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W. H. GRES  
APPARATUS FOR PRODUCING FOLDED BOXES OR  
CONTAINERS HAVING ADHERED SEAMS

3,292,504

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2 Sheets-Sheet 1

Fig. 1

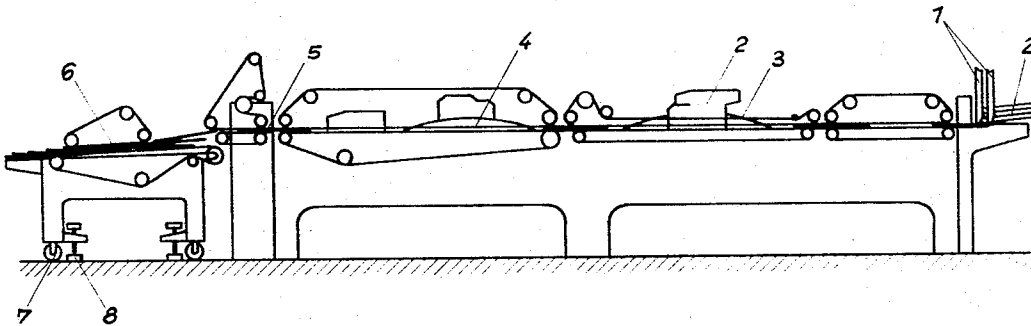


Fig. 2

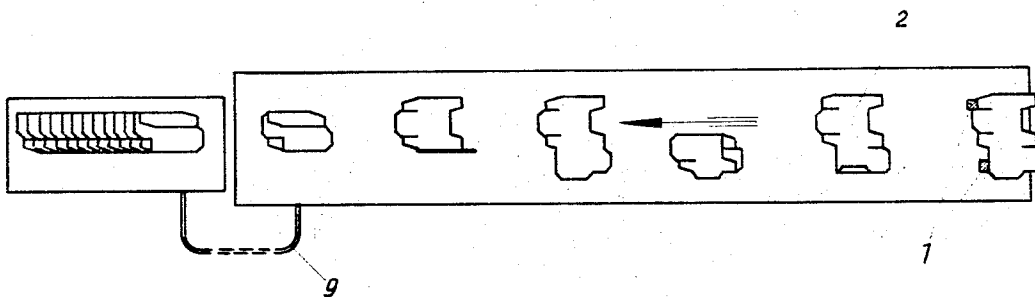
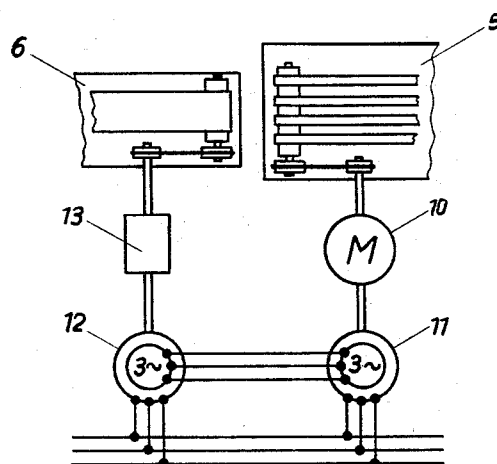


Fig. 3



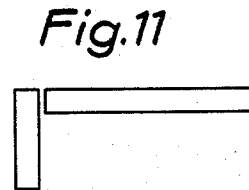
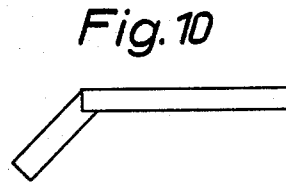
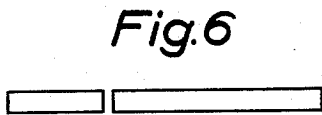
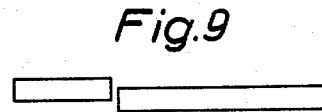
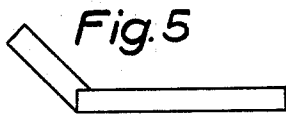
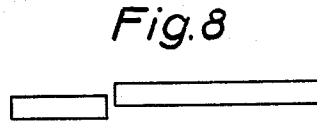
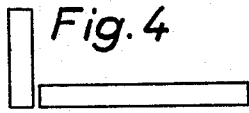
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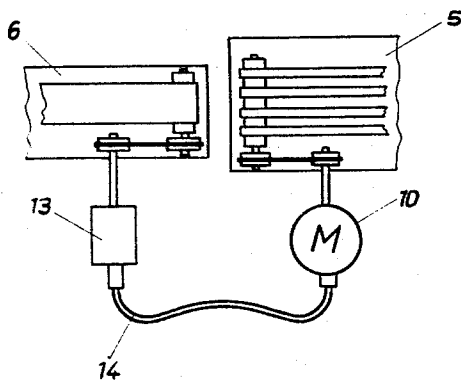
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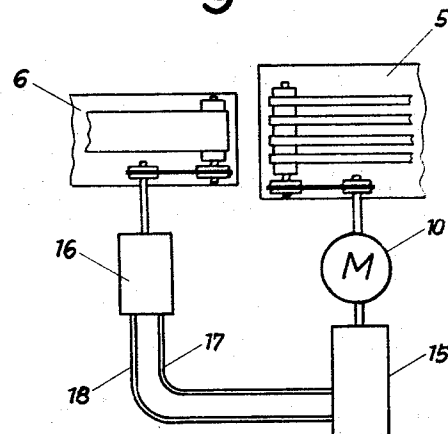
2 Sheets-Sheet 2



*Fig. 12*



*Fig. 13*



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## APPARATUS FOR PRODUCING FOLDED BOXES OR CONTAINERS HAVING ADHERED SEAMS

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8 Claims. (Cl. 93-49)

This invention relates to apparatus for folding and adhesively securing the seam of a box blank provided with a collecting and pressing means located after the folding and securing stations, and more particularly has reference to the arrangement and the driving components for the collecting and pressing means.

Generally, folding box adhering machines function in such a fashion that the flat lying box blanks which have initially been prepared by scoring and punching are withdrawn from a supply source or stack and during their continuous movement through the machine are formed into tubular box blanks by means of folding and adhesively securing their longitudinal seams. The blanks thus treated are ejected or discharged consecutively from the machine in rapid sequence to a collecting and pressing means wherein such blanks are collected and maintained under pressure until the longitudinal seams are well bonded. Due to the substantially slower conveying speed of the collecting and pressing means with respect to the feeding and discharging speeds of the adhering machine, there is a "scale-like" overlapping of the blanks whereby the effective duration of pressure is prolonged.

Dependent upon the type and size of the blank, it is frequently desirable to locate the collecting and pressing means at right angles relative to the folding and adhering machine, and this results in the longitudinal seams being positioned transversely to the conveying direction of the collecting and pressing means. In addition, the space conditions in the building in which the machine is to be installed may require that the collecting and pressing means be arranged at right angles to the folding and adhering machine.

In certain situations it is advantageous to position the collecting and pressing means at an angle of 45° or any other selected angle with respect to the conveying direction of the folding and adhering machine whereby there results an obliquely staggered "scale-like" overlapping of the blanks.

It has been found expedient in still other situations to displace the collecting and pressing means laterally relative to the conveying direction of the folding and adhering machine so as to make the contact pressure effective in a given area or zone without the necessity of shifting or adjusting the collecting and pressing means.

A folding and adhering box machine is known wherein the collecting and pressing means disposed at the end of the machine is swingably mounted in such a manner that the same can be selectively arranged in the conveying direction or transversely to the conveying direction. Needless to say, the requirement of a suitable connection between the folding and adhering machine and the collecting and pressing means limits somewhat the arrangement possibilities. Furthermore, a swingable linkage between the respective components increases the space requirements since the field of traverse of the collecting and pressing means must be maintained open.

Another known embodiment comprehends a collecting and pressing means which can be positioned selectively in the conveying direction or transversely to the conveying direction. Aside from the fact that this structure is limited as to arrangement possibilities, the reloca-

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tion of the collecting and pressing means necessitates additional labor operations in the handling of the fastening components.

It is an object of the present invention to provide a box folding and adhering apparatus which enables the collecting and pressing means connected therewith to be arranged in any desired location relative to the conveying direction of the apparatus without the presence of a close formed connection between the respective units.

By virtue of the invention, it is feasible to easily and rapidly effect an adjustment of the entire apparatus to conform to the particular operational requirements and also allow a better use of the existing space conditions due to the multiple possibilities for arrangement of the collecting and pressing means.

To solve the problems present in the art, the collecting and pressing means which is connected with the box folding and adhering apparatus is defined by a freely mobile assemblage which can extend the direction of conveying of the folding and adhering apparatus in any desired direction and by synchronizing the drives of the collecting and pressing means and the folding and adhering apparatus.

More particularly, the synchronizing of the two drives can be achieved by the use of electrical and/or electronic means and an electro-motor control embodying a so-called electrical, flexible cable would be suitable, for example, as an electrical means, whereas a wireless control embodying a transmitter and receiver would be suitable as an electronic means.

It is further possible to synchronize the respective drives by the employment of a flexible, mechanical or hydraulic power transmission means, and in the first instance a flexible shaft may constitute the driving connection between the respective units, while in the latter case the desired ends could be accomplished by hydraulic motors including suitable control components.

Another advantageous characteristic is the association with the synchronized drive of a regulating means by which the operational speed of the collecting and pressing means can additionally be regulated within fine limits independently of the drive of the folding and adhering apparatus.

Further objects and advantages of the present invention will become more readily apparent to one skilled in the art from the annexed drawings and description, wherein:

FIG. 1 is a side elevational view diagrammatically illustrating a folding and adhering apparatus and collecting and pressing means embodying the present invention;

FIG. 2 is a diagrammatic plan view illustrating the movement of the blanks through the folding and adhering apparatus, and the positioning of such blanks on the collecting and pressing means;

FIG. 3 is a diagrammatic view illustrating the drive control for the collecting and pressing means being achieved by means of the drive of the folding and adhering apparatus;

FIGS. 4 through 11 are plan views illustrating diagrammatically various positional relationships between the folding and adhering apparatus and the collecting and pressing means;

FIG. 12 shows a mechanical transmission of power by means of a flexible shaft; and

FIG. 13 shows a hydraulic transmission of power.

Referring to FIGS. 1 and 2, a box folding and adhering machine is denoted generally "M," and the machine basically includes a feeding assemblage 1 from which flat box blanks 2 are removed, a preliminary folding station 3, a folding and pasting or seam adhering station 4, and a discharger or ejection station 5. A collecting and pres-

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sing apparatus 6 is located behind or after the discharge station 5 for collecting the tubular shaped box blanks in "scale-like" overlapping relationship, and for pressing such overlapped blanks.

It will further be noted that the blanks 2 move sequentially one behind the other through the machine M, and are discharged or ejected at a high speed from the station 5 to the collecting and pressing apparatus 6 which operates at a lower speed than that of the machine M, with the difference in the speeds producing the overlapping relationship of the blanks 2.

As perhaps best shown in FIG. 1, the apparatus 6 is constituted by a freely movable frame F provided with wheels 7 and locking components 8. It is believed readily apparent that when the frame F has been moved to the desired position relative to the machine M, the manipulation of the locking components 8 will hold the frame in its adjusted position. The collecting and pressing apparatus 6 includes a drive connection with the machine M for obtaining and maintaining the desired synchronization of its conveying speed with the conveying speed of the folding and adhering machine M, and such connection is denoted generally C.

In connection with the conveying, folding and pasting means provided for the machine M, these components may be of known type, and such components are not illustrated in detail. These same comments are applicable to the conveying elements provided for the collecting and pressing apparatus 6.

As previously mentioned, the drive of the collecting and pressing apparatus is synchronized with the drive of the machine M, and the means for accomplishing such results are illustrated in FIG. 3. It will be noted that a flexible, electrical conduit means 9 connects the machine M with the apparatus 6, and the drive control includes a multi-phase induction motor 11 driven by a drive motor 10 operably associated with the discharge or ejection station 5 of the machine M. The induction motor 11 functions as a transmitter, and controls multi-phase induction motor 12 which serves as a receiver, and as a drive motor for the collecting and pressing apparatus 6. In order to regulate the drive of the collecting and pressing apparatus 6 independently of the drive of the machine M, there is provided between the induction motor 12 and the apparatus 6 a steplessly regulatable gearing assembly 13.

By virtue of the foregoing arrangement, it is believed quite clear that the drive control provides proper synchronization between the drive of the apparatus 6 and that of the machine M, and by virtue of the component 9 it is possible to position the collecting and pressing apparatus at the desired location relative to the discharge or ejection station 5 of the folding and adhering machine M.

FIGS. 4 to 11 diagrammatically illustrate the various positions which can be assumed by the collecting and pressing means 6 with respect to the machine M. These positions are possible by virtue of the mobility of the apparatus 6, and the drive connection between the apparatus 6 and the machine M.

FIG. 12 shows a mechanical transmission power between the discharge station 5 and the collecting and pressing apparatus 6. In this case the gearing assembly 13 is connected to the motor 10 of the discharge station 5 by means of a flexible shaft 14, so that in this case as well the collecting and pressing apparatus can be arranged as shown in FIGS. 4 to 11.

A further means of power transmission between the discharge station 5 and collecting and pressing apparatus 6 is to use a pump 15 and a hydraulic motor 16, as shown in FIG. 13. In this case, the arrangement is such that the pump 15 is driven by the motor 10. Pump 15 is con-

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nected with the hydraulic motor 16 via the flexible hose-lines 17 and 18, and the hydraulic motor 16 drives the collecting and pressing apparatus 6.

The invention is not to be limited to any strict conformity to the showings in the drawings, but changes or modifications may be made therein, so long as such changes or modifications mark no material departure from the spirit and scope of the appended claims.

I claim:

1. The combination with a machine for producing boxes from substantially flat lying blanks including means for conveying such blanks sequentially past folding, seam adhering and discharge mechanisms, and drive means for said machine, of a collecting and pressing means for the tubular folded and adhered blank leaving said discharge mechanism located behind said discharge mechanism, said collecting and pressing means being movable relative to the discharge mechanism to extend the path of movement of said blanks in any desired direction, and drive means for the collecting and pressing means operably synchronized with the drive means for said machine.

2. The combination as claimed in claim 1, wherein said collecting and pressing means includes a wheeled frame and locking components for maintaining said frame in a desired position relative to said discharge mechanism.

3. The combination as claimed in claim 1, including means operably associated with the drive means for said collecting and pressing means for regulating the speed of the collecting and pressing means independently of the speed of said machine within fine limits.

4. The combination as claimed in claim 3, wherein said speed regulating means is defined by steplessly regulatable gearing.

5. The combination as claimed in claim 1, wherein said drive means for said collecting and pressing means includes electrical means controlled by said drive means for the machine and electronic means controlled by said electrical means.

6. The combination as claimed in claim 1, wherein said drive means for said collecting and pressing means includes flexible mechanical power transmission means controlled by said drive means for the machine.

7. The combination as claimed in claim 1, wherein said drive means for said collecting and pressing means includes hydraulic power transmission means controlled by said drive means for the machine.

8. The combination with a machine for producing boxes from substantially flat blanks including means for conveying such blanks sequentially past folding, seam adhering and discharge mechanisms, and drive means for said machine, of a collecting and pressing means, a freely movable frame carrying said collecting and pressing means located behind said discharge mechanism and capable of being moved relative to the discharge mechanism to extend the path of movement of said blanks in any desired direction, a multi-phase induction motor driven by said drive means and serving as a transmitter, a second multi-phase induction motor serving as a receiver controlled by said first multi-phase induction motor and operable to drive said collecting and pressing means in synchronism with the drive means for said machine.

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BERNARD STICKNEY, Primary Examiner.