Oct. 30, 1945. J. A. MOORE 2,387,766

FEEDING MECHANISM FOR CONTAINER PARTS

Filed Jan. 9, 1943 2 Sheets-Sheet 1

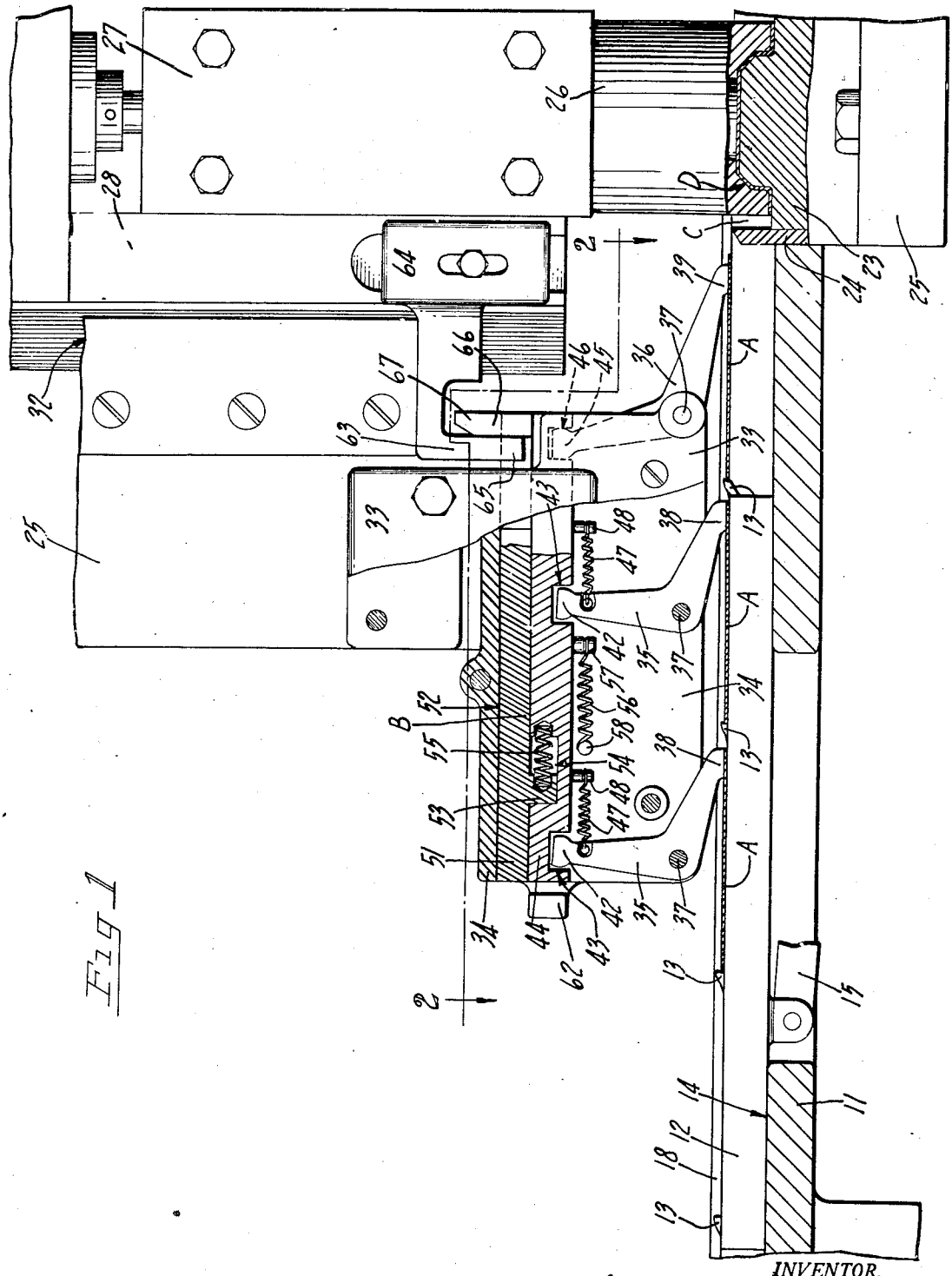


Fig 1

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Fig 2

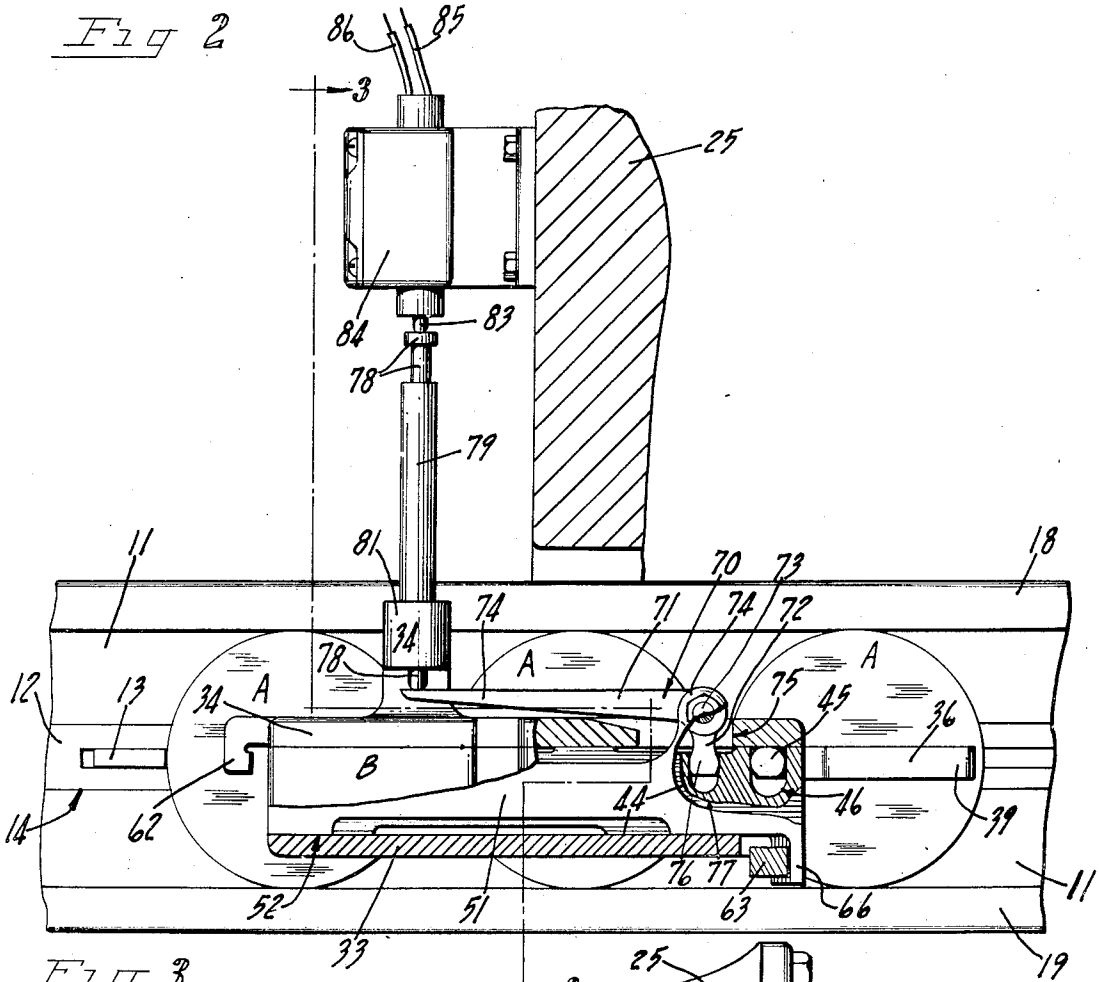
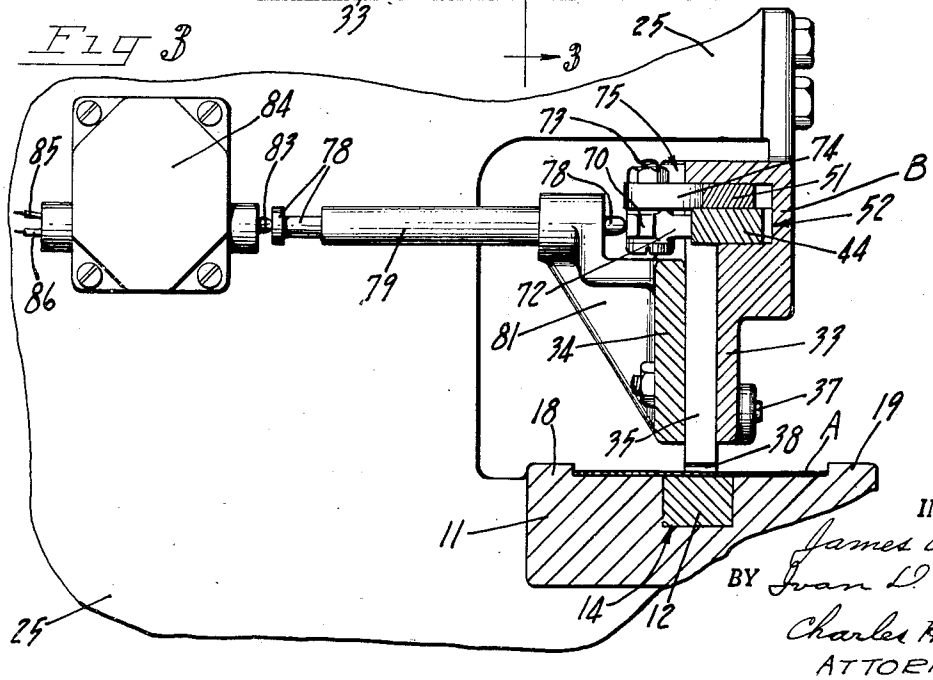


Fig 3



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FEEDING MECHANISM FOR CONTAINER PARTS

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6 Claims. (Cl. 271—57)

This invention relates to a feeding mechanism for can making machines or the like in which sheet material blanks to be operated upon are propelled along a predetermined path of travel in a continuous procession, and has particular reference to hold-down devices which retain the blanks in place while being advanced and which detect blanks of an abnormal thickness when such blanks enter under the devices.

In container or can making practice the flat sheet material blanks from which can parts are made are frequently conveyed through the various working stations of a machine in a step-by-step manner. When stroke bars and the like are used for this purpose there is a tendency for the blanks to lift up and slip backward with the return of the bar on its return stroke. Thus irregularities are likely to occur which would affect proper feeding. In the event that blanks of abnormal thickness are mixed with blanks moving through the machine, usually a separate device is required to detect such blanks so that they will not enter the working stations.

The present invention contemplates overcoming these difficulties by providing combination hold-down and detecting devices which are located adjacent the path of travel of the moving blanks and which hold the blanks against movement while they are at rest, such devices serving as means for detecting blanks of abnormal thickness so that such blanks will be prevented from damaging the machine.

An object of the invention is the provision of combination hold-down and detecting devices in a feeding mechanism for advancing blanks along a predetermined path of travel wherein the devices operate to hold the blanks during their rest periods in their advancement through the mechanism and simultaneously act to detect blanks of abnormal thickness.

Another object is the provision of such combination hold-down and detecting devices which stop the operation of the feeding mechanism in part or entirely and which operate ejector devices for expelling abnormal thickness blanks when such blanks are detected, thus preventing abnormal blanks from entering and damaging such or a subsequent operation machine.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

Referring to the drawings:

Figure 1 is a composite front elevational and vertical sectional view of a feeding mechanism embodying the instant invention, with parts broken away;

Fig. 2 is a sectional top plan view of the parts shown in Fig. 1 as taken substantially along the broken lines 2—2 in that figure with parts broken away; and

Fig. 3 is a transverse vertical sectional view taken substantially along the broken lines 3—3 in Fig. 2 with parts broken away.

As a preferred embodiment of the invention the drawings illustrate the principal parts of a feeding mechanism for advancing flat sheet metal blanks into a forming or other can making machine for converting the blanks into can or container parts. In such a feeding mechanism the blanks, indicated by the letter A, are fed in a continuous procession and in an intermittent or step-by-step manner along a predetermined path of travel. While the blanks are at rest during the intervals between their stepped advancement they are held against displacement by hold-down and detecting devices B.

The hold-down and detecting devices B are arranged to detect blanks of abnormal thickness just prior to the blanks reaching a working station C. Upon detection of an abnormal blank the machine is immediately stopped and entrance of the blank into the working station is prevented. The invention is equally well adapted to stop the feed mechanism only, leaving the rest of the machine in operation. The detecting devices may be adapted to discard the abnormal blank without stopping the machine if such features are desirable.

The blanks A are fed longitudinally along a table 11 which may be a part of the main frame of the machine (Figs. 1 and 2). This advancement of the blanks is effected by a reciprocating feed bar 12 having spring-held, depressible feed dogs or fingers 13 spaced along the bar. The feed bar slides in a slideway 14 which is formed in the table 11. The bar is reciprocated through a forward or feeding stroke and thence through a return stroke by a connecting link 15, which is actuated in any suitable manner in time with the other moving parts of the machine.

As the feed bar 12 moves through a forward or feeding stroke, a blank A is advanced one step and as the bar returns, this blank is held stationary in the advanced position by the hold-down device B until the next forward stroke. In this manner the feed bar moves the blank in a step-by-step advancement along the table toward

the station C. On each forward stroke of the feed bar the first blank A in the line is placed in position at the station C to be operated upon. During this advancement the blanks are guided by side guides 18, 19 formed integral with the table 11.

At the station C the blanks are formed, by cooperating upper and lower die members, into can parts D. The lower members include a stationary die 23 and a die ring 24 which surrounds the die. These parts are carried on and are secured to a machine main frame 25.

The upper die members include a vertically reciprocable punch 26 carried in a holder 27 secured to a slide 28. This slide moves in a slideway 32 in the machine main frame 25. The slide is reciprocated through a down or working stroke and thence through an up or return stroke in any suitable manner in time with the movement of the feed bar 12.

Most of the movable parts of the hold-down and detecting devices B are housed in a recessed bracket casing 33, which is secured to the frame 25 and which is fitted with a cover plate 34. The cover plate is bolted or otherwise secured to the casing and in spaced relation thereto, leaving an opening along the bottom and the ends. Within the space between the casing and its cover plate there is a plurality of hold-down fingers 35 and a hold-down and detecting finger 36. The drawings show two such hold-down fingers 35 and one combination hold-down and detecting finger 36. These fingers are formed as bell crank levers, each finger being carried on a pin 37 mounted in the bracket casing 33 (Fig. 1).

One leg of each of the bell-crank shaped fingers 35, 36 extends along the path of travel of the blanks. The finger 35 is formed with a clamping foot 38, and finger 36 has a corresponding foot 39. The feet bear against the blanks when they are at rest and hold them down flat on the feed table 11. The other leg of each of the fingers 35, 36 extends upwardly in substantially vertical position.

The upper ends of these legs of the fingers 35 are formed as rounded knobs 42 which are loosely disposed in slots 43 in an actuating slide 44. The upper end of the upright leg of the finger 36 is formed with a rounded knob 45 which snugly engages in a slot 46 of the slide 44.

Each hold-down finger 35 is under tension of a spring 47. One end of the spring is connected to its finger adjacent the rounded knob of the finger while the other end of the spring engages over a pin 48 carried in the slide 44. Therefore, there is one spring for each finger. Each spring holds the foot 38 of its corresponding finger 35 yieldably against the blanks when the latter are at rest, as hereinbefore mentioned.

The finger actuating slide 44 cooperates with an auxiliary slide 51 which is superimposed upon the actuating slide. These slides are located and operate in a horizontal groove or slideway 52 formed in the bracket casing 33. At times the two slides move in unison while at other times they move relative to each other, as will be hereinafter fully explained. The auxiliary slide 51 is formed with a depending projection or lug 53 which extends down into a recess 54 in the actuating slide 44. A yieldable connection between the slides is provided by a compression spring 55 which is disposed in the recess and which is interposed between the lug and the slide at one end of the recess. It is this spring that tends to hold the slides together as a unitary structure.

The slides 44, 51 when functioning as a unitary structure are held together by a tension spring 56 (Fig. 1). One end of the spring is connected to a pin 57 which depends from the bottom of the actuating slide 44. The other end of the spring engages over a pin 58 which extends out from the inner wall of the bracket casing cover plate 34. A stop lug 62 formed on the outer end of the cover plate limits the outward travel of the slides against the pull of the tension spring 56.

The two slides 44, 51 as a unitary structure are reciprocated through a forward or holding stroke each time the feed bar 12 completes a forward stroke. The feeding action brings the line of blanks A into advanced position. This movement of the slides is brought about by a depending actuating dog 63 which is formed on an overhanging arm bracket 64 bolted to the outer face of the punch slide 28 at the working station C. The bracket moves with the slide.

The lower end of the actuating dog 63 is formed with a tapered nose 65. Actuating dog 63 operates in a vertical path of travel adjacent to but not directly in line with an upright dog 66 formed on the inner end of the auxiliary slide 51. The upper end of the dog 66 is formed with a tapered nose 67 which is disposed slightly to the right of the tapered nose 65 on the dog 63, as viewed in Fig. 1.

Hence when the punch slide 28 moves down through a working stroke to bring the punch 26 into forming engagement with a blank A then in position in the lower die member 23, the tapered nose 65 of the descending actuating dog 63 engages against the tapered nose 67 on the slide dog 66 and shifts the auxiliary slide 51 inwardly against the tension of the spring 56. This movement is toward the right, as viewed in Fig. 1. The actuating slide 44 at such time moves with the auxiliary slide, both slides moving as a unitary structure.

This forward movement of the slides 44, 51 in their horizontal slideway 52 in the bracket casing 33, rocks the hold-down fingers 35, 36 in a clockwise direction (as viewed in Fig. 1) and brings their clamping feet 38, 39 down onto the blanks which have just been deposited therebeneath. As the nose 65 of the actuating dog 63 passes by the nose 67 of the slide dog 66 and moves down along the straight inner surface of the slide dog, the slides come to rest and remain stationary in their shifted position. This takes place while the punch 26 continues its full downward travel into the die 23. The can part forming operation thus is brought about on the foremost blank in the die mechanism.

This stationary holding of the slides 44, 51 during the forming operation, maintains the hold-down fingers 35, 36 in engagement with the blanks. In this manner the blanks are held against movement while the feed bar 12 moves back through a return stroke.

Following the completion of the forming operation, the punch 26 moves up through a return stroke and ejects the formed can part D from the die in the usual manner. During this up-stroke of the punch, the actuating dog 63 first moves up along the slide dog 66 and then rides off the dog, thus releasing the slides and subjecting the same to the tension of the spring 56. The spring pulls the slides as a unitary structure back against the stop lug 62 and thus rocks the hold down fingers 35, 36 in a counter-clockwise direction (as viewed in Fig. 1). This rocking of the fingers lifts their clamping feet 38, 39 up off the

blanks and thereby releases the blanks for further advancement by the feed bar 12, when it moves through its next forward stroke.

When a blank of abnormal thickness is inadvertently advanced with the other blanks it comes into position beneath the hold down fingers 35 without disturbing the usual conditions which obtain with a normal thickness blank. The loose fit of the rounded knobs 42 of the fingers in the slots 43 of the actuating slide 44 compensates for any changed finger position.

However when the abnormal thickness blank comes into position under the clamping foot 39 of the detector finger 36, the extra thickness of the blank prevents the foot of the finger from moving down to its usual position. Hence, further rocking of the detector finger is halted before the slides 44, 51 complete their forward stroke under the influence of the actuating dog 63 carried on the descending punch slide 28. This held position of the detector finger stops further movement of the actuating slide 44, the snug fit of the knob 45 of the finger 36 in its slot 46 preventing any loose play.

The stopping of the actuating slide, however, does not interfere with further shifting of the hold-down fingers 35. Their respective springs 47 complete the rocking of these fingers until their feet 38 engage the blanks therebeneath. Since the auxiliary slide 51 completes its stroke under the action of the actuating dog 63, it shifts relative to the stationary slide 44 and the relative movement between slides takes place as the spring 55 is compressed.

Relative movement of the slides 44, 51 is utilized to stop the machine so that the abnormal thickness blank may be removed. This prevents the blank entering the die where otherwise it would damage the die members. The auxiliary slide 51 carries a bell crank stop lever 70 (Fig. 2) having a long straight edge arm 71 and a short operating arm 72. This lever is mounted on a pivot pin 73 carried in a lug 74 formed on the inner edge of the actuating slide 44. The lug projects through an opening 75 cut in the bracket casing cover plate 34 so that the long arm 71 is located outside of the casing with its straight edge in substantial parallelism with the path of travel of the slide. The short arm 72 terminates in a rounded knob 76 which extends into a slot 77 formed in the actuating slide 44.

At its free end, the long lever arm 71 (Fig. 2) engages against the inner end of a push rod 78. This rod slides in a long bearing sleeve 79 secured in a bracket 81 formed on the bracket casing cover plate 34. The outer end of the rod engages against a movable element 83 of an electric stop switch 84. The switch is secured to the side of the main frame 25.

This switch is exemplary of a suitable electrical control element embodied in the proper electric circuit or circuits which may include switch wires 85, 86 for performing the desired result of preventing an abnormal thickness blank from passing into the machine. Such a circuit may include the electric motor for operating the machine or it may include other devices for stopping the operation of the feed bar 12 or for ejecting the abnormal blank from the machine. Since such control circuits are in themselves varied and well known further explanation is considered unnecessary.

Under normal operation of the machine as when blanks of normal thickness are advancing along the table 11 into the working station C, and the slides 44, 51 move as a unitary structure, the long arm 71 of the stop lever 70 moving with the slides and merely riding along the inner end of the push rod 78 without moving the rod. When an abnormal thickness blank is encountered and the bottom or actuating slide 44 stops moving while the upper or auxiliary slide 51 continues to move to complete its stroke, the resulting relative movement between the slides rocks the stop lever 70 on its pivot pin 73.

This rocking of the stop lever swings its long arm 71 outwardly against the rod 78 and pushes the latter against the movable element 83 of the electric switch 84 and thereby operates the switch. It is this movement of the stop lever and the operation of the switch that makes or breaks, as the case may be, the circuits connecting with the switch and thereby stops the machine or otherwise prevents the abnormal blank from entering the working station C, as hereinbefore explained.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the form hereinbefore described being merely a preferred embodiment thereof.

I claim:

1. In a feeding mechanism for sheet material blanks, the combination of a support for the blanks, means for advancing the blanks along said support, a blank hold-down device disposed adjacent said support and including a pivotally mounted member for holding down the blanks during their advancement along said support and for detecting blanks having an abnormal thickness, and means operable in time with the advancement of the blanks for pivotally moving said member.

2. In a feeding mechanism for sheet material blanks, the combination of a support for the blanks, means for advancing the blanks along said support, and a blank hold-down device disposed adjacent said support and including a plurality of pivotally mounted hold-down members for maintaining the blanks in engagement with said support while they are being advanced therealong, and means operable in time with the advancement of the blanks for pivotally moving said hold-down member, one of said members being adapted to detect blanks having an abnormal thickness.

3. In a feeding mechanism for sheet material blanks, the combination of a support for the blanks, means for advancing the blanks along said support, a blank hold-down device disposed adjacent said support and including a pivotally mounted member for holding down the blanks during their advancement along said support and for detecting blanks having an abnormal thickness, means operable in time with the advancement of the blanks for pivotally moving said blank holding member, and instrumentalities operable by said member when an abnormal thickness blank is detected for stopping further operation of said feeding mechanism.

4. In a feeding mechanism for sheet material blanks, the combination of a horizontal table for supporting a continuous procession of blanks being advanced therealong, a plurality of hold-down members pivotally mounted adjacent said table for holding the blanks against the table, a combination hold-down and detecting member also

pivotally mounted adjacent said table for detecting blanks of abnormal thickness, an actuating slide disposed adjacent said hold-down members and engageable therewith for operating the same, an auxiliary slide movable with the said actuating slide for lifting said hold-down members during the passage of blanks therebeneath along said table, one of said slides being moved relative to the other when said combination member detects a blank of abnormal thickness, and means operable by said relative slide movement for stopping further operation of said feeding mechanism.

5. In a feeding mechanism for sheet material blanks, the combination of a horizontal table for supporting a continuous procession of blanks being advanced therealong, a plurality of hold-down members pivotally mounted adjacent said table for holding the blanks against the table, a combination hold-down and detecting member also pivotally mounted adjacent said table for detecting blanks of abnormal thickness, an actuating slide disposed adjacent to and loosely engaging said hold-down members and tightly engaging said combination member, an auxiliary slide movable with the said actuating slide for shifting said members during the passage of blanks therebeneath, the said auxiliary slide also being movable relative to said actuating slide when said combination member detects a blank of abnormal thickness, yieldable means connecting said hold-down members with said actuating slide for maintaining engagement of the hold-down members with the blanks when the said combination member detects an abnormal thickness blank, and means operable by said actuating slide for stopping further operation of said feeding mechanism when the auxiliary slide moves relative to said actuating slide.

6. In a feeding mechanism for sheet material blanks, the combination of a table for supporting the blanks, a reciprocating feed bar for advancing the blanks individually along said table, a plurality of hold-down members pivotally mounted adjacent said table, a combination hold-down and detecting member also pivotally mounted adjacent said table for detecting blanks of abnormal thickness, a movable actuating slide disposed above said table and engaging said members for rocking them clear of said table during a feeding stroke of said feed bar and for returning them into holding engagement with the advanced blanks, an auxiliary slide superimposed upon said actuating slide, means for shifting said slides in unison to rock said members in time with the advancement of the blanks, a yieldable connection between said slides for allowing relative movement therebetween when said detecting member engages a blank of abnormal thickness, a stop lever pivotally carried on said auxiliary slide and engaging in said actuating slide and responding to the relative movement between said slides when an abnormal blank is detected, and an electric switch adjacent said stop lever and operated thereby when the latter moves for stopping the feeding mechanism when a blank of abnormal thickness is detected.

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