July 10, 1945. J. J. KREHBIEL 2,379,971

MOLD FOR BINDING BOOKS

Filed Dec. 21, 1937 2 Sheets-Sheet 1

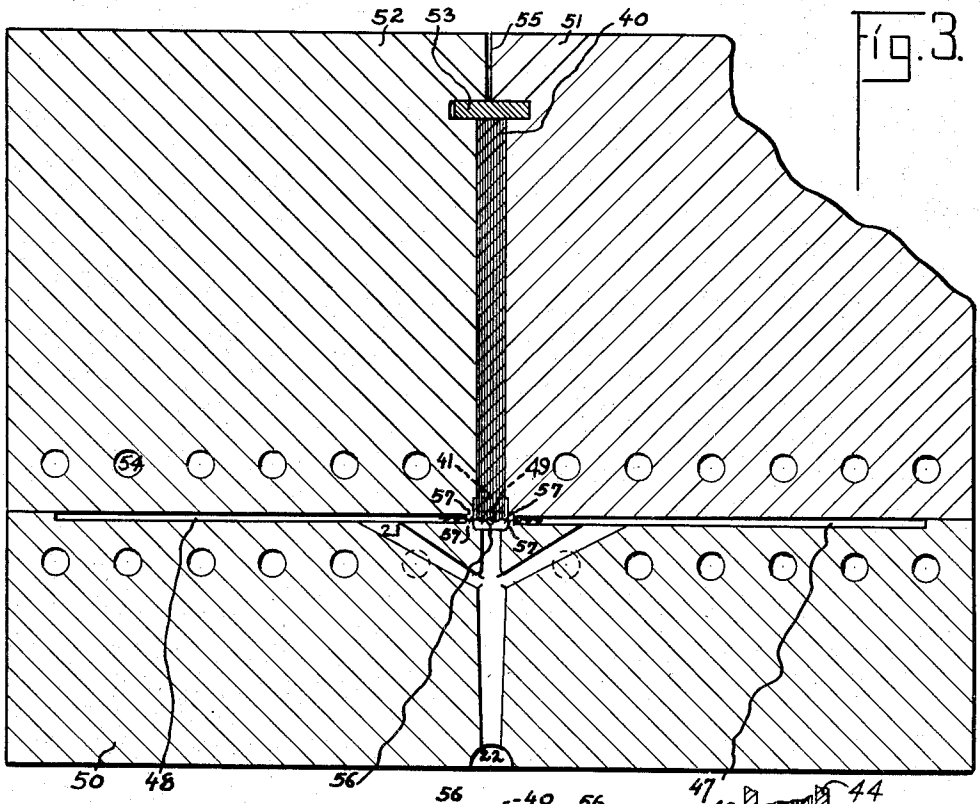


Fig. 3.

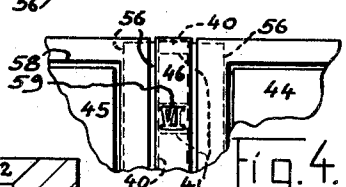


Fig. 4.

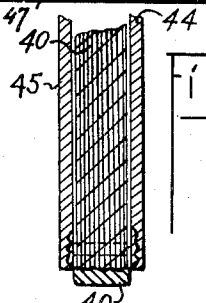


Fig. 5.

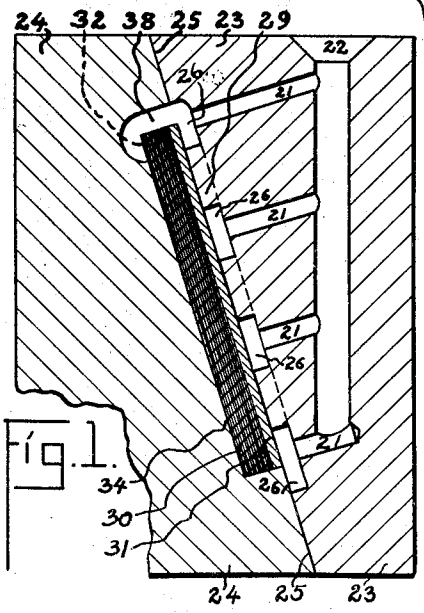


Fig. 1.

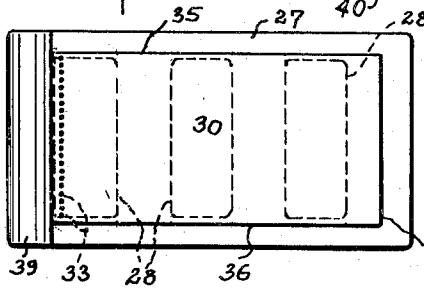


Fig. 2.

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MOLD FOR BINDING BOOKS

Filed Dec. 21, 1937 2 Sheets-Sheet 2

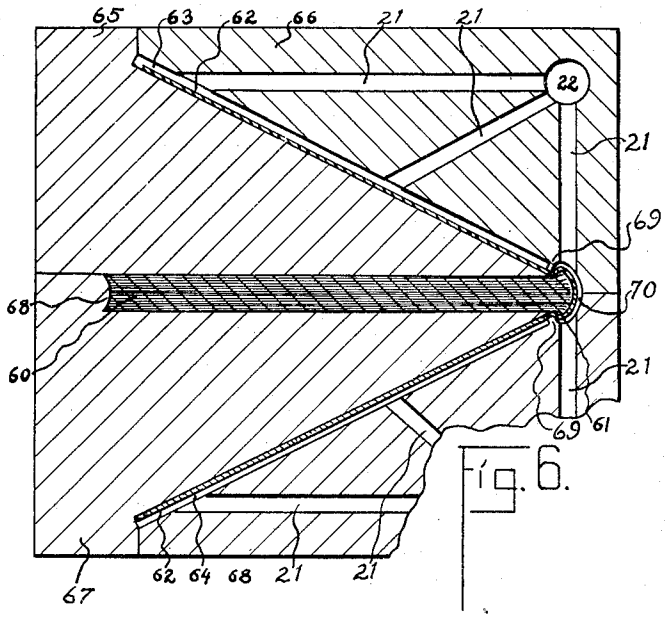


Fig. 6.

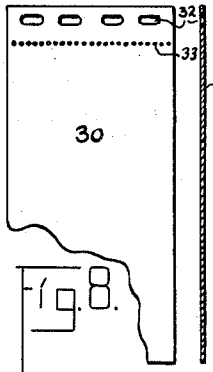


Fig. 9.

Fig. 8.

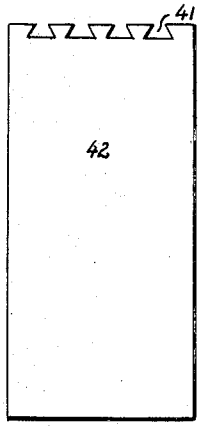


Fig. 10.

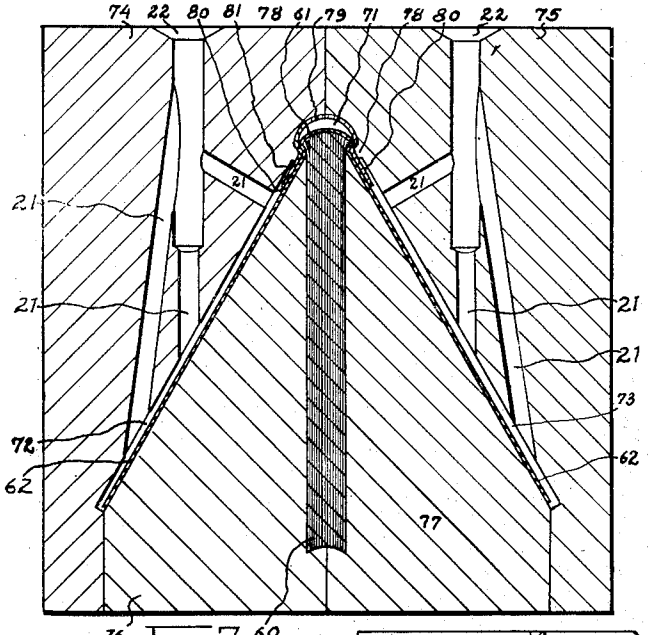


Fig. 7.

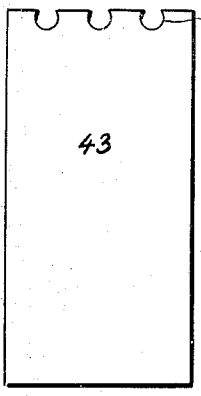


Fig. 11.

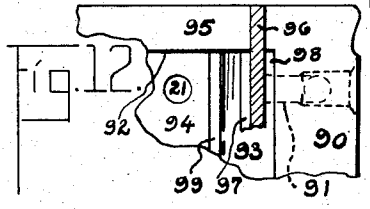


Fig. 12.

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UNITED STATES PATENT OFFICE

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MOLD FOR BINDING BOOKS

John J. Krehbiel, Bridgeport, Conn.

Application December 21, 1937, Serial No. 181,034

15 Claims. (Cl. 18—36)

This invention concerns molds for binding books of sheets, like pads for instance, or of folded, gathered, collated and/or sewed or stitched material.

In the present art of binding books there are separate steps of case making and covering, to which a finishing operation may be added.

It is an object of this invention to provide means for combining the case making, or at least the making of part of the case, with the covering into one, casing operation.

It is the particular object of this invention to provide for molds or forms facilitating the permanent assembly of sheets into a book by a plastic.

I have observed that many of the present-day plastics, such as condensation products can be cast under pressure at comparatively little heat, may be formed onto and around, and will readily engage upon paper and the various materials used in the lining of books. That has led to the instant invention, in which a cover is virtually cast onto or around a book.

Other objects of the invention appear in the following text where they are better understood in connection with the details there described.

The invention may be best described in connection with the examples shown in the accompanying drawings, which are to be interpreted as illustrative, but not as limitative. Such description will also elucidate further objects of this invention.

In the drawings:

Fig. 1 is a cross-sectioned side view of a mold, in which a sheaf of sheets is about to be bound in a plastic.

Fig. 2 shows the top view of the said sheaf mounted on a plastic stand, as it results from the use of the mold of Fig. 1.

Fig. 3 is the cross-sectioned view of a mold, in which loose-leaves are about to be bound into a book with covers.

Fig. 4 shows a sectional rear view of the bound, open book.

Fig. 5 shows a cross-section of the bound, closed book.

Fig. 6 is a cross-section similar to that of Fig. 3 of a mold in which a book is about to be cast into a cover.

Fig. 7 is a similar cross-section of a mold in which a stitched or sewed book is being provided with a casing having a hollow back.

Figs. 8 and 9 show, in a top view and in a cross-sectioned side view, a separate sheet, for instance of the type bound in Fig. 1.

Figs. 10 and 11 show top views of modifications of sheets, these sheets being variously perforated, sheaves of such sheets being for instance bound together in a mold of Fig. 3.

Fig. 12 is a sectional elevation of part of a mold with a cross-sectioned insert for casing the hollow back of the binding.

Similar numerals refer to similar parts throughout the various views; in referring hereinafter to the binding or casing of the book, opposite sides thereof may be called the top and bottom cover; and the part interconnecting the two covers will be called the back of the binding or casing.

In a manner known in the art of molding plastics, the molds here shown may be suitably provided with channels, such as indicated at **21**, such channels servingto distribute the flow of the plastic to the various parts of the mold. A system of such channels may be suitably connected, e. g. at an intake **22**, to an injector apparatus, which presses the liquid plastic into the mold. The part **23** of the mold **23**, **24** of Fig. 1 is provided, down from the parting plane **25**, with interconnected recesses **26**, which serve to shape a base plate **27** for the pad shown in Fig. 2, said base plate being the bottom cover, in terms of a book. Rectangular clearance holes **28** may for instance be provided in the base **27**, these holes being produced by the lugs **29** extending between the recesses **26** of part **23** up to the level of the parting plane **25**.

The book may consist of a sheaf of sheets **30**, and a soft cardboard backing **31**. It may be provided at one end with perforations **32**, into which filters and upon which engages the liquid plastic. A row of fine perforations or a scoring **33** may facilitate the tearing off of sheets from the finished pad.

The part **24** of the mold is recessed down to a bottom **34**, so that the book **30**, **31** is engaged between said bottom **34** and the lugs **29** of the part **23** of the mold. Laterally and downwardly, the sides of the recess in part **24** are cut to fit the head **35**, tail **36** and the fore-edge **37** of the book respectively. The other end of the book, which has the perforations **32**, extends into a space **38**, in which is molded the head **39**. In book terms the head **39** would be back of the book, but the bound book of Figs. 1 and 2, has, for instance, no cast top cover.

The channels **21** may of course be arranged at the convenience of the designer experienced in the art of molds. While they are, for instance, shown in the drawings in sectioned planes of the

mold, these distributing channels of the mold may of course of harbored in a parting plane of the mold.

After a book has been arranged in the mold of Fig. 1, in the manner shown in said figure, the liquid plastic may be injected by way of the intake 22, will fill the recesses 26 and 38 described above, as well as the perforations 32 in the book, and may infiltrate upon the cardboard 31 at the bottom of the book, so that the molded plastic engages upon the end of the hook as well as the bottom thereof. The finished article is shown in Fig. 2 and may serve as a memorandum or desk pad, or calendar, or similar articles known in the stationery art.

A book, e. g. sheaf 40, as bound in the mold of Fig. 3, will have the front cover 44, the bottom cover 45 and the back 46. The leaves of sheaf 40 may have perforations at their lower ends; thus they may be provided with notches 41, as they are indicated in connection with the sheets 42 and 43, illustrated in Figs. 10 and 11, respectively.

Aside from the distributing system 21, 22 for the liquid plastic, I provide channels 54 in the mold of Fig. 3, which serve to accommodate a cooling fluid.

Between the front part 50 of the mold of Fig. 3, and the parts 51 and 52 extending to the back, are accommodated the molding cavities 47, 48 and 49, which serve to form the top and bottom covers 44 and 45, and the back 46 of the book, respectively. A clearance or space is cut into opposite sides from the parting plane 55 between the parts 51 and 52, and serves to accommodate the book 40, so that the book with its cut head and tail fits closely upwardly and downwardly into said clearance, the fore-edge of said book extending to the back against the stop or insert 53, which slidably extends on opposite sides into suitable grooves in the parts 51 and 52. Thus the parts 51 and 52 may be adjustably closed over books of different thickness.

The end of the book 40, which has the holes 32 or notches 41, extends into the central cavity 49, said cavity being slightly larger in height and in width, so that the liquid plastic may surround the said end of book 40 on all sides. A piece of binding material 56, e. g. mull, is laid flatly onto the perforated or notched end of book 40. The parting line between the parts 51 and 52 on one hand and the other parts of the mold on the other hand, extends substantially in level with said mull 56. Thus mull 56 is wedged between the ridges 57 extending from the various parts of the mold towards each other in order to separate the cavity 49 from the cavities 47 and 48.

The mull 56 lying on the perforated end of book 40 extends between said ridges 57 in opposite directions into the cavities 47 and 48. When the liquid plastic is inserted or injected by way of the inlet 22 into the three cavities 47, 48 and 49, the plastic firmly engages in the cavities 47 and 48, upon the ends of the mull 56 extending into said cavities, and the plastic entering upon the cavity 49 filters through the mull 56 around the sides and above and underneath the end of the book 40, and also into the notches 41, so that the book as well as the mull are firmly cast into the back 46 of the book.

The sides of the cavities 47, 48 and 49, and more particularly those facing the part 50 of the mold, may be suitably cut, engraved or etched in the outline of designs, e. g. 58, and legends, e. g. 59, as indicated in Fig. 4.

The mull or other flexible material 56 serves as a hinge for the parts of the casing upon each other, between the covers 44 and 45 on one hand, and the back 46 of the binding on the other hand. If the plastic is flexible and particularly so in thin layers, the ridges 57 do not have to abut tightly upon and wedge the mull or flexible material 56 between each other, but they may be spaced far enough apart, to allow the liquid plastic to enter therebetween and sheath the material 56.

It is readily understood that a wire-stitched or sewed book may be substituted for a book 40 of loose-leaves. But in this latter instance it may not be necessary to use the additional mull 56, because the end papers, particularly when they are perforated, and a lining e. g. of mull, which is ordinarily perforated, may simply be extended between the ridges 57 of the mold from the book into the cavities 47 and 48, and are then engaged upon by the plastic cast in said latter cavities.

The modification of Fig. 6 shows a mold for binding such a book 60 into a cast casing, after the book has been rounded and backed for instance. The lining 61 is shown to extend around the back of the book, at 62, over the top and bottom sides of the book, and it may be assembled with the end papers of the book. These top and bottom flaps 62 of the lining, which may include the end papers, are laid into the cavities 63 and 64, in which the top cover and the bottom cover of the book are to be cast between the parts 65 and 66, and 67 and 68 of the mold respectively. The clearance in the parts 65 and 67 may be convex where it faces the fore-edge of the book 60; this is however not necessary. Ridges 69 on the parts 66 and 68, will again close in on the lining, where the lining passes from the back to the covers, these ridges 69 clearing the acute ends of the parts 65 and 67 sufficiently to allow the lining to extend therebetween from 61 to 62. Between the parts 66 and 68 of the mold and the back of the book cavity 70 is provided and is of a size sufficient to allow the injected molding material or plastics to spread evenly over the back of the lining 61. The material cast in the cavities 70 may, when it is cast thin enough, be so flexible that in connection with a sewed book, the casing substantially is a "limp binding."

Fig. 7 illustrates, exemplarily, a mold for a composite casing, which has a hollow back. The top and bottom flaps 62 of the lining, and the back 61 thereof, are again accommodated in cavities 72, 73 and 71 respectively, the four parts 74, 75, 76 and 77 of the mold being correspondingly assembled and recessed. But the back cavity 71 is not connected with the system 21, 22 distributing the liquid plastic. Here the back cavity 71 is therefore not used for molding a plastic, but accommodates a finished back 79 of the casing, e. g. a leather back, or a back made of other suitable material. Flaps 80 extend from such a back 79 into the other cavities 72 and 73, in order to be engaged by and cast into the plastic eventually filling the said cavities 72 and 73. The ridges 78 of the parts 74 and 75 of the mold may be correspondingly shortened so that the flaps 80 of the finished back extend from the cavity 71 into the cavities 72 and 73 just as the flap 62 of the lining passes from the one to the others of cavities at these ridges in Fig. 6. If the finished back 79 is not made of a pervious material, its flaps 80 may be perforated, as indicated at 81, in order

to make sure that the fluid plastic reaches and engages upon the whole flap 62 of the lining, to the extent to which said flaps are accommodated in the cavities 72 and 73. A bound and finished book 60 of this kind is comparable to a "half-bound" book, although it would not have the corners, which in a half-bound book are usually made of the same material as the material 79 of the hollow back.

That does however not mean that a cast hollow back could not also be provided upon a book by way of the invention herein described. Let distributing channels also extend to the periphery of the hollow cavity 71 from the inlet 22, through which the liquid plastic is introduced or injected. I further provide a retractile core in the hollow space shown in cavity 71 in Fig. 7, which core leans onto the backside of the book 60 or the lining 61 covering the same, and makes the material 79 sufficiently thin and pervious, so that it may be permeated by liquid plastic entering upon the periphery of the cavity 71.

The part 90 of a mold, which is thus adapted, but which may otherwise be similar to part 74 of the mold of Fig. 7, is shown in Fig. 12. An extra distributing channel 91 connects the inlet for liquid plastic of the distributing system with the back cavity 93 of the part 90 of the mold. The cavity 93 for said back and the cavity 94 for the front cover of the book both extend up to a line 92, up to which line will therefore extend the cover and back of the casing of the book. But in the margin 95 above said line 92 is removably lodged the upper end 96 of a scythe-shaped insert 97, said insert corresponding in cross-section substantially to the clear space in the cavity 71 shown in Fig. 7.

Through the space 98 behind the insert 97, i. e. around said insert, a piece of thin material, say of mull, may be extended in cavity 93 and flaps extend therefrom into cavity 94, and the corresponding opposite cavity for the bottom of the book, after they have passed ridges 99. After each cast the insert 97 is of course withdrawn from the back of the bound book.

Having thus described my invention by way of a few selected exemplary modifications, I do not wish to be limited thereby, except as the state of the art and the appended claims may require, for it is obvious that various modifications and changes may be made in the form of embodiment of my invention, without departing from the spirit and scope thereof.

What I claim is:

1. A mold serving to retain a plurality of sheets for the operation of casing said sheets in the manner of a book, comprising a flat bottom wall, a pair of parallel, relatively spaced head and tail walls extending from said bottom wall, forming a rectangular channel therewith and adapted to abut upon the head and tail edges of a plurality of sheets deposited upon said bottom wall and to align such sheets with each other, and a top wall parallel with and spaced relatively to said bottom wall and adapted to engage topwise upon such plurality of sheets deposited upon said bottom wall, said bottom and top walls being oppositely, outwardly offset at and near one end from one of said pair of walls to the other one, so that such a plurality of sheets may be permanently interengaged by a plastic flowed thereover where they extend between the offset portions of said bottom and top walls.

2. A mold serving to retain a plurality of sheets for the operation of casing said sheets in the manner of a book, comprising a flat bottom wall, a pair of parallel, relatively spaced head and tail walls extending from said bottom wall, forming a rectangular channel therewith and adapted to abut upon the head and tail edges of a plurality of sheets deposited upon said bottom wall and to align such sheets with each other, and a top wall parallel with and spaced relatively to said bottom wall and adapted to engage topwise upon such plurality of sheets deposited upon said bottom wall, certain of said walls being outwardly offset at and near one of their corresponding ends, so that such a plurality of sheets may be permanently interengaged by a plastic flowed thereover where they extend between the offset portions of said walls.

3. A mold serving to retain a plurality of sheets for the operation of casing said sheets in the manner of a book, comprising a flat bottom wall, a pair of parallel, relatively spaced head and tail walls extending from said bottom wall, forming a rectangular channel therewith and adapted to abut upon the head and tail edges of a plurality of sheets deposited upon said bottom wall and to align such sheets with each other, a top wall parallel with and spaced relatively to said bottom wall and adapted to engage topwise upon such a plurality of sheets deposited upon said bottom wall, said bottom and top walls being oppositely, outwardly offset at and near one end from one of said pair of walls to the other one to form a chamber, means closing the chamber formed by said walls at said end, and a port at said end for admitting a plastic to said chamber to interengage permanently the ends of such plurality of sheets extending between the offset portions of said bottom and top walls.

4. A mold serving to retain a plurality of sheets for the operation of casing said sheets in the manner of a book, comprising a flat bottom wall, a pair of parallel, relatively spaced head and tail walls extending from said bottom wall, forming a rectangular channel therewith and adapted to abut upon the head and tail edges of a plurality of sheets deposited upon said bottom wall and to align such sheets with each other, and a top wall parallel with and spaced relatively to said bottom wall and adapted to engage topwise upon such plurality of sheets deposited upon said bottom wall, said bottom and top walls being oppositely, outwardly offset at and near one end from one of said pair of walls to the other one, so that such a plurality of sheets may be permanently interengaged by a plastic flowed thereover where they extend between the offset portions of said bottom and top walls, said mold having a parting plane parallel to said bottom wall.

5. A mold serving to retain a plurality of sheets for the operation of casing said sheets in the manner of a book, comprising a flat bottom wall, a pair of parallel, relatively spaced head and tail walls extending from said bottom wall, forming a rectangular channel therewith and adapted to abut upon the head and tail edges of a plurality of sheets deposited upon said bottom wall and to align such sheets with each other, a top wall parallel with and spaced relatively to said bottom wall and adapted to engage topwise upon such plurality of sheets deposited upon said bottom wall, said bottom and top walls being oppositely, outwardly offset at and near one end from one of said pair of walls to the other one, so that such a plurality of sheets may be permanently interengaged by a plastic flowed thereover where they extend between the offset portions of said

bottom and top walls, and means closing the space surrounded by said walls near the other end of said bottom and top walls and serving as an end stop for such plurality of sheets.

6. A mold serving to retain a plurality of sheets for the operation of casing said sheets in the manner of a book, comprising a flat bottom wall, a pair of parallel, relatively spaced head and tail walls extending from said bottom wall, forming a reactangular channel therewith and adapted to abut upon the head and tail edges of a plurality of sheets deposited upon said bottom wall and to align such sheets with each other, a top wall parallel with and spaced relatively to said bottom wall and adapted to engage topwise upon such plurality of sheets deposited upon said bottom wall, said bottom and top walls being oppositely, outwardly offset at and near one end from one of said pair of walls to the other one, so that such a plurality of sheets may be permanently interengaged by a plastic flowed thereover where they extend between the offset portions of said bottom and top walls, said bottom and top walls being movable towards and away from each other in order to close upon sheets stacked therebetween, and an end plate for such plurality of sheets inserted into opposite slots in said bottom and top walls near their other ends.

7. A mold serving to retain a plurality of sheets for the operation of casing said sheets in the manner of a book, comprising a flat bottom wall, a pair of parallel, relatively spaced head and tail walls extending from said bottom wall, forming a rectangular channel therewith and adapted to abut upon the head and tail edges of a plurality of sheets deposited upon said bottom wall and to align such sheets with each other, and a top wall parallel with and spaced relatively to said bottom wall and adapted to engage topwise upon such plurality of sheets deposited upon said bottom wall, said bottom and top walls being oppositely, outwardly offset at and near one end from one of said pair of walls to the other one, so that such a plurality of sheets may be permanently interengaged by a plastic flowed thereover where they extend between the offset portions of said bottom and top walls, said bottom and top walls being movable towards and away from each other in order to close upon sheets stacked therebetween.

8. A mold serving to retain a plurality of sheets for the operation of casing said sheets in the manner of a book, comprising a flat bottom wall, a pair of parallel, relatively spaced head and tail walls extending from said bottom wall, forming a rectangular channel therewith and adapted to abut upon the head and tail edges of a plurality of sheets deposited upon said bottom wall and to align such sheets with each other, a top wall parallel with and spaced relatively to said bottom wall and adapted to engage topwise upon such plurality of sheets deposited upon said bottom wall, said bottom and top walls being oppositely, outwardly offset at and near one end from one of said pair of walls to the other one, so that such a plurality of sheets may be permanently interengaged by a plasitic flowed thereover where they extend between the offset portions of said bottom and top walls, and a convex wall closing the space surrounded by said walls near the other end of said bottom and top walls and serving as an end stop for such plurality of sheets.

9. A mold comprising a first compartment of rectangular cross-section, closed at one end, open at the other end and adapted to accommodate in fixed alignment a stack of sheets fanning out at one end from said open end of said compartment, a second compartment forming a continuation of said first compartment at the open end of the first compartment but having a larger cross-section than the first compartment and being closed at the end removed from said first compartment, said second compartment having ports serving to admit a plastic to be cast in said second compartment around said fanned ends of said sheets, and a flat compartment extending angularly from said second compartment near the open end thereof and ported for admitting a plastic to be cast into a cover in said flat compartment.

10. A mold comprising a first compartment of rectangular cross-section, closed at one end, open at the other end and adapted to accommodate in fixed alignment a stack of sheets fanning out at one end from said open end of said compartment, a second compartment forming a continuation of said first compartment at the open end of the first compartment but having a larger cross-section than the first compartment and being closed at the end removed from said first compartment, said second compartment having ports serving to admit a plastic to be cast in said second compartment around said fanned ends of said sheets, and a flat compartment extending angularly from said second compartment near the open end thereof and ported for admitting a plastic to be cast into a cover in said flat compartment, said third compartment communicating with one of said other compartments and having a ridge narrowing it down where it communicates therewith.

11. A mold comprising a first compartment of rectangular cross-section, closed at one end, open at the other end and adapted to accommodate in fixed alignment a book fanning out at one end from said open end of said compartment, a second compartment forming a continuation of said first compartment at the open end of the first compartment but having a larger cross-section than the first compartment and being closed at the end removed from said first compartment, and a crescent-shaped core bridging said second compartment and serving to provide a hollow in the back to be cast onto said book in said second compartment.

12. A mold for casing a book, comprising a compartment of rectangular cross-section adapted to accommodate a book, a ported, flat cover casting compartment, and a cavity between said compartments establishing communication between the compartments, said mold having a parting plane extending through the length of said intermediate cavity.

13. A mold for casing a book, comprising a compartment of rectangular cross-section adapted to accommodate a book, a ported, flat cover casting compartment, and a cavity between said compartments establishing communication between the compartments, said compartments having separate parting planes crossing each other outside of said cover casting compartment.

14. A mold for casing a book comprising a compartment adapted to accommodate a stack of sheets to be bound in book form and open at one end to expose an edge portion of the stack of sheets, cover casting compartments at opposite sides of the first compartment having open ends adjacent the open end of the first compartment and adapted to be filled with molding plas-

tic, and a cavity at the open end of the first mentioned compartment communicating with all of the compartments, and the planes of the compartments being in such angular relation to each other that they intersect within said cavity.

15. A mold for casing a book comprising companion sections having confronting faces defining a compartment open at one end and adapted to accommodate a stack of sheets to be bound in book form and side compartments adapted to be filled with molding plastic, the side compartments being angularly disposed with respect to the first compartment and each other and having open ends in close proximity to the open end of the first compartment, and a cavity across the open end of the first compartment communicating with open ends of all of the compartments, and the planes of the compartments intersecting within the cavity at a point opposite the first compartment.

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