an Offset Printing Machine or the Like without departing from the real spirit and purpose of my invention, and it is my intention to cover by my claims, any modified forms of structure or use of mechanical equivalents which may be reasonably included within their scope.

I claim:

1. A machine having a stock receiving end and a stock feed bed vertically movably mounted at said receiving end, and a stock levelling device comprising:

- a stock support plate for providing the total support for stock placed thereon and being pivotally supported on said feed bed for pivotal movement about an axis parallel to the direction of travel of stock into said stock receiving end of said machine, said pivotal axis extending closely adjacent one longitudinal side of said support plate,
- a downwardly extending tab secured to said stock support plate laterally inwardly offset from said pivotal axis,
- a vertical guide member extending between the upper and lower limits of travel of said feed bed and positioned laterally outwardly of said pivotal stock support plate, said guide member being inclined outwardly from the top to the bottom thereof,
- a horizontally disposed actuating cam element slidably secured to said pivotal stock plate for lateral movement relative to said stock plate, said actuating cam element having a roller means on its outer end en-

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gaging said vertical guide member and said inner end operatively engaging said downwardly extending tab whereby the upward movement of said feed bed causes said inclined vertical guide member to slidably move said guide element laterally inwardly against said downwardly extending tab causing said pivotal support plate to be pivoted towards a horizontal position.

2. The structure of claim 1 wherein a second stock support plate is pivotally supported on said feed bed for pivotal movement about an axis parallel to the direction of travel of stock into said stock receiving end of said machine, said pivotal axis extending closely adjacent the longitudinal side of said second support plate adjacent said first support plate, a downwardly extending connecting element on each of said first and second pivotal support plates laterally remote from their respective pivotal axes, and a link arm pivotally interconnecting said connecting elements whereby said first and second pivotal support plates will be progressively pivoted together towards a horizontal position as said feed bed is raised with respect to the receiving end of said machine.

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3. The structure of claim 2 wherein said machine is a printing machine and said stock on each of said pivotal support plates is a stack of envelopes.

4. The device of claim 1 wherein a vertically movable element is positioned on said machine over and at one side of the stock on said stock support plate at the upper end thereof, said element consisting of an inverted conical member being vertically and rotatably movable on a vertical shaft to exert a predetermined force on one side of said stock, said conical member normally being positioned on the lower end of said shaft.

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