Dec. 14, 1948. F. AUER 2,456,240

CHASE DIE ASSEMBLY

Filed June 22, 1946 4 Sheets-Sheet 1

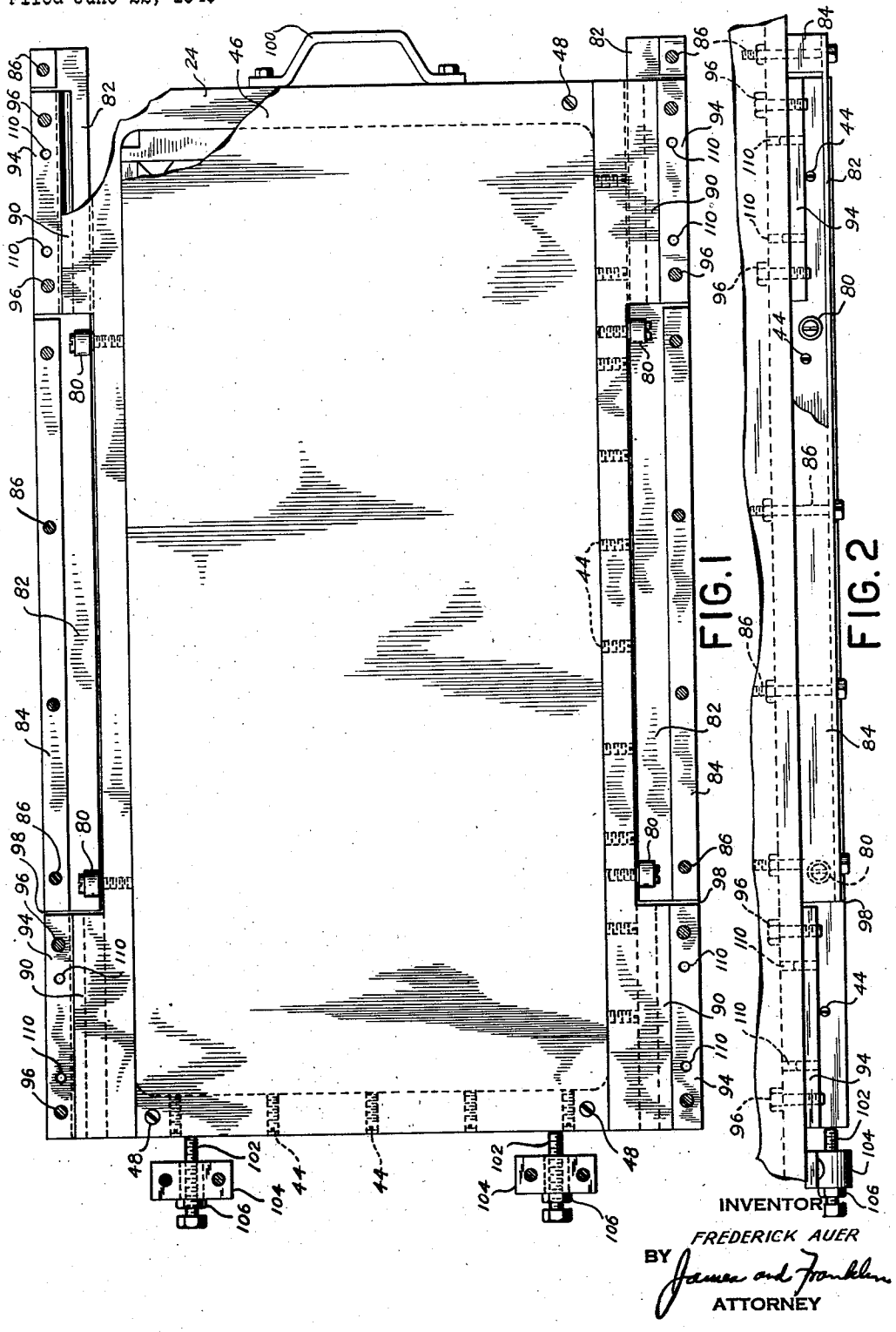


FIG. 1

FIG. 2

INVENTOR
FREDERICK AUER
BY James and Franklin
ATTORNEY

Dec. 14, 1948. F. AUER 2,456,240

CHASE DIE ASSEMBLY

Filed June 22, 1946 4 Sheets-Sheet 2

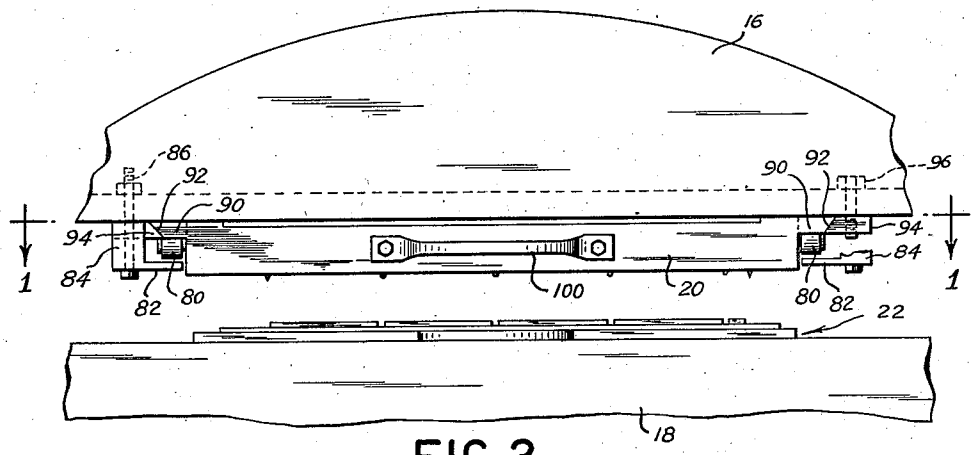


FIG. 3

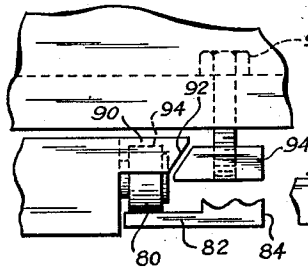


FIG. 4

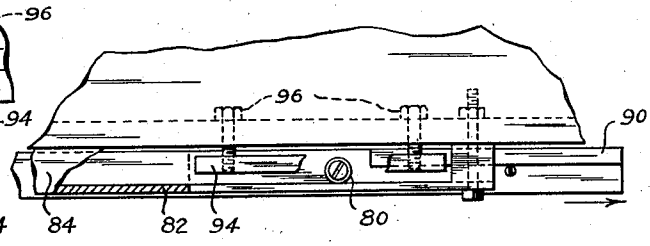


FIG. 5

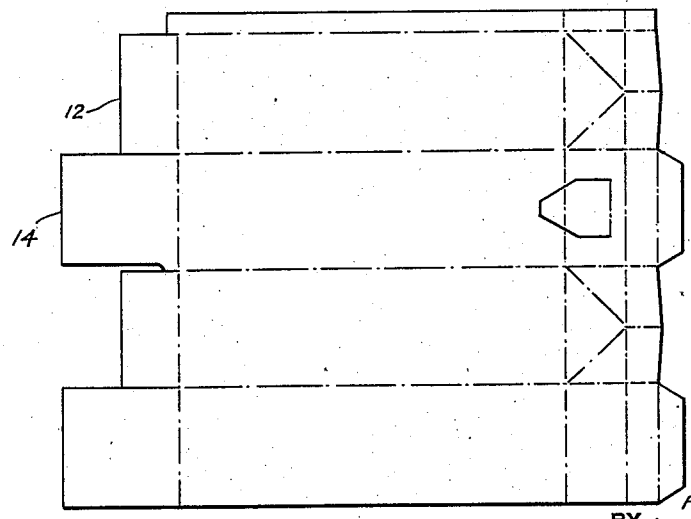


FIG. 14

INVENTOR
FREDERICK AUER
BY James and Franklin
ATTORNEY

Dec. 14, 1948. F. AUER 2,456,240

CHASE DIE ASSEMBLY

Filed June 22, 1946 4 Sheets-Sheet 3

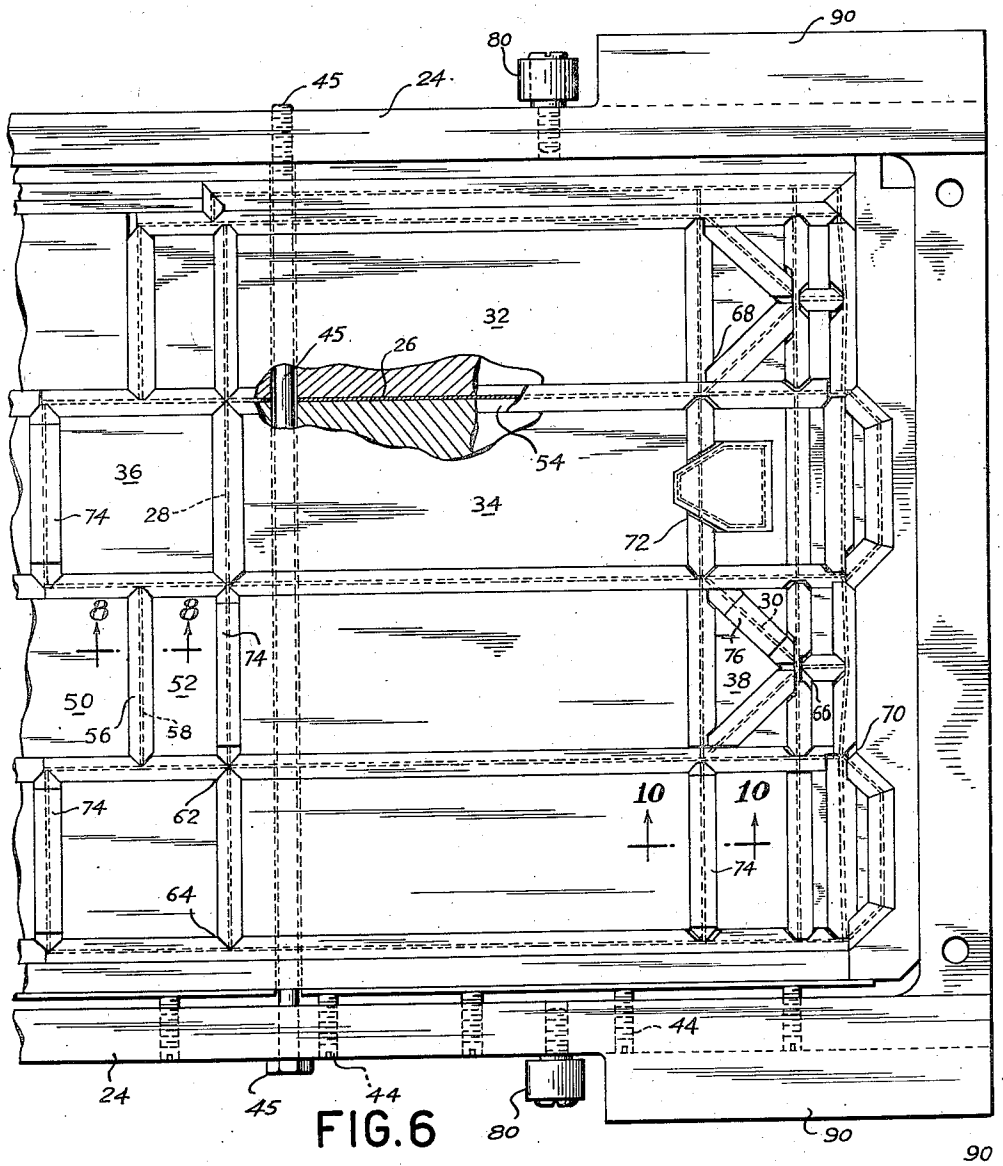


FIG. 6

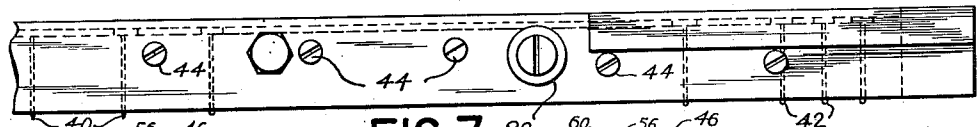


FIG. 7

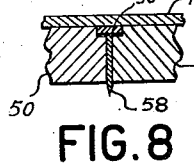


FIG. 8

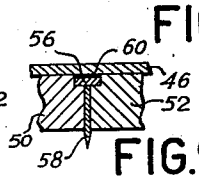


FIG. 9

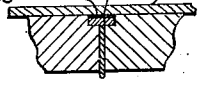


FIG. 10

INVENTOR
FREDERICK AUER
BY James and Franklin
ATTORNEY

Dec. 14, 1948. F. AUER 2,456,240

CHASE DIE ASSEMBLY

Filed June 22, 1946 4 Sheets-Sheet 4

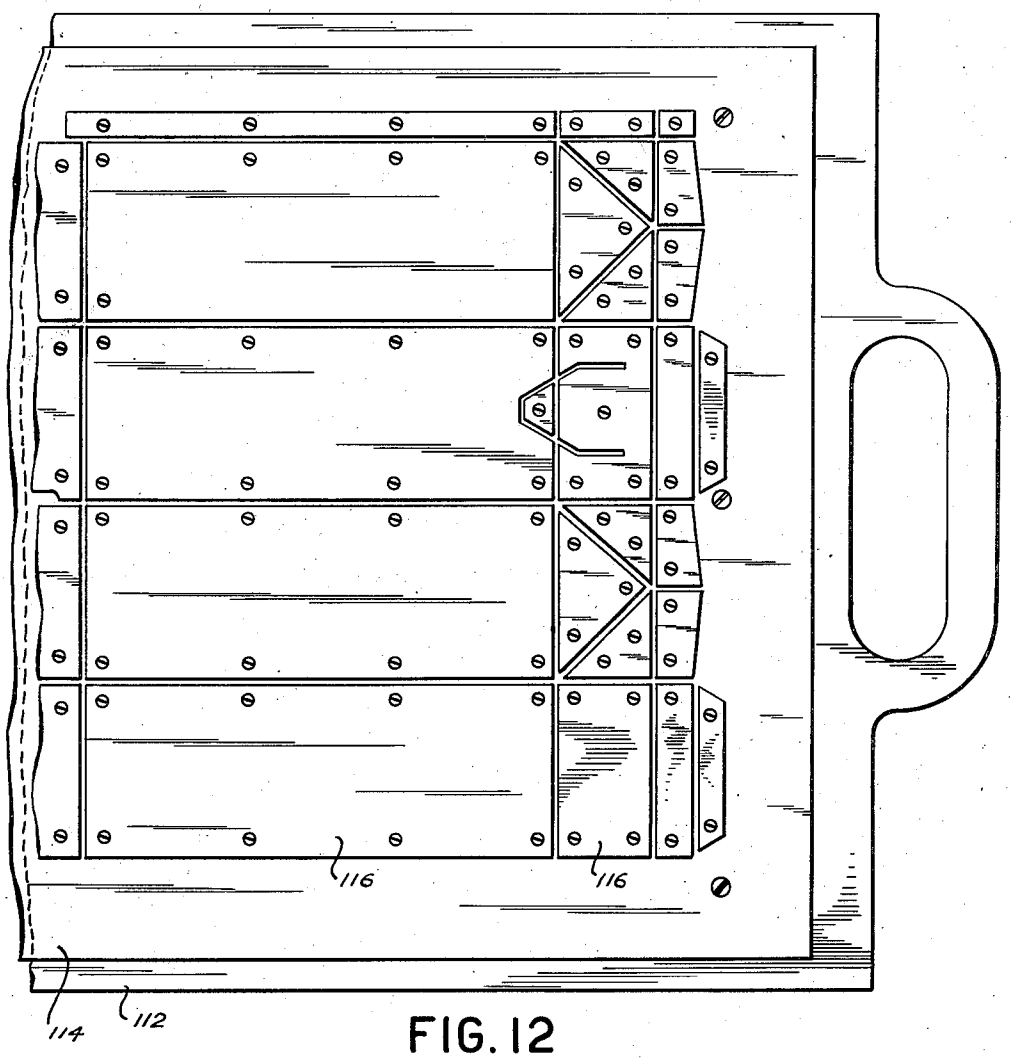


FIG. 12

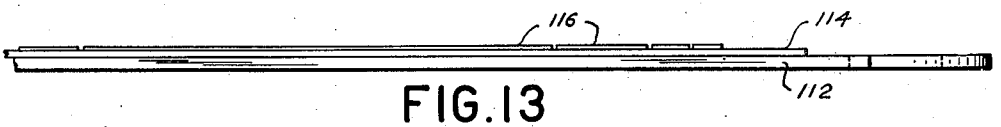


FIG. 13

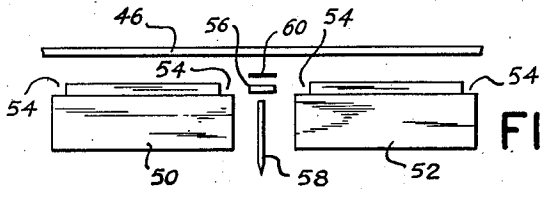


FIG. 11

INVENTOR
FREDERICK AUER
BY James and Franklin
ATTORNEY

Patented Dec. 14, 1948 2,456,240

UNITED STATES PATENT OFFICE

2,456,240

CHASE DIE ASSEMBLY

Frederick Auer, Teaneck, N. J., assignor to Champlain Company, Inc., Bloomfield, N. J., a corporation of New York

Application June 22, 1946, Serial No. 678,613

24 Claims. (Cl. 164—29)

1

This invention relates to dies for cutting and scoring sheet material, and more particularly to chase dies.

A chase die comprises a chase frame within which cutting or/and scoring rules are supported by spacing blocks or "furniture." For small "runs" the furniture may be made of wood, but for standard items made in larger "runs," for example, milk containers made by the millions, the furniture is made of metal. The chase die is ordinarily mounted on the upper platen or bolster of a press, and cooperates with a relatively thin flat bottom assembly comprising a bottom plate beneath a cutting plate surmounted by scoring spacers or die plates, between which the scoring rules bend the material of the web. The cutting rules are sharpened and wide enough to go all the way through the material to the cutting plate.

After first setting up and testing the die, it is found that some cuts are "clean" and others not, and that some score lines are too deep and others too shallow. This requires an adjustment commonly called "make-ready," and heretofore for this purpose, bits of paper were placed between the bottom plate and the cutting plate at points where the scoring or cutting is to be made deeper. For this reason the cutting plate was ordinarily fairly thin, and the bottom assembly was usually called a "make-ready assembly."

This trial-and-error procedure was often long drawn-out and tedious, and the nature of the adjustment made was such that a whole area would be changed, rather than one particular cutting rule or scoring rule.

The primary object of the present invention is to generally improve chase dies, and to facilitate making ready.

A more particular object is to localize the adjustments to any one rule, instead of an area of the die. To this end the make-ready adjustments are made at the die itself, rather than at the bottom assembly, and in accordance with further features and objects of the invention, the die is mounted on the bolster with appropriate guide means, preferably including rollers and guide rails to facilitate sliding the die out of position and back again for the necessary adjustments of the rules. Appropriate locating means are also provided to insure return of the die to identical position after each adjustment.

To accomplish the foregoing general objects and other more specific objects which will hereinafter appear, my invention resides in the chase die elements, the guide and locating means for the same, and their relation one to the other, as

2

are heinafter more particularly described in the following specification. The specification is accompanied by drawings in which:

Fig. 1 is a horizontal view of a chase die, showing also the guide means, and taken substantially in the plane of the line 1—1 of Fig. 3;

Fig. 2 is an elevation showing the guide means in relation to the press bolster;

Fig. 3 is an elevation showing a part of the press with the die mounted therein;

Figs. 4 and 5 are explanatory of the operation of the guide means;

Fig. 6 is a plan view of a part of the die with the hold-down plate removed;

Fig. 7 is an elevation thereof;

Fig. 8 is a section through a cutting rule, taken in the plane of the line 8—8 of Fig. 6;

Fig. 9 is a similar section showing the addition of a shim to lower the rule;

Fig. 10 is a section through a scoring rule, taken approximately in the plane of the line 10—10 of Fig. 6;

Fig. 11 is an exploded view showing the parts associated with one of the rules;

Fig. 12 is a plan view of a part of the bottom assembly;

Fig. 13 is an elevation thereof; and

Fig. 14 shows the blank being made by the particular die illustrated in Figs. 6 and 12.

Referring to the drawing, and more particularly to Fig. 14, the die in the present case is intended to make a milk container blank. This requires cutting on the lines shown as solid lines, and scoring on the dot-dash lines. When this blank is folded and cemented, it provides a milk container of the type having a sloping or gabled top. The blanks are formed in a continuous web of stock, and the die is preferably made long enough to form two blanks at a time, because they interfit at the bottom edges 12 and 14 in such a way as to conserve material.

Referring now to Fig. 3, the web (not shown) is passed between the upper platen or bolster 16 and the lower head 18. Usually the upper head 16 is movable and the lower head 18 is stationary. A chase die 20 is secured to bolster 16, and a bottom assembly 22 is mounted on the bottom head 18.

Referring now to Figs. 6 and 7 of the drawing, the die comprises a chase frame 24 within which cutting and scoring rules 26, 28, 30, etc., are disposed, these rules being properly spaced and supported in vertical or edgewise position by furniture 32, 34, 36, 38, etc. Fig. 7 shows how the cutting rules are sharpened, as for example at 40,

while the scoring rules are blunt or rounded, as for example, at **42**. Two sides of the chase frame are provided with set screws or Allen head screws **44**, and are used to clamp the furniture and rules tightly together. These screws are best shown in Figs. 1 and 6. Fig. 6 also shows one of two tie-rods **45** passing from one side of the chase frame to the other, which may be provided in order to hold the frame against any possibility of spreading under pressure of the set screws **44**. The furniture is slotted to loosely received the tie-rod **45**, so that the latter does not interfere with assembly of the furniture within the frame, and seating of the furniture when tightened together by the set screws.

The furniture and rules are supported at the top by a so-called "hold-down" plate. This has been removed in Fig. 6, but is shown at **46** in Fig. 1. It may be comparatively thin, and is held by four screws at the corners as indicated at **48**. There is no appreciable load other than compression between the faces of the hold-down plate, for the reason that the plate is flush with the top of the chase frame, and rests directly against the bottom face of the bolster of the press. Thus the reaction of the cutting pressure is applied from the rules to the hold-down plate to the bolster of the press.

As so far described, the die would be conventional, but referring now to Figs. 8, 9, 10 and 11, it will be seen that the furniture or spacers **50** and **52** are provided with peripheral steps or lands **54** (Fig. 11) within which a back-up strip **56** is received, this back-up strip preferably being thinner than the depth of the lands receiving the same. Thus the pressure of the rule **58** is applied to the back-up strip and in turn to the hold-down plate **46**. To lower rule **58** for a deeper cut, it is merely necessary to substitute another back-up strip having slightly greater thickness, or even more conveniently, one or more thin shims **60** (exaggerated in thickness in the drawing) are added to the back-up strip **56**. In this way the make-ready adjustment may be applied to any individual rule.

It will also be understood that in cruder form, the lands **54** and back-up strips **56** might be eliminated, and the shims applied directly to the rules, but this would have the disadvantage of tending to tilt the furniture slightly. An intermediate possibility is to provide the furniture with shallow lands, and to then use shim stock where needed, in which case the shims would not tend to tilt the furniture. However, the preferred arrangement employs back-up strips and shims, the back-up strips being thick enough to provide relatively rigid support over the full length of the rule.

Fig. 9 is like Fig. 11, but shows the parts in assembled relation. Fig. 9 differs from Fig. 8 in showing the addition of shim **60** to slightly lower the rule **58**. Fig. 10 is a section through a scoring rule, but otherwise corresponds to Fig. 9.

Reverting now to Fig. 6, it will be seen that the back-up strips preferably are so shaped at the intersections of the rules, that each rule may be supported throughout its length. Thus, at a simple rectangular intersection, the strips are preferably mitred, as indicated at **62**. At the edge of the die, one back-up strip may be notched and the other mitred, as indicated at **64**. When the rules come together at different angles, the back-up strips may be appropriately shaped to fit the special case, as indicated at **66**, **68**, **70** and **72**. It will be understood that no great precision is needed, and that the back-up strips are preferably loosely fitted together, and loosely received in the lands. The rules are disposed edgewise and therefore are themselves rigid, so that the refinement of interfitting the ends of the back-up strips as just described, is not essential, though desirable.

The back-up strips are themselves sufficiently thick and stiff that the shims need not have the exact length or outline of the back-up strip. The shims are preferably rectangular in outline, being made of ordinary shim stock having a width approaching that of the back-up strips. The pieces may have a length approximately equal to the length of the back-up strips without the mitred ends. Such shims are indicated in Fig. 6 at **74** and **76**.

Inasmuch as the chase die may have to be slid out several times for trial and error adjustment of the rules, I provide guide means to facilitate access to the top of the die. While not essential, I prefer to provide anti-friction means in the form of cooperating rollers and rails. In the present case, the rollers are provided at the sides of the die, and the rails are fixedly secured to the bolster of the press. In the drawing, the rollers are indicated at **80** and run on rails **82**. The latter have vertical support and spacer portions **84** which are secured directly to the bolster by means of bolts **86**. The parts **82** and **84** are L-shaped in section, as is best indicated at the left in Fig. 3.

To secure the die firmly in position on the bolster, I provide attaching means, here exemplified by mating ears and gibs. The ears are shown at **90**, and in the present case are made integrally with the chase frame, there being four ears at the four corners of the frame, as is best shown in Figs. 1 and 6. The ears have sloping outer edges **92**, best shown in Figs. 3 and 4, and these mate with the sloping inner edges of gibs **94** which are releasably secured to bolster **16** by means of screws **96**. The vertical support portion **84** of the L-shaped track **82** is interrupted, or cut away, at the forward gibs **94**. This is unnecessary at the rear gibs, because the entire track terminates at **98**, as will be seen at Fig. 1, for the rollers **80** are then in their innermost position. There is no need to extend the track further because the die is always pulled out of the press toward one side. In Fig. 1, it will be noted that a handle **100** is provided at the end of the die which is pulled out of the press.

It will be understood that to perform the make-ready adjustment the bolts **96** holding the gibs **94** are released slightly, thus permitting the rollers **80** to descend slightly until they rest on the rails **82**, this change being indicated to an exaggerated extent by the change from Fig. 3 to Fig. 4 in the drawing. In Fig. 3 the gibs have been tightened and the rollers **80** are lifted slightly from the rails. In Fig. 4 the gib has been released and the roller rests on the rail. The die is then pulled out of the press; the hold-down plate **46** is removed; some shims are added or removed at the appropriate rules; the hold-down plate is replaced; the die is slid back into position, and the gibs are again tightened.

In order to insure perfect registration of the chase die with the bottom assembly and with the web, it is important that the die be restored to exact position. This is accomplished by several means. Stops are provided to limit the insertion of the die, and for convenience, the stops are preferably adjustable. Referring to Fig 1, it will be seen that in the present case the stops

are screws 102 received in threated blocks 104 which are secured to the bolster of the press. The adjustment of the screws is locked by means of appropriate lock nuts 106. This determines the position of the die to the left or right, as viewed in Fig. 1.

To fix the position of the die in transverse direction, that is, left and right, as viewed in Fig. 3, the gibs on one side, for example, the gibs 94 on the right side, are considered the "home" gibs, and are invariably tightened first, thus bringing them all the way up against the bolster. The gibs on the other side are tightened last, and move the die to the right as far as permitted by the home gibs. Moreover, the position of the gibs themselves is accurately fixed by the use of dowel pins. These are indicated at 110 in Figs 1 and 2. The dowel pins fit the dowel holes closely and thus fix the location of the gibs more accurately than would be done by the screws alone.

In passing, it may be mentioned that there is no chance of the die being twisted excessively to one side or the other as it is being rolled into position, for the sides of the chase frame come fairly close to the inside edges of the rails 82 (see Figs. 3 and 4). Thus the ears 90 slide smoothly over the released gibs as the die is pushed to the end stops 102, whereupon the gibs may be tightened, one side being tightened home first, as previously described.

The bottom assembly is shown in Figs. 12 and 13, and may be conventional It comprises a bottom plate 112, a cutting plate 114, and scoring spacers or die plates 116. The plates 116 are held in position by screws (see Fig. 12), and provide grooves or spaces therebetween in which the rules of the chase die are received. The plates 116 are not needed for the cutting rules, the action of which depends on the sharp edge of the rule reaching the cuting plate 114, but they are essential for the scoring rules which bend the stock into the space between the plates 116. With the present invention it is not important to have both a cutting plate 114 and a botom plate 112, this construction being carried over from the old practice in which make-ready was accomplished by inserting bits of paper or the like between the plates 112 and 114 at points requiring a deeper cut. For the same reason, the handle shown at 116 is no longer essential.

It is believed that the construction and operation of my improved chase die and guide means therefor, as well as the advantages thereof, will be apparent from the foregoing detailed description. The die is somewhat more complex in providing lands on the furniture and back-up strips within the lands, but this is compensated by the ease and accuracy of making-ready, for each individual rule may be separately and accurately adjusted by the use of thin shims disposed above that particular rule. Moreover, access to the back-up strips is facilitated by the guide means, which preferably include anti-friction rollers such that the die is readily pulled out of position and replaced during the process of making-ready by trial and error. It is correctly located when replaced, but in addition, for caution, the die may be provided with pilot pins, and the bottom assembly with mating pilot holes (not shown in the drawing).

It will be apparent that while I have shown and described my invention in a preferred form, changes may be made in the structure disclosed without departing from the spirit of the invention, as sought to be defined in the following claims. For convenience, those claims dealing with the rail and roller arrangement specify that the rollers are on the die and the rails on the bolster, but it will be understood by those skilled in the art that if desired, rollers might be mounted on the bolster, and rails provided on the die.

I claim:

1. A chase die comprising a chase frame, rules, furniture supporting said rules within said frame, a hold-down plate in back of said rules and furniture, and make-ready means for determining the height of said rules relative to one another within said chase frame and relative to said frame.

2. A chase die comprising a chase frame, rules, furniture supporting said rules within said frame, a hold-down plate in back of said rules and furniture, and make-ready means for determining the relative height of said rules, said make-ready means including shims disposed between the back of some of the rules and the hold-down plate.

3. A chase die comprising a chase frame, rules, furniture supporting said rules within said frame, said furniture having peripheral lands at the top, a hold-down plate, and back-up strips received in said lands between the backs of the rules and the hold-down plates.

4. A chase die comprising a chase frame, rules, furniture supporting said rules within said frame, said furniture having peripheral lands at the top, a hold-down plate, and back-up strips received in said lands between the backs of the rules and the hold-down plates, said back-up strips having a thickness less than the depth of the lands receiving the same.

5. A chase die comprising a chase frame, rules, furniture supporting said rules within said frame, said furniture having peripheral lands at the top, a hold-down plate, and back-up strips between the backs of the rules and the hold-down plates, said back-up strips being so relatively shaped at intersections of the rules that each rule may be supported throughout its length by a back-up strip.

6. A chase die comprising a chase frame, rules, furniture supporting said rules within said frame, said furniture having peripheral lands at the top, a hold-down plate, back-up strips between the backs of the rules and the hold-down plates, said back-up strips having a thickness less than the depth of the lands receiving the same, and make-ready shims disposed between one or more of the back-up strips and the hold-down plate in order to determine the relative height of the rules.

7. A chase die comprising a chase frame rules, furniture supporting said rules within said frame, said furniture having peripheral lands at the top, a hold-down plate, back-up strips between the backs of the rules and the hold-down plate, said back-up strips having a thickness less than the depth of the lands receiving the same, and being mitred at intersections of the rules in order that each rule may be supported throughout its length by a back-up strip, and make-ready shims disposed between one or more of the back-up strips and the hold-down plate in order to determine the relative height of the rules.

8. The combination with a press bolster or platen and a chase die including make-ready means accessible from the back of the die of guide means to facilitate making ready, said means including ears on the chase frame, and mating gibs releasably secured to the bolster, said ears being slidable relative to said gibs.

9. The combination with a press bolster or platen and a chase die including make-ready means accessible from the back of the die, of means to facilitate making ready, said means including rollers at the sides of the die, and rails secured to the bolster on which rails said rollers may be run.

10. The combination with a press bolster or platen and a chase die including make-ready means accessible from the back of the die, of means to facilitate making ready, said means including rollers at the sides of the die, rails secured to the bolster on which rails said rollers may be run, and means for accurately locating the position of the die relative to the bolster when the die is returned after having been rolled out of the bolster for make-ready adjustment.

11. The combination with a press bolster or platen, and a chase die including make-ready means accessible from the back of the die, of means to facilitate making ready, said means including rollers at the sides of the die, rails secured to the bolster on which rails said rollers may be run, ears on the chase frame, and mating gibs releasably secured to the bolster.

12. The combination with a press bolster or platen, and a chase die including make-ready means accessible from the back of the die, of means to facilitate making ready, said means including rollers at the sides of the die, rails secured to the bolster on which rails said rollers may be run, ears on the chase frame, mating gibs releasably secured to the bolster, and adjustable stops for locating the position of the die relative to the bolster when the die is returned after having been rolled out of the bolster for make-ready adjustment.

13. In combination, a press bolster or platen, a chase die having make-ready means accessible from the back of the die, and guide means to facilitate moving the chase die into or out of the bolster for make-ready adjustment, said die comprising a chase frame, rules, furniture supporting said rules within said frame, and make-ready shims disposed between one or more of the rules and the hold-down plate in order to adjust the relative height of the rules, said guide means including means at the sides of the die movable relative to means secured to the bolster so that the die may be slid out from the bolster.

14. In combination, a press bolster or platen, a chase die having make-ready means accessible from the back of the die, and guide means to facilitate moving the chase die into or out of the bolster for make-ready adjustment, said die comprising a chase frame, rules, furniture supporting said rules within said frame, and make-ready shims disposed between one or more of the rules and the hold-down plate in order to determine the relative height of the rules, said guide means including means at the sides of the die movable relative to means secured to the bolster so that the die may be slid out from the bolster, and means for locating the position of the die relative to the bolster when the die is returned after having been slid out of the bolster for make-ready adjustment.

15. In combination, a press bolster or platen, a chase die having make-ready means accessible from the back of the die, and guide means to facilitate moving the chase die into or out of the bolster for make-ready adjustment, said die comprising a chase frame, rules, furniture supporting said rules within said frame, said furniture having peripheral lands at the top, a hold-down plate, back-up strips between the banks of the rules and the hold-down plates, said back-up strips having a thickness less than the depth of the lands receiving the same, and make-ready shims disposed between one or more of the back-up strips and the hold-down plate in order to determine the relative height of the rules, said guide means including means at the sides of the die movable relative to means secured to the bolster so that the die may be slid out from the bolster.

16. In combination, a press bolster or platen, a chase die having make-ready means accessible from the back of the die, and guide means to facilitate moving the chase die into or out of the bolster for make-ready adjustment, said die comprising a chase frame, rules, furniture supporting said rules within said frame, said furniture having peripheral lands at the top, a hold-down plate, back-up strips between the banks of the rules and the hold-down plates, said back-up strips having a thickness les than the depth of the lands receiving the same, and make-ready shims disposed between one or more of the back-up strips and the hold-down plate in order to determine the relative height of the rules, said guide means including means at the sides of the die movable relative to means secured to the bolster so that the die may be slid out from the bolster, and means for locating the position of the die relative to the bolster when the die is returned after having been slid out of the bolster for make-ready adjustment.

17. In combination, a press bolster or platen, a chase die having make-ready means accessible from the back of the die, and guide means to facilitate moving the chase die into or out of the bolster for make-ready adjustment, said die comprising a chase frame, rules, furniture supporting said rules within said frame, and make-ready shims disposed between one or more of the rules and the hold-down plate in order to determine the relative height of the rules, said guide means including rollers at the sides of the die and rails secured to the bolster on which rails said rollers may be run.

18. In combination, a press bolster or platen, a chase die having make-ready means accessible from the back of the die, and guide means to facilitate moving the chase die into or out of the bolster for make-ready adjustment, said die comprising a chase frame, rules, furniture supporting said rules within said frame, and make-ready shims disposed between one or more of the rules and the hold-down plate in order to determine the relative height of the rules, said guide means including rollers at the sides of the die and rails secured to the bolster on which rails said rollers may be run, and means for locating the position of the die relative to the bolster when the die is returned after having been rolled out of the bolster for make-ready adjustment.

19. In combination, a press bolster or platen, a chase die having make-ready means accessible from the back of the die, and guide means to facilitate moving the chase die into or out of the bolster for make-ready adjustment, said die comprising a chase frame, rules, furniture supporting said rules within said frame, said furniture having peripheral lands at the top, a hold-down plate, back-up strips between the backs of the rules and the hold-down plates, said back-up strips having a thickness less than the depth of the lands receiving the same, and make-ready shims disposed between one or more of the back-up strips and

the hold-down plate in order to determine the relative height of the rules, said guide means including rollers at the sides of the die and rails secured to the bolster on which rails said rollers may be run.

20. In combination, a press bolster or platen, a chase die having make-ready means accessible from the back of the die, and guide means to facilitate moving the chase die into or out of the bolster for make-ready adjustment, said die comprising a chase frame, rules, furniture supporting said rules within said frame, said furniture having peripheral lands at the top, a hold-down plate, back-up strips between the backs of the rules and the hold-down plates, said back-up strips having a thickness less than the depth of the lands receiving the same, and make-ready shims disposed between one or more of the back-up strips and the hold-down plate in order to determine the relative height of the rules, said guide means including rollers at the sides of the die and rails secured to the bolster on which rails said rollers may be run, and means for locating the position of the die relative to the bolster when the die is returned after having been rolled out of the bolster for make-ready adjustment.

21. In combination, a press bolster or platen, a chase die having make-ready means accessible from the back of the die, and guide means to facilitate moving the chase die into or out of the bolster for make-ready adjustment, said die comprising a chase frame, rules, furniture supporting said rules within said frame, said furniture having peripheral lands at the top, a hold-down plate, back-up strips between the backs of the rules and the hold-down plate, said back-up strips having a thickness less than the depth of the lands receiving the same, and make-ready shims disposed between one or more of the back-up strips and the hold-down plate in order to determine the relative height of the rules, said guide means including ears having sloping outer edges on the chase frame, and mating gibs releasably secured to the bolster.

22. In combination, a press bolster or platen, a chase die having make-ready means accessible from the back of the die, and guide means to facilitate moving the chase die into or out of the bolster for make-ready adjustment, said die comprising a chase frame, rules, furniture supporting said rules within said frame, said furniture having peripheral lands at the top, a hold-down plate, back-up strips between the backs of the rules and the hold-down plate, said back-up strips having a thickness less than the depth of the lands receiving the same, and make-ready shims disposed between one or more of the back-up strips and the hold-down plate in order to determine the relative height of the rules, said guide means including rollers at the sides of the die, rails secured to the bolster on which rails said rollers may be run, ears on the chase frame, and mating gibs releasably secured to the bolster.

23. In combination, a press bolster or platen, a chase die having make-ready means accessible from the back of the die, and guide means to facilitate moving the chase die into or out of the bolster for make-ready adjustment, said die comprising a chase frame, rules, furniture supporting said rules within said frame, said furniture having peripheral lands at the top, a hold-down plate, back-up strips between the backs of the rules and the hold-down plate, said back-up strips having a thickness less than the depth of the lands receiving the same, and so shaped at intersections of the rules that each rule may be supported throughout its length by a back-up strip, and make-ready shims disposed between one or more of the back-up strips and the hold-down plate in order to determine the relative height of the rules, said guide means including rollers at the sides of the die, rails secured to the bolster on which rails said rollers may be run, ears on the chase frame, and mating gibs releasably secured to the bolster.

24. In combination, a press bolster or platen, a chase die having make-ready means accessible from the back of the die, and guide means to facilitate moving the chase die into or out of the bolster for make-ready adjustment, said die comprising a chase frame, rules, furniture supporting said rules within said frame, said furniture having peripheral lands at the top, a hold-down plate, back-up strips between the backs of the rules and the hold-down plate, said back-up strips having a thickness less than the depth of the lands receiving the same, and being so shaped at intersections of the rules that each rule may be supported throughout its length by a back-up strip, and make-ready shims disposed between one or more of the back-up strips and the hold-down plate in order to determine the relative height of the rules, said guide means including rollers at the sides of the die, rails secured to the bolster on which rails said rollers may be run, ears on the chase frame, gibs releasably secured to the bolster, and adjustable stops for locating the position of the die relative to the bolster when the die is returned after having been rolled out of the bolster for make-ready adjustment.

FREDERICK AUER.

REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
2,183,400	Herrmann	Dec. 12, 1939