Oct. 18, 1949. E. G. STAUDE 2,485,020

COMBINED CUTTING AND CREASING DIE FOR PAPER SLOTTING MACHINES

Filed Nov. 5, 1945 3 Sheets-Sheet 1

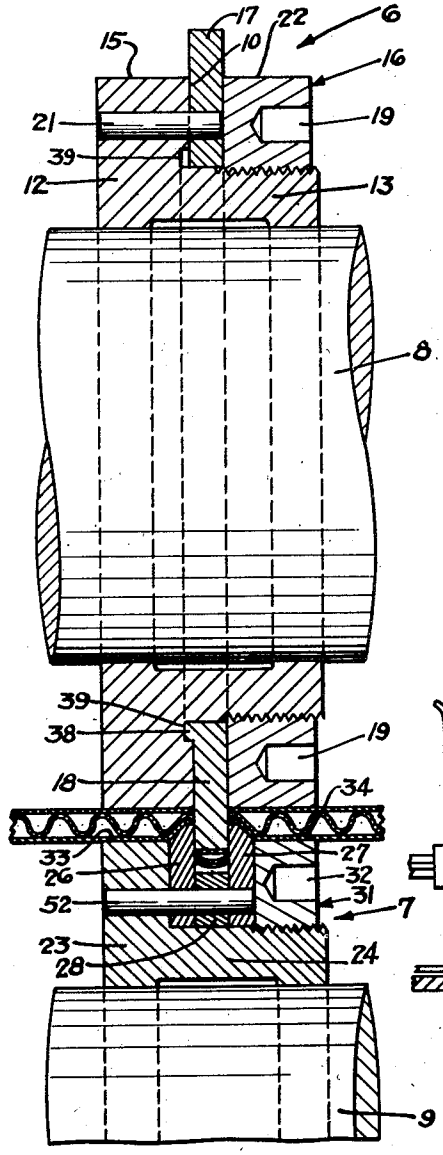

FIG. 2

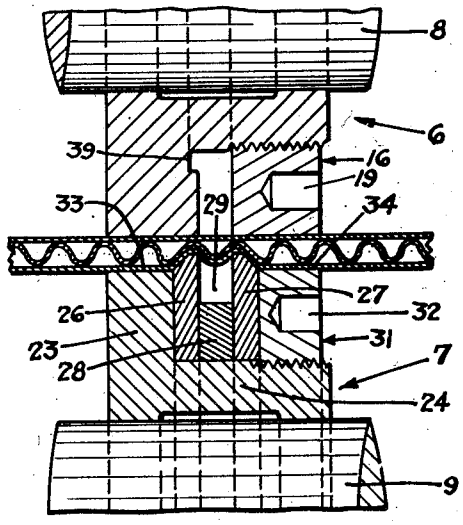

FIG. 3

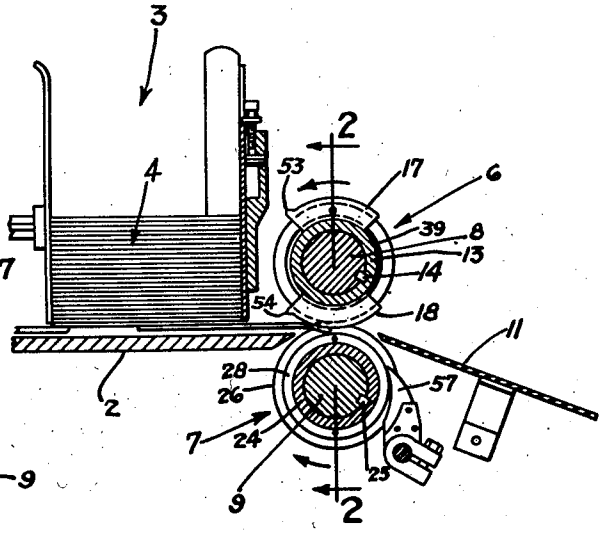

FIG. 1

INVENTOR
EDWIN G. STAUDE
By Paul, Paul & Moore
ATTORNEYS

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COMBINED CUTTING AND CREASING DIE FOR PAPER SLOTTING MACHINES

Filed Nov. 5, 1945 3 Sheets-Sheet 2

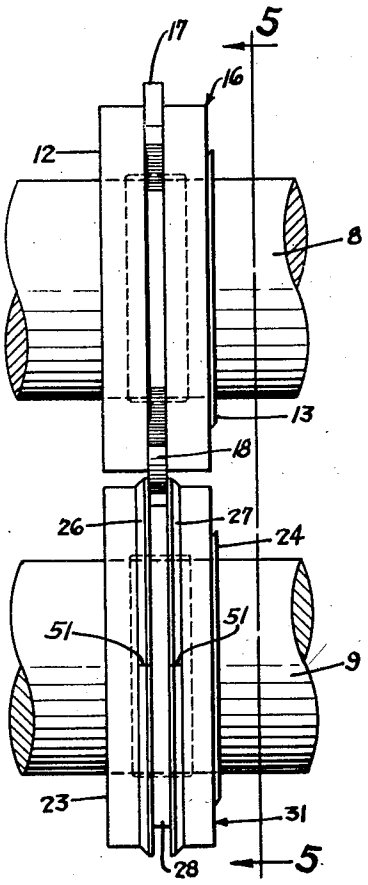

FIG. 4

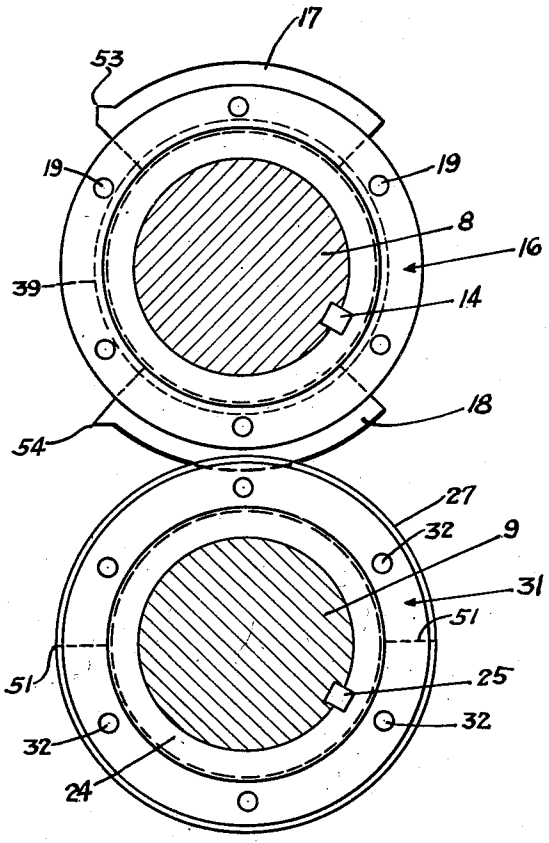

FIG. 5

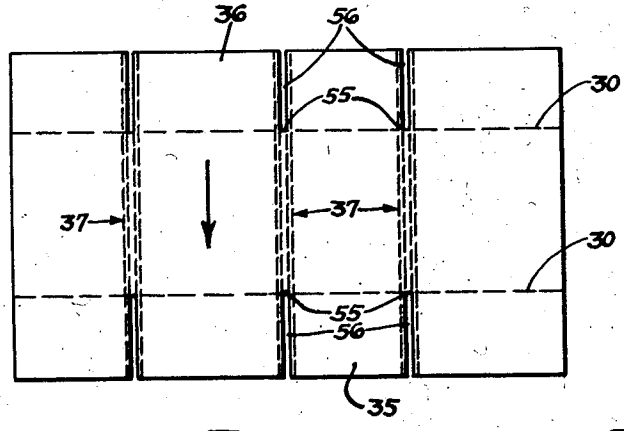

FIG. 7

INVENTOR
EDWIN G. STAUDE
By Paul, Paul & Moore
ATTORNEYS

Oct. 18, 1949. E. G. STAUDE 2,485,020

COMBINED CUTTING AND CREASING DIE FOR PAPER SLOTTING MACHINES

Filed Nov. 5, 1945 3 Sheets-Sheet 3

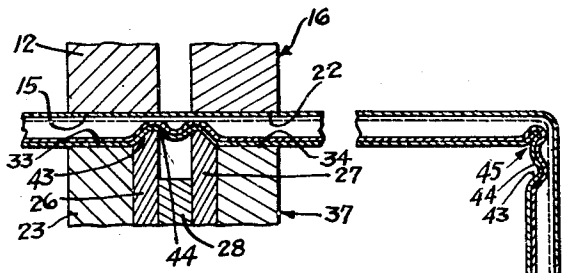

FIG. 8

FIG. 9

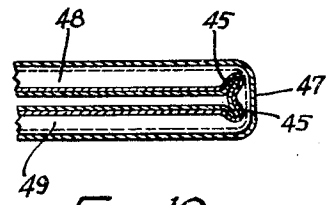

FIG. 10

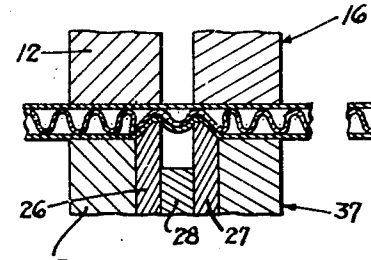

FIG. 11

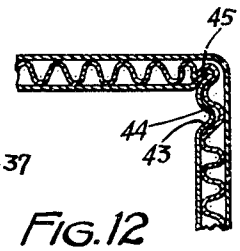

FIG. 12

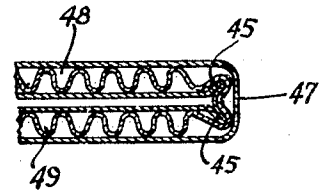

FIG. 13

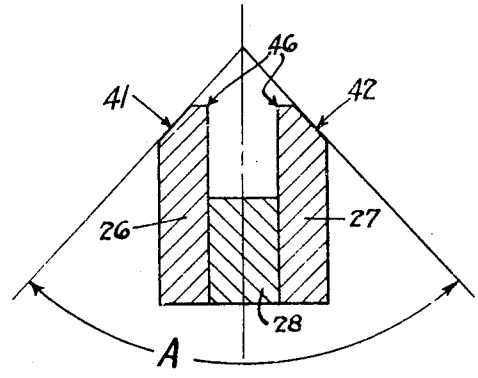

FIG. 6

INVENTOR
EDWIN G. STAUDE
By Paul, Paul & Moore
ATTORNEYS

Patented Oct. 18, 1949

2,485,020

UNITED STATES PATENT OFFICE

2,485,020

COMBINED CUTTING AND CREASING DIES FOR PAPER SLOTTING MACHINES

Edwin G. Staude, Minneapolis, Minn., assignor to The Sperry Corporation, New York, N. Y., a corporation of Delaware

Application November 5, 1945, Serial No. 626,877

12 Claims. (Cl. 164—60)

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This invention relates to new and useful improvements in machines for slotting and creasing blanks to facilitate the subsequent folding of the blanks into box form, and more particularly to the construction of the slotting and creasing dies utilized in such machines, and is an improvement on my Patent No. 1,687,522.

In the manufacture of boxes or cartons made from corrugated paper, cardboard, or other such materials, it is usually customary to inwardly slot the blanks from opposite sides thereof and to transversely crease the blanks in alignment with the pairs of slots provided in the opposed edges of each blank, thereby to provide fold lines for facilitating folding the blank into box form, and also whereby the box blank may be folded upon itself to facilitate storage.

It is highly desirable in the manufacture of boxes of corrugated paper such as herein disclosed, that the slotting and creasing of the blanks be accurately formed and also that the creasing be such that when the various panels of the blank are folded or bent along the crease marks to form the walls of the box, the walls will be disposed in right-angular relation with respect to one another and with respect to the bottom, when the box is erected ready for use.

Conventional container slotting machines are usually provided with two pairs of heads, one pair for cutting the slots in the blank and the second pair for forming the necessary creases, which, in the form of blank herein disclosed, are usually arranged in pairs and the creases of each pair are disposed in close proximity to one another and so related to each pair of slots that said slots are disposed between their respective creases and in parallel relation thereto.

To thus slot and crease the blanks in conventional machines, the blanks are first fed between the slotting heads which cut aligned slots in the leading and trailing edge portions of each blank. The blanks next pass through the creasing heads which crease each blank in alignment with the previously formed slots. In such machines, it is therefore necessary that two independent sets of heads be utilized to condition each blank for folding into a container.

To define the panels in a blank of corrugated paper or board that will make up into a corrugated container when set up, the blanks heretofore have been provided with both single and double creases. Single creases have not been desirable, because when the panels or sections of the blank are folded upon themselves to what is commonly referred to by the trade as a complete one hundred eighty degree fold, too great a strain is exerted on the outside face or surface of the blank which may fracture the paper, except when using the best kraft-lined corrugated board. Double creases are therefore generally utilized when a portion of the blank is to be folded to one hundred eighty degrees, such as when collapsing a partially completed box for storage purposes.

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When double creasing a blank with conventional equipment, as is now common in the art, no provision has heretofore been made to limit the fold at each crease to ninety degrees, and the result has often been "lopsided" and uneven folding of the blank, which frequently has been so bad where the creases are disposed substantially parallel to the corrugations, that the blank could not be folded and taped by automatic machinery and obtain a uniform product which would be acceptable to the trade.

One of the features of the present invention resides in the construction of such a machine wherein but a single pair of slotting and creasing heads are utilized, said heads being provided with combined slotting and creasing dies, whereby as each blank is fed between said heads, the required slots and creases are formed therein in a single operation and with the assurance that said slots and creases will be accurately disposed with respect to one another.

It is therefore the primary object of the present invention to provide not only a novel combined cutting and creasing member or die, but to so shape the pair of cutting and creasing members that when the blank has been creased and is subsequently folded over upon itself along adjacent creases, each crease will limit the paper to be bent but ninety degrees, whereby adjacent creases will permit the blank to be folded to a complete one hundred eighty degrees bend or fold, the shaping of the creases by the creasing members being such that the opposed walls of each crease will contact each other and thus limit the corrugated board to a ninety degree bend at each crease, thereby resulting in accurate folding of the blank panels so that when the opposed ends of the blank are secured together by suitable means, such as a binding tape, the walls of the partially completed carton or box may be collapsed into parallel relation to facilitate storage, and with the assurance that the walls at the corners of the collapsed carton or box will not be subjected to excessive strain because of double folds.

A further object is to provide in a box making

machine a single pair of complemental cutting and creasing heads, one of said heads having combined cutting and creasing members removably mounted thereon, and the other having means mounted thereon adapted to co-act with said combined cutting and creasing members to slot and crease each blank as it is fed between the heads.

Other objects of the invention reside in the simplified construction of the cutting and creasing members and in the manner in which they are removably supported on the head; in the means for securing the slotting knives in the other of said heads and whereby one of said knives is circumferentially adjustable with respect to the other and without requiring its removal from the head; in the provision of a pair of opposed creasing members having their inwardly facing peripheral corners providing cutting edges, and the outwardly facing peripheral corners of said members being beveled at such an angle that the combined angles of said beveled faces is less than ninety degrees, thereby to cause the inclined walls of each crease to firmly contact each other when the blank is bent therealong, whereby the resultant corner of the box will be substantially right-angular in configuration, as there will be no "slack" or "looseness" in the bend or fold; and in the simplified construction of the creasing members and cutting knives, whereby they may be readily removed for sharpening or repairs, if necessary, and also whereby one set of dies or knives may be quickly substituted for another, should it be deemed advisable to change to narrower or wider dies and knives for a given job.

Other objects of the invention will appear from the following description and the accompanying drawings and will be pointed out in the annexed claims.

In the accompanying drawings there has been disclosed a structure designed to carry out the various objects of the invention, but it is to be understood that the invention is not confined to the exact features shown, as various changes may be made within the scope of the claims which follow.

In the drawings:

Figure 1 is a view showing a portion of a paper slotting machine with the invention embodied therein;

Figure 2 is a large detail sectional view on the line 2—2 of Figure 1, showing a box blank being fed between the complemental cutting and creasing heads, one of the knives being shown cutting a slot in the blank;

Figure 3 is a view similar to Figure 2 showing only the creasing dies in action;

Figure 4 is an elevational view of the complemental cutting and creasing heads with one of the cutting knives in operative engagement with the combined cutting and creasing members;

Figure 5 is a detail view substantially on the line 5—5 of Figure 4;

Figure 6 is an enlarged fragmentary view showing the effective combined angle of the beveled faces of the creasing members and also showing the cutting edges thereof;

Figure 7 is a view showing a blank completely slotted and creased;

Figure 8 is an enlarged detail sectional view showing a blank of corrugated paper being creased by two parallel cutting and creasing members to provide two closely spaced parallel creases disposed transversely of the corrugations and parallel with the direction of blank travel and wherein it will be noted that the axial spacing of the creasing members leaves a portion of the paper stock uncrushed between the adjacent creases formed thereby;

Figure 9 illustrates a blank bent along one of the creases formed by the dies herein disclosed and showing the means for limiting the fold or bend to approximately ninety degrees;

Figure 10 is a view showing a double bend wherein the connecting portion between the two parallel walls is disposed at right angles thereto;

Figure 11 is a view similar to Figure 8 but showing the stock creased in parallel relation to the corrugations therein;

Figure 12 is a view similar to Figure 9, and

Figure 13 is a view similar to Figure 10, except that the paper stock has been creased in parallel relation to the corrugations thereof.

In the selected embodiment of the invention herein disclosed, there is illustrated in Figure 1, for purposes of disclosure, a portion of a conventional blank slotting and creasing machine comprising a table 2 having mounted thereon a suitable hopper or magazine 3 in which the box or carton blanks 4 or other articles to be slotted and creased are placed.

The blanks are fed from the magazine 3 between a pair of complemental cutting and creasing heads by suitable means, not shown. These heads are generally designated by the numerals 6 and 7, and are mounted upon shafts 8 and 9, respectively, which are simultaneously driven in opposite directions, as indicated by the arrows, by suitable means not believed necessary to illustrate in the drawings. From the heads 6 and 7 the slotted and creased blanks are delivered onto a suitable chute or inclined plate 11, as is well known.

An important feature of the present invention resides in the provision of a blank slotting and creasing machine of a single pair of heads 6 and 7 which carry combined slotting and creasing members adapted simultaneously to slot and crease each blank, as the blanks are successively fed therebetween from the magazine 3.

The upper head 6, as best shown in Figure 2, comprises a body 12 having a hub portion 13 bored to receive the shaft 8, which is non-rotatably supported on the shaft by a suitable key 14, indicated in Figure 1. The body 12 has a cylindrical portion 15 providing a radial face 10 against which a pair of segmental knives 17 and 18 are secured by a suitable clamping ring or nut 16 which is received in threaded engagement with the hub 13 of the body 12, and may be provided with sockets or recesses 19 for receiving a spanner wrench, whereby it may be readily manipulated to secure the knives 17 and 18 in position in the head 6, or release them therefrom. The knife 17 is preferably non-adjustably secured in the head, and is shown retained in fixed position therein by a suitable dowel 21.

The knife 18 is preferably mounted for circumferential adjustment with respect to the knife 17, whereby the spacing between the knives may be varied to suit the particular size of blanks to be operated upon. The cylindrical surface 15 of the head 12 and the similar cylindrical surface 22 of the clamping ring 16 are preferably of the same diameter and serve as die faces to press the blanks into creasing engagement with the creasing dies or members, subsequently to be described.

The lower head 7 comprises a part which will hereinafter be referred to as the die holder 23. The die holder has a hub 24 mounted on the shaft 9 and restrained against rotation thereon by a suitable key 25. A pair of annular creasing and cutting members 26 and 27 are mounted on the hub 24 of the die holder 23 and are spaced apart a predetermined distance by a suitable spacer 28, whose width determines the space between cutting faces of the knives 17 and 18 and therefore the width of the slot in the blank. In other words, by spacing apart the combined creasing and cutting members 26 and 27, as shown in Figure 3, an annular peripheral groove 29 is provided therebetween adapted to receive the cutting knives 17 and 18, as shown in Figure 2.

The combined creasing and cutting members 26 and 27 are secured in fixed position on the holder 23 by a suitable clamping ring or nut 31 received in threaded engagement with the hub 24 and having sockets 32 therein for receiving a suitable spanner wrench in a manner similar to the nut 16.

The peripheral surfaces 33 and 34 of the die holder and clamping ring or nut 31, respectively, serve as die faces and co-act with the corresponding surfaces 15 and 22 of the head 6 to engage as blank feeding members and support the blank as it passes between the heads 6 and 7, as will be clearly understood by reference to Figures 2 and 3.

In the operation of the machine, the knives 17 and 18 of the upper head 6 are preferably mounted in diametrically opposed relation, as shown in Figures 1 and 5, and are so spaced with relation to the width of the blank in the direction of blank travel, that as each blank is fed between the heads 6 and 7, the opposed marginal edge portions 35 and 36 of each blank will be inwardly slotted as shown in Figure 7, and at the same time the blanks will be creased between the slots, as indicated at 37.

In a conventional form of blank, such as shown in Figure 7, three sets of combined creasing and scoring heads are utilized, as each pair of slots, and their respective creases, require one complete set of such heads. The heads are axially adjustable on the shafts 8 and 9, whereby the spacing between the slots in a direction lengthwise of the blank may be varied to suit any size blank. The diameters of the two heads are such that for each revolution thereof a blank passes therebetween and is slotted on its leading and trailing edges, as shown in Figure 7. The circumferential adjustment of the knife 18 makes it possible to quickly adjust the spacing of the knives to suit the height of the blank, as hereinbefore stated.

Each blank is also provided with transversely extending creases 30, which intersect the inner ends of the slots cut in the blanks, as shown in Figure 7, and which define the height of the box when set up for use. The creases 30 are usually formed in a separate operation in a different type of machine either before or after the blanks are slotted and creased parallel to direction of travel through the slotting machine.

To facilitate adjusting the knife 18, it is shown provided with a laterally or axially disposed ledge or flange 38 which is received in an annular groove 39 provided in the portion 12 of the head 6. The ledge or flange 38 prevents the knife 18 from becoming detached from the head 6, when the clamping ring 16 is partially unscrewed to free the knife 18, whereby it may be circumferentially adjusted in the periphery of the head 6. This

is an important feature, as it makes it possible to quickly change the position of the knife 18 with respect to the knife 17 without requiring its removal from the head, and with the assurance that the cutting edge or periphery of the knife 18 will always be accurately disposed with relation to the axis of the head 6.

Another important feature of the invention resides in the shape of the peripheral edges of the opposed cutting and creasing members 26 and 27. In the manufacture of paper boxes, it is highly desirable that the walls of the finished box are disposed in right-angular relation to one another. Heretofore, some difficulty has been experienced to produce boxes wherein the walls of each box were disposed in right-angular relation to one another, primarily because the conventional method of double line creasing usually allows a slight slackness or looseness at the creases where the blank is folded, which may result in the outside edges of the blank, when folded, not being parallel one with the other resulting in some of the boxes of a given run being rejected for use because of not being uniform in configuration.

To overcome this difficulty I have discovered that by beveling the outwardly facing peripheral corners of the cutting and creasing members 26 and 27, as shown at 41 and 42, respectively, in Figure 6, whereby the combined angle A of said inclined or beveled faces may be less than ninety degrees, that such slackness or looseness at each crease may be entirely eliminated, with the assurance that each fold in the blank will be in the form of a true right angle, as shown in Figures 9 and 12, and in the case of double folds, as shown in Figures 10 and 13, the blank walls will be symetrically folded. Thus, when the blank is so creased, all boxes will be substantially uniform in appearance, when set up.

By thus making the combined angle A of the opposed beveled faces 41 and 42 of the cutting and creasing members 26 and 27 somewhat less than ninety degrees, when the panel of a blank is folded to provide a wall of a box, the inclined wall portions 43 and 44 of each crease, being disposed at less than ninety degrees with respect to one another, will firmly contact each other, as shown at 45 in Figures 9 and 10, thereby causing the walls to be put under a slight tension as they are bent into right-angular relation. The result is that when all of the panels in a blank have been folded or bent to their collapsible or flatwise positions, all of the walls of the box will be disposed in right angular relation to one another and, in addition, the corners of the box, when the latter is set up, will be relatively non-yieldable as compared to boxes made in accordance with the usual conventional form of creasing. The inwardly facing peripheral corners 46 of the combined cutting and creasing members 26 and 27 have a shear edge surface and provide the cutting edges which co-act with the segmental knives 17 and 18 to slot the paper, as hereinbefore stated.

In double folds such as shown in Figures 10 and 13, the inclined walls 43 and 44 of each crease will firmly contact one another, whereby the outside connecting wall portion 47, shown in Figures 10 and 13, will be under tension and will be disposed at right angles to the parallel wall portions 48 and 49, and the folds or bends between the wall portions 47, 48 and 49 will be such that the paper is under a slight tension at the corners of each bend, thereby causing all bends or folds to be substantially right-angular in cross-section.

Each combined cutting and creasing member 26 and 27 is preferably made in two halves, as indicated at 51 in Figures 4 and 5, in order that they may be quickly removed for sharpening. The parts or halves of each such member are retained against relative outward and rotary movements upon the member 23 by suitable dowel pins 52, the clamping ring or nut 31 serving to securely fix them in the head, whereby they become, in effect, an integral part of the head, as will readily be understood by reference to Figures 2 and 3. To remove the member 26 and 27 from their supporting head 7, it is only necesary to partially unscrew the clamping ring or nut 16 and remove the dowel pins 52, after which the two halves of each member 26 and 27 may readily be removed from the head without removing the head from the shaft 9.

The segmental knife sections 17 and 18 may be similarly removed from their supporting head 6 by partially unscrewing the clamping ring or nut 16 sufficiently to permit the lateral flange or ledge 38 of the knife 18 to be withdrawn radially from its supporting recess, as will be understood by reference to Figure 2. The knife 17 may readily be removed, when the clamping nut 16 is loose, by withdrawing the dowel 21.

In Figures 2 and 3 I have shown the spacer 28 for spacing apart the members 26 and 27 as being likewise formed in two pieces for quick removal so that other size spacers may be quickly replaced. If desired, the spacer may be made of two or more sections or laminations, whereby the spacing between the members 26 and 27 may readily be varied by inserting additional laminations or removing laminations therefrom. The important thing, however, is that the spacing between the combined cutting and creasing members 26 and 27 must corresponding substantially to the width or thickness of knife sections 17 and 18, whereby the cutting edges of each knife may co-act with the cutting edges 46 of the members 26 and 27 to slot the blank, as shown in Figures 1 and 2.

The knife sections 17 and 18 are each provided at one end with a transversely disposed chisel-like cutting edge 53 and 54, respectively, adapted to cut the material at the inner ends 55 of the slots 56, as will be best understood by reference to Figure 7. A clean-out finger 57 is mounted on the machine and has its upper end received in the groove 29 between the members 26 and 27 for cleaning the waste stock out of the groove, as is well known in the art.

In Figure 7 I have shown a corrugated container box blank comprising three sets of slots and creases which are necessary in the formation of conventional square or rectangular corrugated containers or boxes provided with end flaps for closing the box ends which are usually glued down. It is to be understood, however, that the number of such sets of slots and creases and the spacing therebetween may be varied to suit any blank regardless of the particular use to be made of the blank and without departing from the scope of the invention.

It will be apparent to those skilled in the art that I have accomplished at least the principal objects of my invention, and it will also be apparent to those skilled in the art that the embodiments herein described may be variously changed and modified without departing from the spirit of the invention, and that the invention is capable of uses and has advantages not herein specifically described; hence it will be appreciated that the herein disclosed embodiments are illustrated only, and that my invention is not limited thereto.

I claim as my invention:

1. In a machine of the class described, a pair of complemental cutting and creasing heads, one of said heads comprising a member providing a cutting edge and an annular creasing surface, and means carried by the other of said heads including a knife and a creasing surface both cooperating with said cutting and creasing member to simultaneously slit and crease material fed between said heads.

2. In a machine of the class described, a pair of complemental cutting and creasing heads, one of said heads comprising a pair of combined cutting and creasing members each having a cutting edge and a blank supporting surface, and means carried by the other of said heads including a segmental knife and a supporting surface, both adapted to cooperate with said cutting and creasing members to simultaneously slit and crease material fed between said heads.

3. In a machine of the class described, a pair of complemental cutting and creasing heads, one of said heads comprising a pair of annular members spaced apart in an axial direction and providing spaced cutting edges and supporting surfaces, and means carried by the other of said heads and receivable between said members and coacting with the cutting and supporting surfaces thereof to simultaneously slot and crease material fed between said heads.

4. In a machine of the class described, a pair of complemental cutting and creasing heads, one of said heads comprising a pair of combined cutting and creasing members spaced apart in an axial direction and each provided with a cutting edge, and means carried by the other of said heads, including a knife and surfaces, both adapted to coact with said cutting and creasing members to simultaneously slot and crease a blank fed between said heads.

5. In a machine of the class described, a pair of complemental cutting and creasing heads, one of said heads comprising a pair of combined cutting and creasing members spaced apart in an axial direction to provide a peripheral groove, said members providing spaced cutting edges and supporting surfaces, and knife sections carried by the other of said heads and receivable in said groove and coacting with said cutting edges and supporting surfaces to slot the opposed marginal edge portions of blanks fed between said heads, simultaneously as the blanks are creased by said heads.

6. In a machine of the class described, a pair of complemental cutting and creasing heads, means for feeding blanks therebetween, one of said heads comprising a pair of combined cutting and creasing members spaced apart in an axial direction to provide a peripheral groove, and knife sections carried by the other of said heads adapted to enter said peripheral groove and coacting with said cutting edges to slot the opposed marginal edge portions of each blank fed between said heads, said other member having surfaces to coact with said cutting and creasing members for simulaneously creasing each blank transversely thereof and substantially in alignment with said slots.

7. In a machine of the class described, a pair of complemental cutting and creasing heads, means for feeding blanks therebetween, one of said heads comprising a pair of adjustable combined cutting and creasing members spaced apart

in an axial direction to provide a peripheral groove, and knife sections carried by the other of said heads adapted to enter said peripheral groove and co-acting with said cutting edges to slot the opposed marginal edge portions of blanks fed between said heads, said other member having surfaces to coact with said cutting and creasing members for simultaneously creasing each blank adjacent to each side of each slot and across the full width of the blank.

8. In a machine of the class described, complemental cutting and creasing heads, means for feeding blanks therebetween, one of said heads comprising a pair of combined cutting and creasing members spaced apart in an axial direction to provide a peripheral groove, the inwardly facing corners of said members providing cutting edges, segmental knife sections carried by the other of said heads and spaced apart circumferentially thereon, said knife sections being adapted to enter said groove and coacting with said cutting edges to slot the opposed marginal edges of each blank fed between said heads and whereby the slots are longitudinally aligned in the direction of blank travel, said other member having surfaces to coact with said cutting and creasing members for simultaneously creasing the blank adjacent to the sides of said slots and across the full width of the blank.

9. In a machine of the class described, a pair of complemental cutting and creasing heads, means for feeding carton blanks therebetween, one of said heads comprising a pair of combined cutting and creasing members spaced apart in an axial direction, the inwardly facing peripheral corners of said members providing cutting edges and the outwardly facing edges thereof being beveled to provide inclined creased faces, and means carried by the other of said heads receivable between said members and coacting with the cutting edges and inclined creasing faces thereof to simultaneously slot and crease each blank fed between said heads.

10. In a machine of the class described, a pair of complemental cutting and creasing heads, means for feeding carton blanks therebetween, one of said heads comprising a pair of combined cutting and creasing members spaced apart in an axial direction, the inwardly facing peripheral corners of said members providing cutting edges and the outwardly facing edges thereof being beveled to provide inclined creasing faces, and means carried by the other of said heads and

coacting with said cutting edges and inclined creasing faces to simultaneously slot and crease each blank fed between said heads, the angles of said inclined creasing faces being of such inclination that when the carton blank is folded along one of the creases produced by said members, the opposed walls of the crease mark will contact each other to provide a right angle bend in the blank.

11. In a machine of the class described, a pair of complemental cutting and creasing heads, means for feeding carton blanks therebetween, one of said heads comprising a pair of combined cutting and creasing members spaced apart in an axial direction, the inwardly facing peripheral corners of said members providing cutting edges and the outwardly facing edges thereof being beveled to provide inclined creasing faces, and means carried by the other of said heads and coacting with said cutting edges and inclined creasing faces to simultaneously slot and crease each blank fed between said heads, the combined angles of said inclined creasing faces being less than ninety degrees, whereby when the carton blank is folded along one of the creases produced by said members, the opposed walls of the crease mark will contact each other to provide a right angle bend in the blank.

12. In a machine of the class described, complemental cutting and creasing heads, means for feeding carton blanks therebetween, one of said heads comprising a pair of opposed cutting and creasing members made in sections and disposed in axially spaced relation, segmental knife sections carried by the other of said heads and spaced apart circumferentially thereon, said other head having means to provide circumferential adjustment of one of said knife sections with respect to the other without removal from the head, and said knife sections coacting with said members to simultaneously slot each blank fed between said heads as the blanks are creased thereby.

EDWIN G. STAUDE.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
682,651	Tripp et al.	Sept. 17, 1901
2,311,698	Saubestre	Feb. 23, 1943

Certificate of Correction

Patent No. 2,485,020 **October 18, 1949**

EDWIN G. STAUDE

It is hereby certified that errors appear in the printed specification of the above numbered patent requiring correction as follows:

Column 7, line 12, for the word "member" read *members*; column 8, lines 67 and 68, for "simulaneously" read *simultaneously*; column 9, line 38, for "creased" read *creasing*;

and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 28th day of February, A. D. 1950.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.