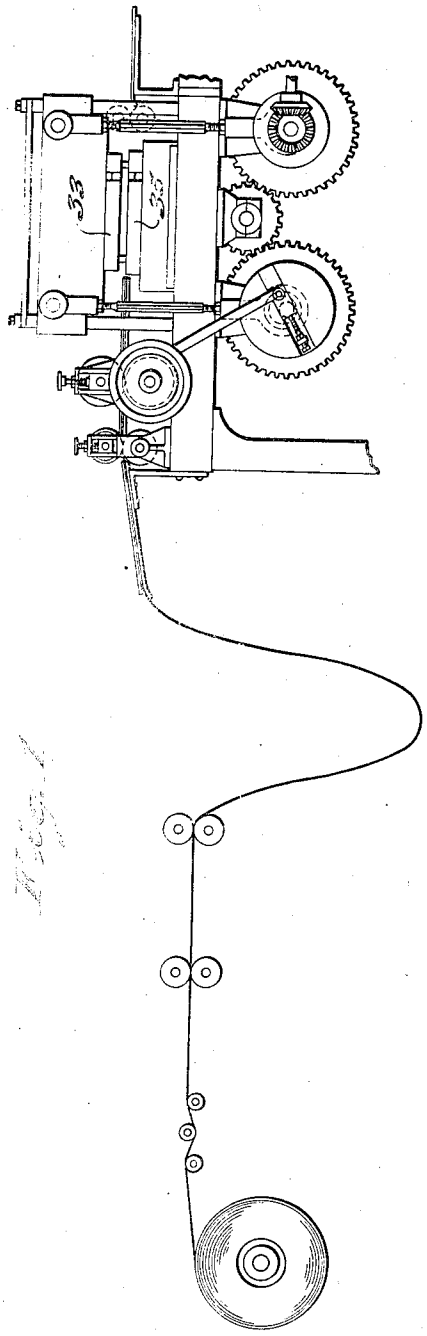
Aug. 16, 1938. C. A. MOELLER 2,127,131

DIE FOR THE PRODUCTION OF BOX BLANKS

Filed April 16, 1937 2 Sheets-Sheet 1



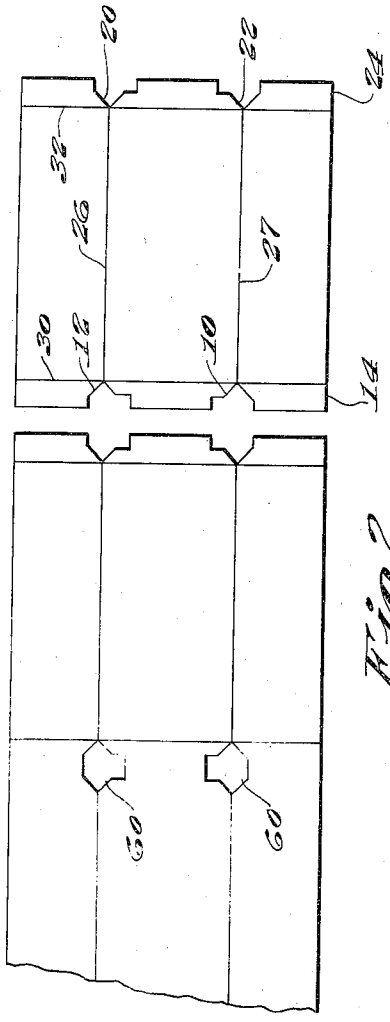


Fig. 2

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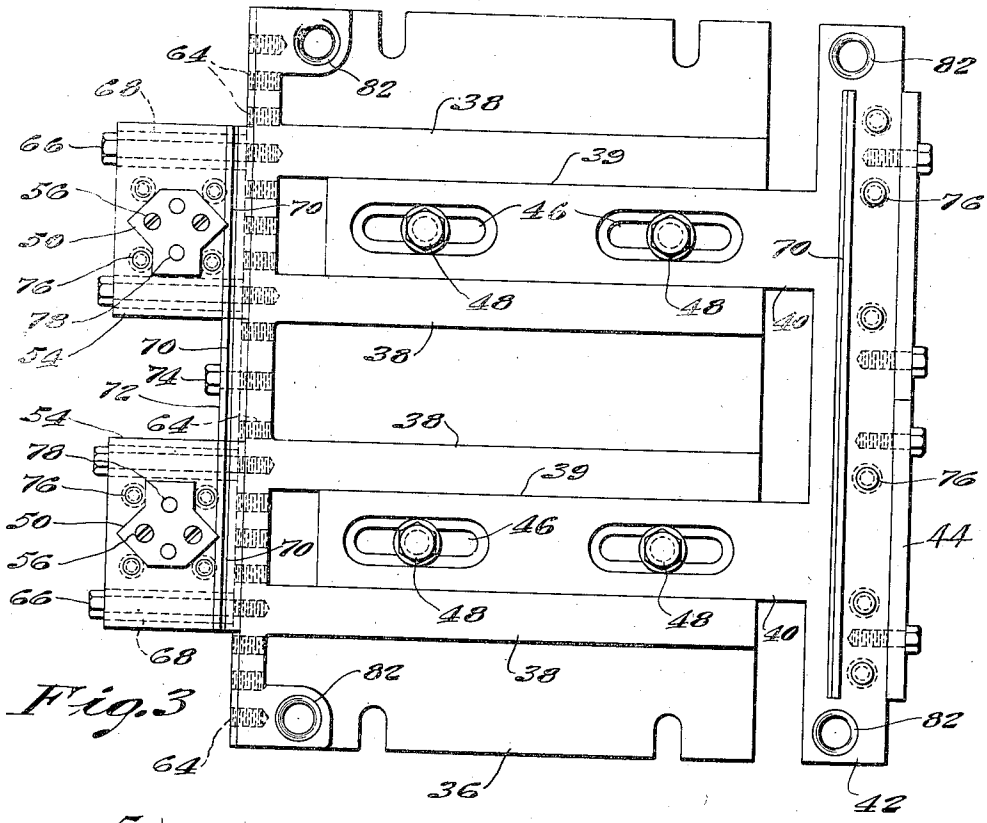

Fig. 3

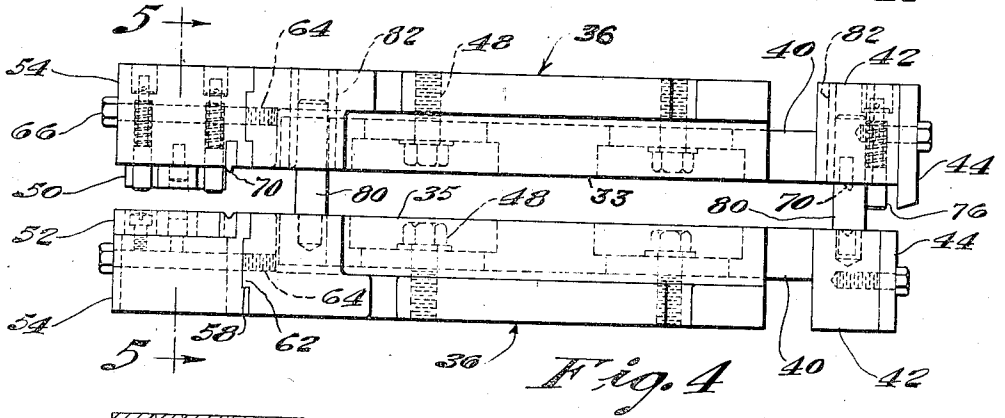

Fig. 4

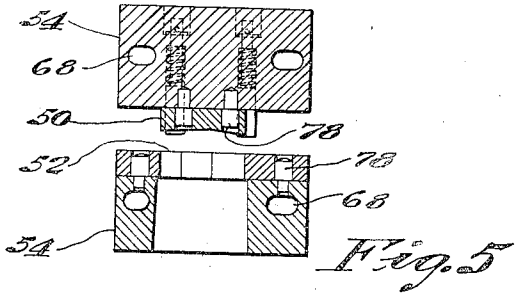

Fig. 5

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UNITED STATES PATENT OFFICE

2,127,131

DIE FOR THE PRODUCTION OF BOX BLANKS

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Application April 16, 1937, Serial No. 137,255

14 Claims. (Cl. 93—58)

This invention relates to an improved die for the manufacture of box blanks.

The invention has for an object to provide a novel and improved construction of die for use in box making machines, which die is particularly adapted to facilitate the adjustment of the operative portions of the die to enable box blanks of different sizes to be produced by the machine with the expenditure of a minimum amount of time and effort in setting and lining up the different portions of the die.

With this general object in view and such others as may hereinafter appear, the invention consists in the die for a box making machine and also in the various structures, arrangements, combinations and parts hereinafter described, and particularly defined in the claims at the end of this specification.

In the drawings illustrating a preferred form of the invention when embodied in box making machines forming the subject matter of the Claff and Joplin Patent No. 1,721,431, granted July 16, 1929, Fig. 1 is a diagrammatic view in elevation illustrating a portion of said machine; Fig. 2 is a plan illustrating a box blank produced by the operation of the present die in the box making machine shown in Fig. 1; Fig. 3 is an inverted plan of the male die member; Fig. 4 is a front elevation of the male and female members of the present die, and Fig. 5 is a sectional detail taken on the line 5—5, Fig. 4.

In the machine illustrated in the Claff and Joplin Patent No. 1,721,431, the body blank of the box produced by the machine is formed by the operation of a reciprocatory die which functions to simultaneously form notched out portions for each end of the body blank as the box making material is fed between the members of the die from a supply roll, as fully described in said patent. The male and female members of the die are also provided with cutting members or knives arranged to cut each box blank from the web of material fed between the members of the die. As illustrated in Figs. 18 and 19 of the aforesaid Claff and Joplin patent, the structure of the die therein disclosed includes a unitary bed plate having upon one end a pair of cutting members indicated in said patent at 158 formed as individual members bolted to the end of the bed plate. The cutting members 158 were positioned by spacing members and between bolts. At the other end of the bed plate a similar pair of cutting members, also indicated in said patent at 162, are operatively supported on the bed plate by cooperative spacing members and bolts. The die members are also provided with cutting members, indicated in the patent at 166, for severing the web transversely to produce the box blank, and each cutting member 166 is bolted on the outside of one of the spacing members. From an inspection of Fig. 18 and the description thus far it will be apparent that the die disclosed in Fig. 18 of said Claff and Joplin patent is adapted primarily for use on one size box blank. In practice, in order to set up the die it is necessary to accurately align the cutting members 158, 162, and also to align the cutting members 166, and in view of the excessive number of parts by which these members are held, this operation has been found to be troublesome and to involve the expenditure of a large amount of time. Furthermore, the construction of the die itself does not lend itself to satisfactory adjustment for the manufacture of box blanks of different sizes.

The present invention aims to provide a construction of die which is adapted for convenient adjustment for the manufacturing of varying sizes of box blanks and in addition which may be readily set up and the operative cutting members aligned in a minimum time and with minimum effort.

Referring now to the drawings, and as illustrated in the above mentioned Claff and Joplin patent, the blank for forming the body portion of the box to be produced by the machine illustrated in such patent, is formed with one pair of notches 10, 12 cut out from the end flaps 14, and with a second pair of notches 20, 22, cut out from the second set of end flaps 24. The blank is provided with score lines comprising longitudinal score lines 26, 27 and transversely extended score lines 30, 32, and in the operation of the machine set forth in the above mentioned patent, the side panels are folded upwardly and the end flaps inwardly preparatory to the reception of the end pieces forming the ends of the box. Inasmuch as the different features of the present invention have to do particularly with the die for forming the notches in the end flaps of the body blank and for the severing of the body blank from the web of box material, it is believed unnecessary to include further description of the Claff and Joplin patent box making machine, reference being made to the aforesaid Claff and Joplin Patent No. 1,721,431.

Referring now to Figs. 3, 4 and 5 the die illustrated therein is composed of an upper movable die member 33 and a lower stationary member 35, and each member 33, 35 is provided with a bed plate 36 which is provided with upstand-

ing ribs 38, forming between them a guideway 39 for the reception of longitudinally extended tongues 40 formed as a part of a knife carrying member 42. Each knife carrying member 42 has a cutting knife 44 bolted to it to be secured in fixed relation thereto. The cutting knife 44 affixed to the stationary die member is positioned so as to cooperate with the cutting knife 44 upon the movable member to sever the box blank from the web when the movable member of the die is moving downwardly during the operation of the machine.

In order to adjustably secure the knife carrying members 42 and the knives 44 carried thereby, in definite relation to the bed plate, as herein shown, each tongue is provided with a pair of elongated slots 46 and bolts 48 are provided for bolting the tongues in adjustable fixed relation to the bed plate of each die. As a result of this construction it is possible to conveniently and rapidly adjust the position of the knives so as to sever the box blank at any decided point to adapt the die for operation upon varying lengths of box blanks.

The upper die member 33 is provided upon the opposite end of the bed plate 36 thereof with two punch members 50, preferably shaped as illustrated and adapted to punch out an opening in the box blank of the general shape illustrated at 60 in Fig. 2. The lower or stationary member 35 of the die is provided with a correspondingly shaped die 52 which is adapted to cooperate with the punch 50 when the movable member 33 of the die is moved downwardly in the operation of the machine. As herein shown, both the die and punch members are secured to supporting pieces 54 by screws 56, and the supporting pieces 54 are provided with grooves 58 arranged to cooperate with the tongues 62 on the ends of the bed plates 36 of the die members so as to definitely locate the punch and die in a vertical direction with respect to the bed plate 36.

The end of the bed plate 36 is provided with a series of threaded holes 64 spaced a short distance apart for the reception of the bolts 66, by which the supporting pieces 54 may be secured in definite but varying positions transversely of the bed plate 36. In order to provide for the additional adjustment of the supporting pieces 54, the supporting pieces are provided with slots 68 through which the clamping bolts 66 extend so that in practice the position of the end pieces are adjusted to the nearest threaded hole in the bed plate and the slots permit accurate alignment of the punch 50 and die 52 with relation to the remainder of the bed plate 36 and the travel of the box blank between the die. When the clamping bolts 66 are tightened up the parts are retained in predetermined position.

The usual creasing rules or scoring knives 70 are provided at each end of the dies and as herein shown at one end the rule 70 is inserted into the knife carrying member 42. At the opposite end of the die, the creasing rules are carried by the supporting members 54 and by a separate section 72 clamped to the bed plate 36 and of sufficient length to fill in the space between the supporting members 54. The spacer 72 is secured to the bed plate by a bolt 74 and a different spacer is provided for each different width of box blank to be run. The usual spring pressed pins 76, for releasing the punched out blank from the dies when the operation is completed, are also provided. Dowel pins 78 aid in aligning the punch 50 in relation to the die 52 when replacement is required.

In order to assure positive alignment of the dies 33, 35 in their adjusted position and to retain the dies in cooperative relationship during operation, four registering pins 80 are provided, one located at each corner. The pins are secured to the lower die 35 and are arranged to extend into bushings 82 provided in the upper die 33. Two of the pins are secured to the bed plate 36 in a fixed portion of the die while the other two are secured to the knife carrying member 42, one at each end. In this manner, the knife carrying members 42 are adjusted simultaneous to exactly the same extent, thus securing positive alignment of the cutting knives 44 in their newly adjusted position. It will be seen that this feature of the invention will result in a great saving of time which would otherwise be necessary in aligning the cutting member 44 in operative relationship and will also assure positive alignment of the punch 50 with the die 52 in their adjusted position during operation.

In the operation of this die, when it is desired to readjust it for a different width or length of blank, the clamping bolts 48 are first loosened in both the upper and lower die members 33 and 35. The knife carrying members 42 are then adjusted in the base members 36 for the desired length of blank and distance between the scoring knives 70. Since the guide pins 80 maintain both the end plates and knife members in proper cooperating alignment at all times, both knife carrying members 42 will be adjusted simultaneously and to exactly the same extent in a single operation. When the proper length adjustment of the die members has been effected, the parts will be secured in their new relation by tightening the clamping bolts 48.

The punch members are next adjusted transversely of their respective bed plates to bring them into proper position with respect to the longitudinal score lines already formed in the strip material. This transverse adjustment is effected, where a relatively slight change in width is desired, by loosening the clamping bolts 66 and adjusting the supporting pieces 54 laterally on the base members 36 to the desired extent, the slotted openings 68 in these pieces permitting such limited lateral adjustment.

If a greater transverse adjustment than is permitted by these elongated slotted openings is desired, the bolts 66 are entirely removed, the supporting pieces moved laterally to approximately their desired position, and the bolts then replaced in another set of threaded holes 64. Before finally tightening these bolts the pieces will be given their final adjustment to the exact position required.

In addition to its adaptability to punch out and cut off various widths and lengths of box blanks the dies of the present invention possess many other advantages over the dies shown in the aforesaid patent to Claff and Joplin. The time required to interchange the dies to run a different size of box necessitated a shut down of the machine for about one half a day which seriously handicapped the production, and involved expense.

A further economy is effected in the manufacture of the present dies through the use of fewer parts than was formerly used. In the maintenance of the present dies it will be seen that there are fewer parts to sharpen when the cutting members become dull resulting in a saving of

time. The design of the cutting members is such that they are easier to sharpen and in practice it has been found that they stay sharp longer. The ease of replacement of worn punches and dies is another feature which makes the present invention more practicable.

In practice it was found that due to a more equalized and better balanced construction, less strain was caused on the various parts when they came together during the operation of the machine so that there was less friction thereby resulting in less wear and longer life for the dies. It will be seen that in the present punch and die, the cut out sections or chips of board will fall through the die away from the work whereas formerly some of the chips might be carried into the machine thereby interfering with the production to such an extent that a considerable number of blanks were wasted. In practice it has been found that the present invention eliminated this waste.

While the preferred embodiment of the invention has been herein illustrated and described in connection with a die particularly designed for use in the Claff and Joplin box making machine, it will be understood that the invention is not limited to the specific form of die shown in the drawings or to a die adapted only for use in said machine, as it may be embodied in other forms and constructions within the scope of the following claims.

Having thus described the invention, what is claimed is:

1. A die for the production of box blanks comprising two relatively movable die members, each die member being composed of two component members secured to one another to be capable of adjustment in one direction, and each of said die members being provided with a cutter member, the corresponding cutter members of said movable die members being adapted for cooperation when the die members are moved toward one another and means for simultaneously adjusting the component members of each die member whereby to maintain the alignment of said cutter members during the adjustment thereof.

2. A die for the production of box blanks comprising two relatively movable die members, each die member being composed of two component members, one of said component members being provided with tongues and the other with grooves whereby to permit adjustment of said component members longitudinally of said tongues and grooves, means for securing said component members in adjusted positions, each component member being provided with a cutter member and the corresponding cutter members being adapted to cooperate when the die members are moved toward one another and means for simultaneously adjusting the component members of each die member whereby to maintain the alignment of said cutter members during the adjustment thereof.

3. A die for making box blanks comprising two relatively movable die members, each die member being composed of two component members secured to one another to be capable of adjustment in one direction, a cutter member carried by each of said component members, and means for adjustably securing one set of cutter members upon the corresponding component members of said die members, to permit said cutter members to be adjustably positioned in a direction at right angles to the aforesaid adjustment of said component members and means for simultaneously adjusting the component members of each die member whereby to maintain the alignment of said cutter members during the adjustment thereof.

4. A die for producing box blanks comprising two relatively movable die members, each die member being composed of two component members adjustably movable in one direction, corresponding component members of said die members being provided with cooperative punch and dies for forming notches in the box blank, said punch and dies being secured to said component members to be capable of being adjustably positioned in a direction transversely of the direction of adjustment of said component members.

5. A die for producing box blanks comprising two relatively movable die members, each die member being composed of two component members adjustably movable in one direction, corresponding component members of said die members being provided with cooperative punch and dies for forming notches in the box blank, said punch and dies being secured to said component members to be capable of being adjustably positioned in a direction transversely of the direction of adjustment of said component members, and transverse cutter members mounted upon the second set of component members and means for simultaneously adjusting the cutter members mounted upon the second set of component members whereby to retain the alignment of said cutter members during the adjustment thereof.

6. A die for producing box blanks comprising two relatively movable die members, each die member being composed of two component members adjustably movable in one direction, corresponding component members of said die members being provided with cooperative punch and dies for forming notches in the box blank, said punch and dies being secured to said component members to be capable of being adjustably positioned in a direction transversely of the direction of adjustment of said component members, and box blank scoring members mounted upon said component members to be adjustably moved therewith and means for simultaneously adjusting the component members of each die member whereby to maintain the alignment of said cutter members and said box blank scoring members during the adjustment thereof.

7. A die for producing box blanks comprising two relatively movable die members, each die member being composed of two component members adjustably movable in one direction, corresponding component members of said die members being provided with cooperative punch and dies for forming notches in the box blank, said punch and dies being secured to said component members to be capable of being adjustably positioned in a direction transversely of the direction of adjustment of said component members, transverse cutter members mounted upon the second set of component members, and box blank scoring members mounted upon each of said component members and means for simultaneously adjusting the component members of each die member whereby to maintain the alignment of said cutter members and said box blank scoring members during the adjustment thereof.

8. A die for the production of box blanks comprising two relatively movable die members, each member being composed of two component members secured to one another to be capable of adjustment in one direction, and each of said members being provided with a box blank scoring

member, the corresponding box blank scoring members of said movable die members being adapted for cooperation when the die members are moved toward one another and means for simultaneously adjusting the component members of each die member whereby to maintain the alignment of said box blank scoring members during the adjustment thereof.

9. A die for the production of box blanks comprising two relatively movable die members, each die member being composed of two component members, one of said members being provided with tongues and the other with grooves whereby to permit adjustment of said component members longitudinally of said tongues and grooves, means for securing said component members in adjusted positions, each component member being provided with a box blank scoring member and the corresponding box blank scoring members being adapted to cooperate when the die members are moved toward one another and means for simultaneously adjusting the component members of each die member whereby to maintain the alignment of said box blank scoring members during the adjustment thereof.

10. A die for the production of box blanks comprising two relatively movable die members, each member being composed of two component members secured to one another to be capable of adjustment in one direction, and one component member of each die member being provided with a cutter member, the corresponding cutter members of said movable die members being adapted for cooperation when the die members are moved toward one another and means for simultaneously adjusting the component members of each die member whereby to maintain the alignment of said cutter members during the adjustment thereof.

11. A die for the production of box blanks comprising two relatively movable die members, each member being composed of two component members secured to one another to be capable of adjustment in one direction, and one component member of each die member being provided with a box blank scoring member, the corresponding box blank scoring members of said movable die members being adapted for cooperation when the die members are moved toward one another and means for simultaneously adjusting the component members of each die member whereby to maintain the alignment of said box blank scoring members during the adjustment thereof.

12. A die for the production of box blanks comprising two relatively movable die members, each member being composed of two component members secured to one another to be capable of adjustment in one direction, and each of said die members being provided with a cutter member, the corresponding cutter members of said movable die members being adapted for cooperation when the die members are moved toward one another, and means for adjusting the die members and cutter members simultaneously whereby to maintain said die members and cutter members in proper alignment throughout the range of adjustment of the die members.

13. A die for the production of box blanks comprising two relatively movable die members, each member being provided with two component members secured to one another to be capable of adjustment in one direction, and each of said members being provided with a cutter member, the corresponding cutter members of said movable die members being adapted for cooperation when the die members are moved toward one another, and means for maintaining the die members and cutter members in proper alignment throughout the range of adjustment of the die members, said means comprising guide members carried by the component members of one die member, the component members of the other die member being provided with cooperating guide surfaces in sliding engagement with the guide members.

14. A die for the production of box blanks comprising two relatively movable die members, each member being provided with two component members secured to one another to be capable of adjustment in one direction, and each of said members being provided with a cutter member, the corresponding cutter members of said movable die members being adapted for cooperation when the die members are moved toward one another, and means for maintaining the die members and cutter members in proper alignment throughout the range of adjustment of the die members, said means comprising guide pins carried by the component members of one die member, the component members of the other die member being provided with cooperating guide openings in sliding engagement with said guide pins.

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