Feb. 5, 1929. 1,700,893

G. MEYER-JAGENBERG

PAPER BOX MACHINE AND THE LIKE

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Fig. 1.

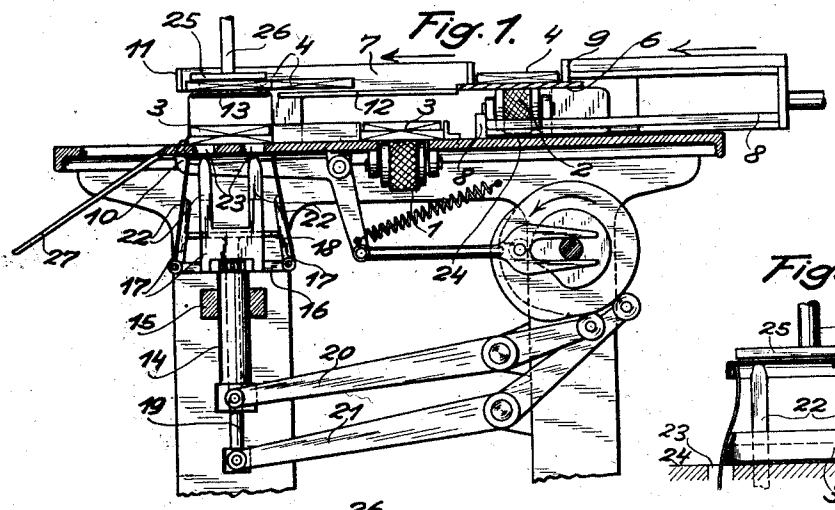


Fig. 4.

Fig. 2.

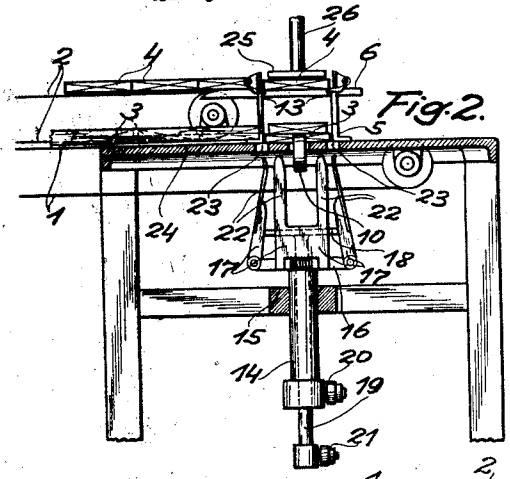


Fig. 5.

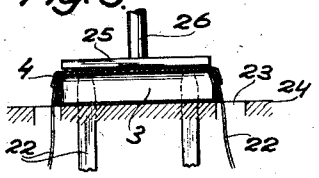


Fig. 6.

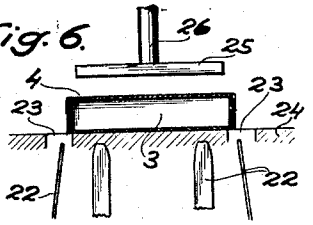


Fig. 7.

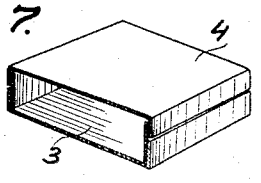
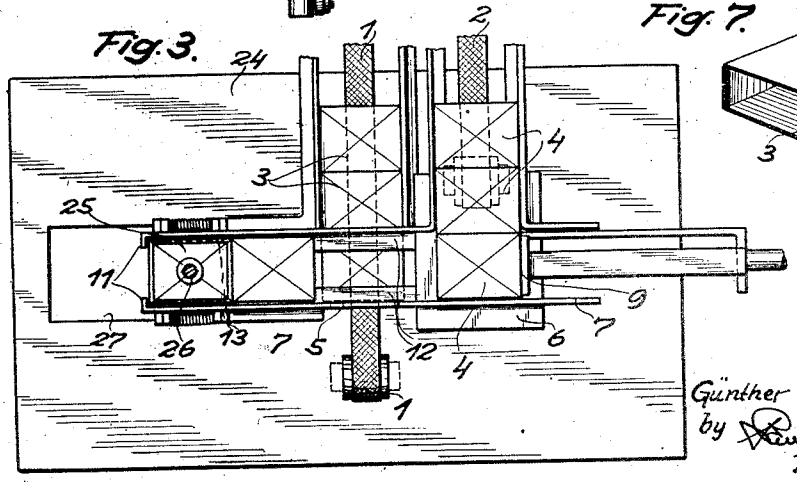


Fig. 3.



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PAPER BOX MACHINE AND THE LIKE

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Fig. 8.

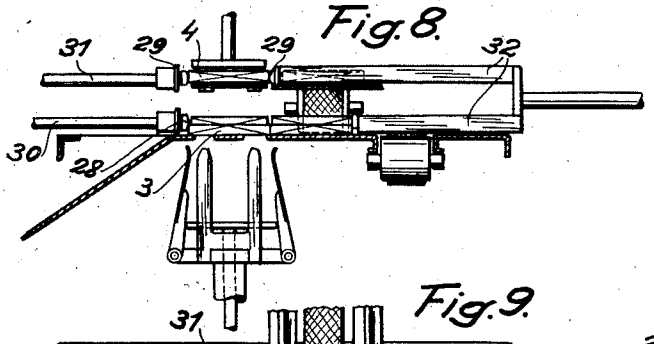


Fig. 10.

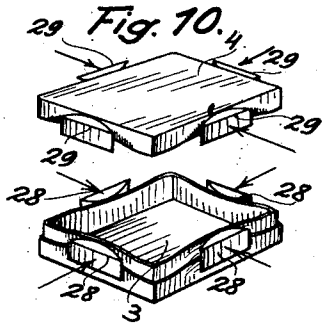


Fig. 9.

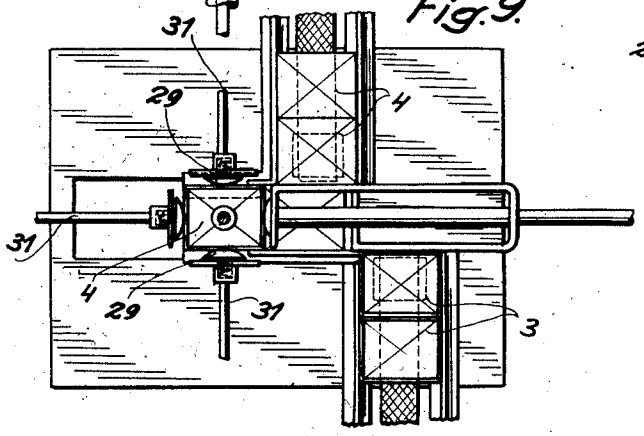


Fig. 11.

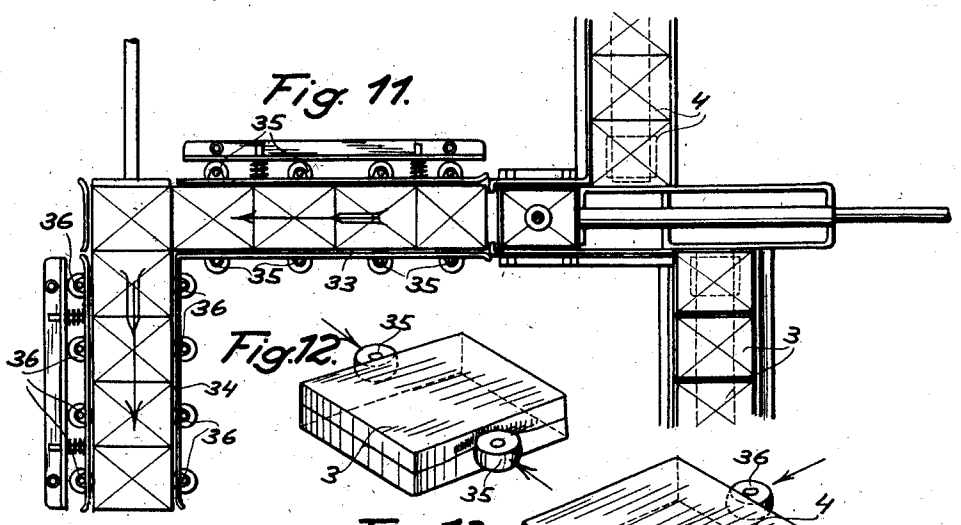
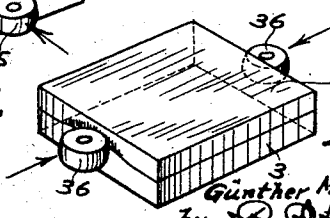


Fig. 12.

Fig. 13.



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by [illegible]

Attorney

Patented Feb. 5, 1929. 1,700,893

UNITED STATES PATENT OFFICE.

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PAPER-BOX MACHINE AND THE LIKE.

Application filed May 16, 1927, Serial No. 191,666, and in Germany May 12, 1926.

This invention refers broadly to improvements in the manufacture of paper or cardboard boxes and the like and in particular to that part of the art in which the cover or lid of the box is mounted automatically and an rapid succession upon the body or base part of the box, and it is intended to generally improve the process of manufacture and the machinery employed in connection therewith. In view thereof and in accordance with this invention the base parts of the boxes and the lids are fed separately and at different levels into the device according to this invention and are moved past each other whereupon the cover or lid is mounted upon the base part of the box by means of special guide members. The box sections are preferably fed to the device by means of conveying belts or aprons movable in parallel relation to each other and alternatingly or staggeringly arranged, means being provided in connection with the device according to the invention to cause the most advanced lid or base section to be placed by slides or the like in superposed relation and to be then assembled to each other, whereupon the thus connected box sections may be fed, if desired, into a device or part of machinery by means of which they may for instance be provided with a wrapper of paper or the like. The supporting and guiding means for the box sections at the point of closure or assemblage are arranged in such a manner that the box sections before the mounting of the cover or lid may be automatically trued or smoothened with accuracy, means being provided to adjust and to compensate any inaccuracies of the edges of the box sections so that in every case the lid or cover may be mounted upon the base section of the box in the regular run of the machine and without any interfering disturbance.

The invention will be more particularly described by reference to the accompanying drawings showing by way of example some forms of preferred embodiment of the principles of the invention in Fig. 1 in vertical longitudinal section, and in Fig. 2 in vertical transverse section, and in Fig. 3 in plan view. Figures 4–6 illustrate the mode of operation of the device for the assembling of the box sections; and Fig. 7 is a perspective of the entire box. In Figures 8–10 a modification is shown which is particularly adapted for the smoothening and truing of the walls of the box, Fig. 8 showing the parts in front elevation and Fig. 9 in plan view, and Fig. 10 the mode of operation of this part of the device as applied to the truing of the walls. Fig. 11 is another modification and Figs. 12 and 13 illustrate the mode of operation of the modification according to Fig. 11.

The box sections are conveyed into the machine by means of the aprons or conveyor belts 1, 2 which are alternatingly arranged and upon which the base sections 3 and the covers or lids 4 are respectively mounted closely adjacent to each other. The mounting of the box sections may be effected manually or by machinery in which case the assembling device may be directly united to the box making machine. The aprons 1, 2 are disposed at different levels and in such a manner that the base sections 3 of the boxes are moved at the level of the machine table against a stop 5 while the covers 4 are fed onto a plate 6 in a guide frame 7. The apron or belt 2 and the plate 6 are spacedly disposed above the machine table 24 which corresponds to a multiple of the heights of the boxes. A slide 8, 9 which is reciprocated transversely to the belts or aprons moves those box sections 3, 4 which have been the furthest advanced towards the point of assemblage, causing the base section 3 of the box to come in contact with a movable stop 10 which is controlled by a cam disc or the like, while the cover 4 is moved against the stationary stops 11. In the forward movement of the covers or lids 4 they slide from the plate 6 onto the stationary supporting bars 12 and then upon the spring actuated (yielding) stops 13. Underneath the base part 3 which rests against the stops 10 a hollow bar or tube 14 is vertically reciprocated in the frame 15 and its head plate 16 carries the levers 17 pivotally secured thereto and spring actingly forced against the plate 18. This plate 18 is movably connected to the rod 19 which is movable in the tubular bar 14. The parts 14, 19 are controlled in any suitable manner, thus for instance by means of cam discs and by the levers 20, 21 cooperating therewith. On the levers 17 thin plate spring fingers 22 are connected which upon the raising of the tubular bar 14 are adapted to pass through slots 23 of the machine table 24. Above the cover or lid 4 resting against the stop 11 a plunger or piston 25 is reciprocatingly guided which is moved in a manner not shown in the drawing by a piston rod 26 which is controlled in any suitable manner. This plung-

er 25 when pressed downward forces the cover section 4 past the stops, which yield outwardly to allow the cover section to pass downwardly.

The device operates substantially as follows:—The box sections 3, 4 which are fed to the machine by the belts or aprons 2 are moved in succession towards the point of assemblage by means of the slides 8, 9 where they are made to rest against the stops 10, 11. Then the spring acting fingers 22 are raised and are moved past and about the base section 3, and are then allowed to move inwards which movement is produced by first raising the plate 18 together with the tubular bar 14 and then moving the plate 18 with relation to the levers 17; in the highest position the ends of the spring fingers 22 have passed through the apertures of the table and have entered into the covers or lids 4 (Fig. 4). Now, the cover is lowered, while the spring fingers 22 and the plunger 25 are descending together and retain the cover between them which slides along the spring actingly yielding supporting bars 13. As soon as the cover approaches the base section of the box the ends of the spring fingers 22 are moved outwards causing the cover to be trued and smoothened and to be adjusted with relation to the base section. This will cause the edges of the cover in some cases to be bent somewhat outwards, while the edges of the body of the box are forced somewhat inwards so that the cover will be engaged with the body or base part of the box free from obstructions (Fig. 5), whereupon the spring fingers 22 are returned to their initial position (Fig. 6). This terminates one cycle of operations; the slides 8, 9 feed the next succeeding box sections into the machine, while the assembled finished box is discharged from the machine past the previously withdrawn stop 10 and by means of a chute or conveyor or the like 27 and may be introduced into a labelling machine or wrapping machine or the like.

The guiding members for the box sections and other parts of the machine may be made adjustable, in order to be able to operate on pieces of work of different sizes. With a corresponding arrangement of the spring fingers 22 the invention is also applicable to oval shaped and round boxes in the manner described, the operation being accompanied by an automatic truning and adjustment of inaccuracies of the box sections. On account of the accuracy of operation of the machine it may be worked at very high speed.

In Figures 8–13 special means are shown for the truing of the edges and the walls of the box sections, and by means thereof the walls or edges of the box sections before or after assembling them into a finished box are treated with the pressing means adapted to force the resilient material inwards to such an extent that any of the edges or walls which by slight inaccuracies or deficiencies of operation have become bulged outwards are relieved from the irregularities of tension and by their elasticity after the release of the pressing means will assume the regular vertical and straight position with relation to each other instead of the unsightly bulged out appearance which interferes greatly with the normal and regular assembling of the different box sections.

Pressing dies, plungers or the like 28 and respectively 29 may be employed for the purpose mentioned which are arranged at the point of assemblage of the box sections and which, after the box sections have been fed to the point of assemblage will exert an inwardly directed pressure against the edges of the box sections at all four sides thereof. The dies or plungers 28, 29 are rounded off or provided with torous thickened portions at the point of pressure and are moved for instance by the rods 30, 31 or in another suitable manner. They may however also be stationarily or spring actingly arranged. Either one of the pressing members may be preferably mounted on the feeding slide 32 for the box sections, while the pressing members opposite therefrom may serve as stops for the advanced box sections. After the pressure has been produced the box sections are assembled in the manner hereinbefore described.

In Fig. 11 of the drawing a modification is shown in which the readily assembled boxes 3, 4 after their discharge from the assembling device are moved through channels or passages 33, 34 disposed at right angle to each other and the side walls of which are provided with resilient or spring acting pressure rollers 35, 36. These rollers force the narrow sides of the boxes during their travel in the first place against the longer side of the boxes, and then the transverse sides are all forced inwards, as clearly appears from Figures 11–13 of the drawing.

While the invention has been shown and described by reference to what I consider preferred constructions it should be understood that the principles of the invention may be embodied in other exemplifications and modifications without thereby deviating from the spirit of the invention, as particularly defined in the appended claims.

I claim:—

1. In a box making machine, in combination, separate means for bringing a box body and a box cover into alined position for assemblage, means to move the cover and the box body into engagement when so alined, guiding members movable about the box body and into the cover for guiding the cover onto the box body, and means for moving said guiding members into such working position and retracting the same upon the assemblage of the box body and the box cover.

2. In a box making machine, in combination, separate means for bringing a box body and a box cover into alined position for assemblage, means to move the cover and the box body into engagement when so alined, resilient guiding fingers movable about the box body and into the cover for guiding the cover onto the box body, and means for moving said guiding fingers into such working position and retracting the same upon the assemblage of the box body and the box cover.

3. In a box-making device in combination, separate, parallel superimposed and laterally staggered feeding and guiding means for the box body and the box cover, pushing means transversely disposed with relation to the guiding means, for moving the body and the cover into vertical axial alignment with each other, stops for holding the box body and cover in such relative positions, and means for bringing the cover and the box body into engagement with each other.

4. In a box-making device in combination, separate, parallel, superimposed, laterally staggered guiding means for the box body and the box cover, pushing means for said box sections cooperating with said guiding means for bringing the box body and cover into superposed relation, and vertically reciprocable means adapted to move the cover and the box into engagement with each other.

5. In a box-making device in combination, separate, parallel, superimposed guiding and feeding means for bringing the box body and cover into non-registering positions at different levels, lateral guiding means, and pushing means cooperating with the lateral guiding means for moving the box body and cover into superimposed axial alignment, vertically reciprocable, laterally movable spring fingers operative in one direction of motion to embrace the box body and engage and support the cover and in the opposite direction of motion to release the box body and bring the cover into engagement therewith, and means for reciprocating said fingers.

6. In a box making machine, feeding and guiding means for bringing a box body and its cover in spaced and superposed relation, means for yieldingly supporting the cover in elevated position, a device having spring fingers movable upwardly to cause the fingers to embrace the box body and engage the cover and movable downwardly to guide the cover into engagement with the box body and to release said body and cover when such engagement is effected, and means for forcing the cover out of engagement with the yielding supporting means and to force the cover while supported by the fingers into engagement with the box body.

7. In a box making machine, feeding and guiding means for bringing a box body and its cover in spaced and superposed relation, means for yieldingly supporting the cover in elevated position, a device having spring fingers movable upwardly to cause the fingers to embrace the box body and engage the cover and movable downwardly to guide the cover into engagement with the box body and to release said body and cover when such engagement is effected, a spreader movable longitudinally of the fingers to permit them to move inwardly to engage the box body and to force them outwardly to release the box body, and means for forcing the cover out of engagement with the yielding supporting means and to force the cover while supported by the fingers into engagement with the box body.

In testimony whereof I affix my signature.

GÜNTHER MEYER-JAGENBERG.