United States Patent

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[54] **DOUBLE-END DETECTOR FOR CAN END CURLER**
6 Claims, 7 Drawing Figs.

[52] **U.S. Cl.** ..... **113/1 F,**
113/113 C, 72/12, 72/26
[51] **Int. Cl.** **B21d 43/00**
[50] **Field of Search** ..... 113/113 C,
11 A, 14 R, 1 E, 1 F, 121 AA; 72/12, 16, 26, 31

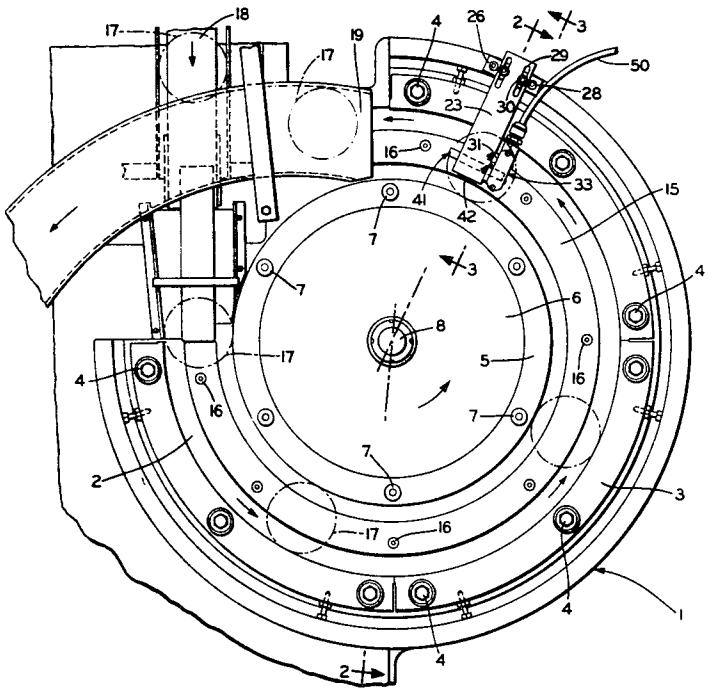
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ABSTRACT: A device for attachment to a curler for can ends for detecting the delivery of two telescoped can ends from a press to the curler. A limit switch controlling the circuit to the motor means driving the curler and the press is operatively associated with a cam located in the path of the cAn ends as they are delivered to the curler from the press. The limit switch and cam are so adjusted that when two telescoped can ends contact the cam the switch will be opened stopping operation of the press and the curler.



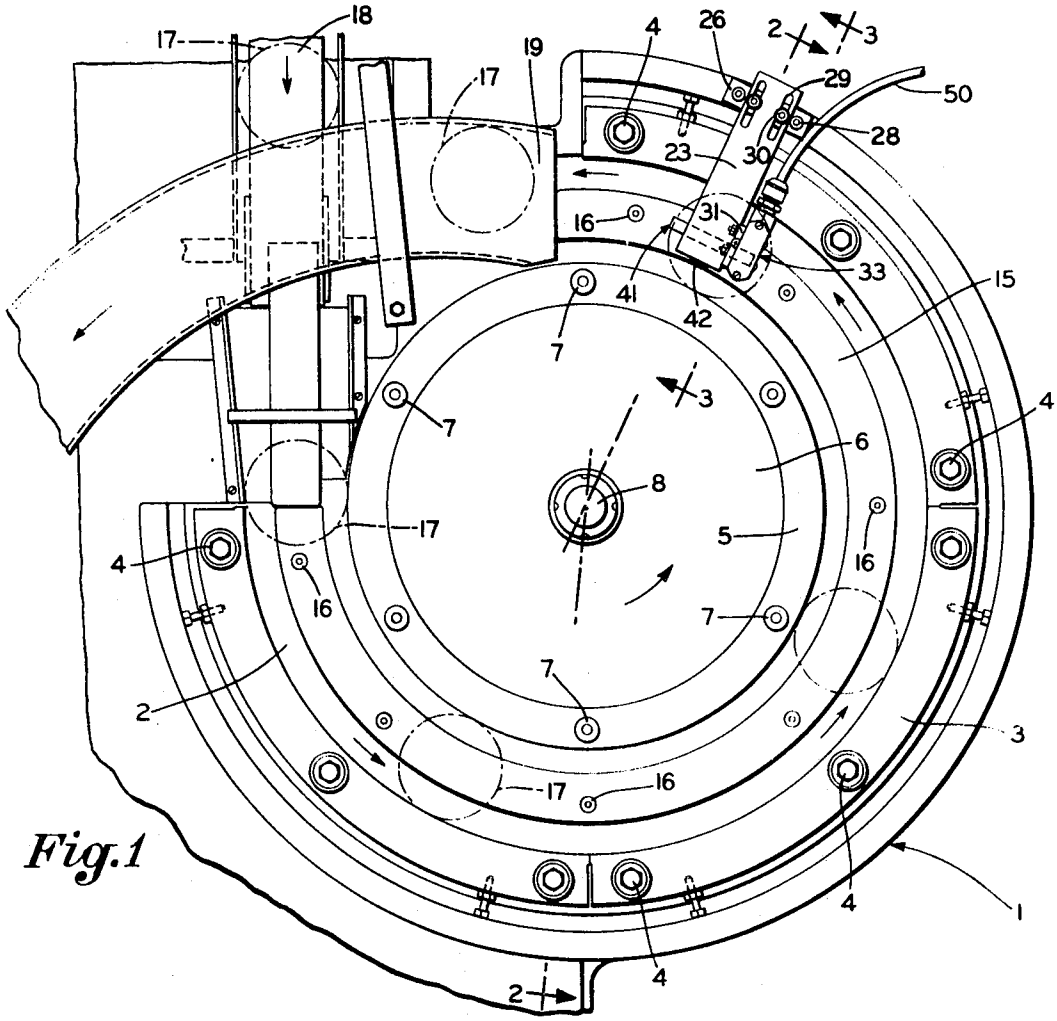


Fig. 1

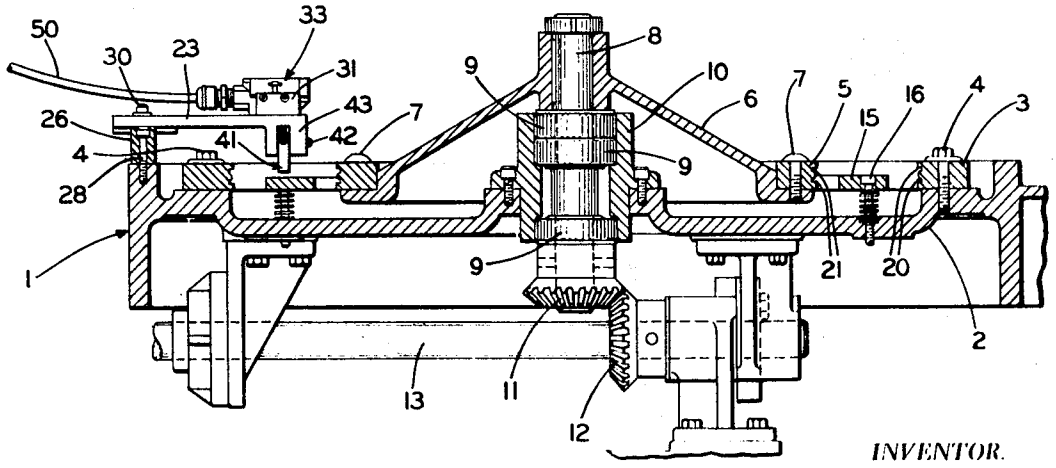


Fig. 2

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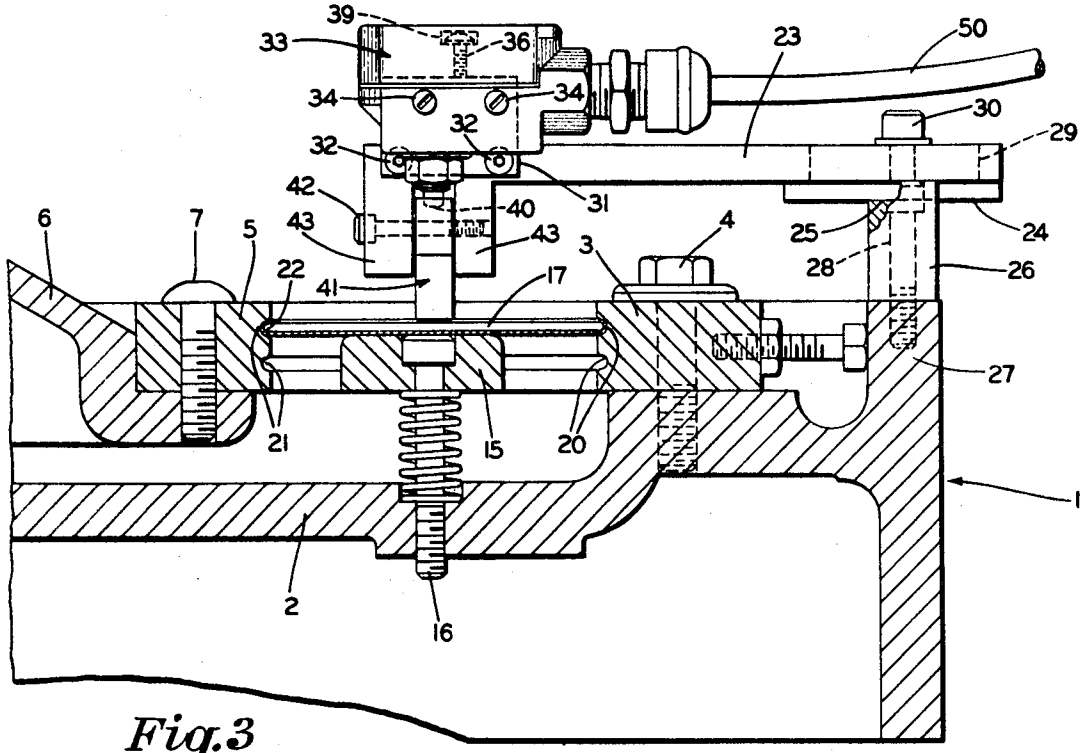


Fig.3

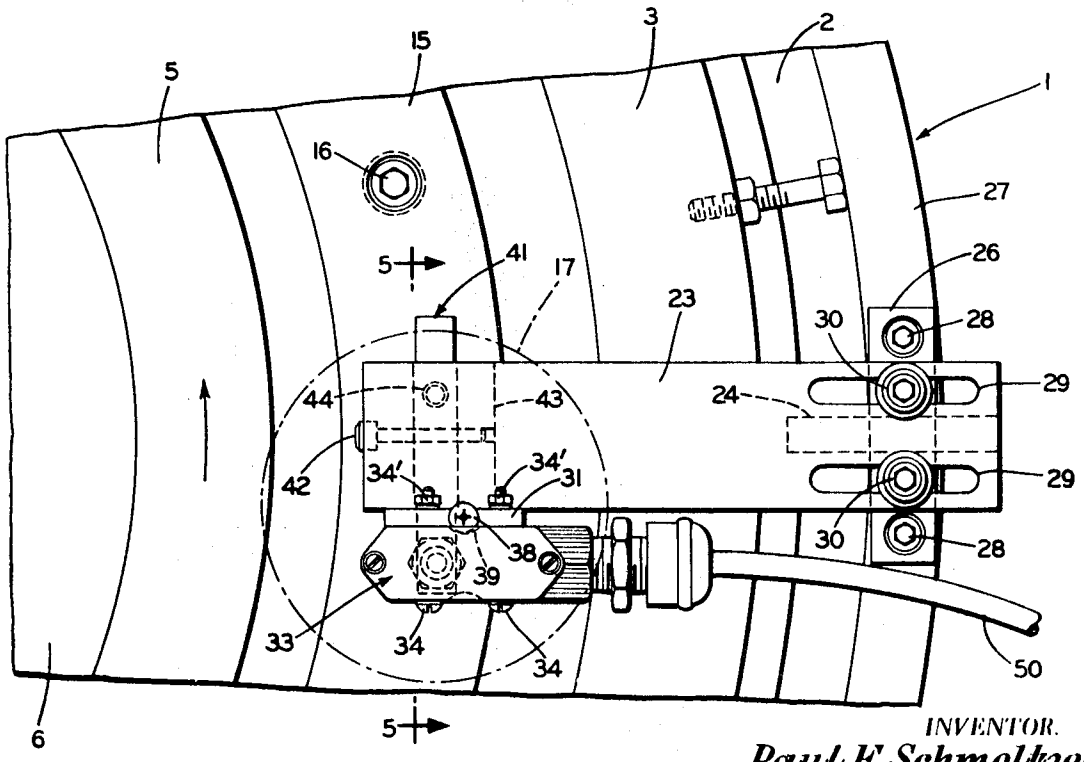


Fig.4

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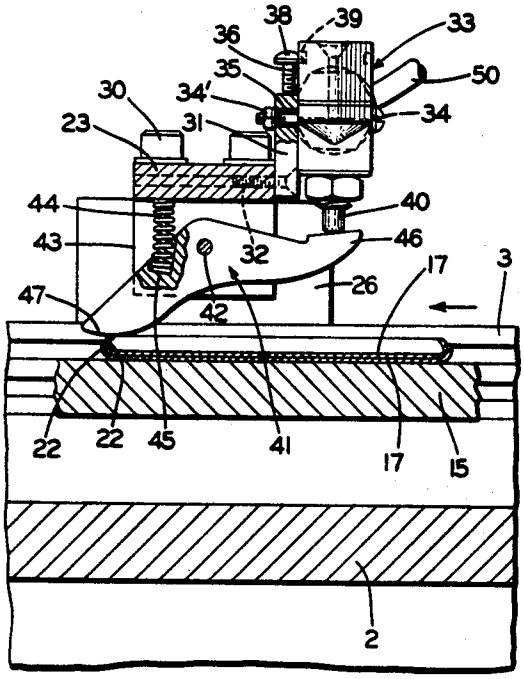


Fig. 6

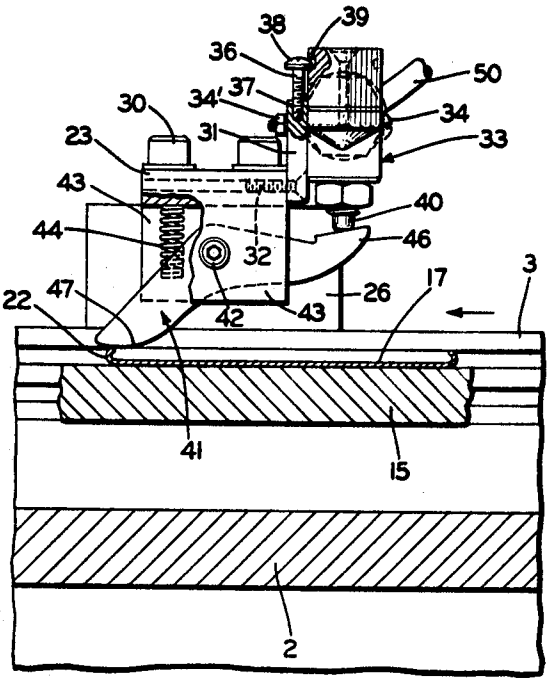
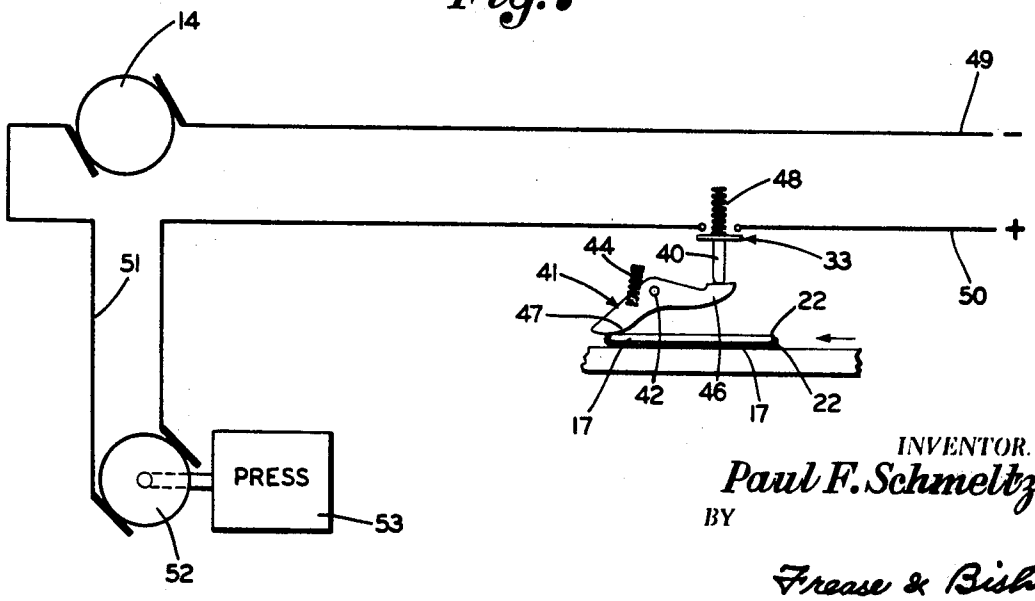


Fig. 5

Fig. 7



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DOUBLE-END DETECTOR FOR CAN END CURLER

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates to a detector for a curler for can ends for detecting when two can ends are accidentally delivered to the curler in telescoped condition. More particularly, the invention includes a limit switch controlling the circuit to the motor means for the curler and the press delivering can ends thereto, the switch being actuated to open the circuit by means of a cam contacted by the can ends as they are delivered to the curler.

2. Description of the Prior Art

In the manufacture of can ends, it is common practice to stamp the same on a press in the form of sheet metal discs, each having a peripheral flange thereon. These flanged discs are delivered from the press,, by suitable conveyor means, to a curler which rolls or curls the peripheral flanges upon the can ends.

It occasionally happens that by accident two of the flanged can ends are delivered to the curler in telescoped condition. If this double end goes through the rest of the processing, it will wind up jamming the seamer in the cannery. To the best of applicant's knowledge, no one has provided a satisfactory means for detecting delivery of a double end to the curler prior to this invention.

SUMMARY OF THE INVENTION

In general terms, the invention may be described as comprising a cam-actuated limit switch for controlling the circuit to motor means for a can end press and curler. The press forms can ends in the shape of sheet metal discs having peripheral flanges and discharges them upon a conveyor which delivers the can ends to a curler which curls or curves the peripheral flanges.

The curler comprises a stationary table having a grooved outer curling ring and a concentric rotating hub having a complementary grooved inner curling ring. The flanged can ends are carried in a circular path between the grooved curling rings which curl or roll the annular flanges of the can ends.

It occasionally happens that two flanged can ends are delivered from the press in telescoped condition. If such a double end is permitted to pass through the curler and go through the rest of the process of manufacture, it will eventually jam the seamer in the cannery.

All of the above-described mechanism is in general use in the manufacture of can ends. The invention comprises means for detecting a double end and stopping both the press and the curler so that the double end may be removed therefrom. This detector includes a limit switch controlling the electric circuit to the motor means for the press and curler and a pivoted cam operatively associated with the switch and adapted to be actuated by double can ends passing through the curler.

This cam is set so that if a double can end enters the curler the additional thickness of the two layers of sheet metal will lift the cam sufficiently to break the electrical contact of the limit switch thus shutting down the press and the curler so that the press operator is enabled to go to the curler and remove the double end which has stopped the press.

An object of the invention is to provide detector means in combination with a press and a curler for forming flanged can ends and curling the flanges thereof, to detect the delivery of two can ends in telescoped condition to the curler and to automatically open the electric circuit to the motor means for the press and curler.

Another object of the invention is to provide such a double-end detector including a limit switch controlling the electric circuit to the motor means for the press and curler and a pivoted cam actuated by double can ends contacting the same for opening the circuit when a double end is delivered to the curler.

A further object of the invention is to provide a double-end detector of the character referred to in which the limit switch has a spring-loaded plunger normally urging the switch to closed position, one end of the pivoted cam being contacted by double can ends passing through the curler, the other end of the pivoted cam moving the plunger against the pressure of the conventional spring in the limit switch.

A still further object of the invention is to provide such a double-end detector having means for adjusting the limit switch relative to the cam for different can sizes.

Another object of the invention is to provide a double-end detector of this type having a fine and a coarse adjustment on the limit switch.

The above and other objects, apparent from the drawings and following description, may be attained, the above-described difficulties overcome and the advantages and results obtained, by the apparatus, construction, arrangements and combinations, subcombinations and parts which comprise the present invention, a preferred embodiment of which, illustrative of the best mode in which applicant has contemplated applying the principle, being set forth in detail in the following description and illustrated in the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top plan view of a can end curler having the double end detector to which the invention pertains associated therewith;

FIG. 2 is a vertical sectional view taken on the line 2—2, FIG. 1;

FIG. 3 is an enlarged fragmentary vertical sectional view taken on the line 3—3, FIG. 1, showing a single can end in the curler and passing under the double-end detector without operating it;

FIG. 4 is a fragmentary plan view of the portion of the curler shown in FIG. 3, the can end being indicated in broken lines;

FIG. 5 is a vertical section taken on the line 5—5, FIG. 4, with parts broken away;

FIG. 6 is a section similar to FIG. 5 showing a double end in the curler and operating the detector to stop the curler and the press; and

FIG. 7 is a wiring diagram of the electric circuit controlled by the detector.

DESCRIPTION OF THE PREFERRED EMBODIMENT

At 1 is illustrated generally the right-hand curler of a 020 double curler as made and sold by E. W. Bliss Company. Such a curler includes a main table 2 having the stationary outer curling ring 3 attached thereto as by cap screws 4.

The inner rotary curling ring 5 is attached to the curling ring hub 6 by screws 7. The hub 6 is fixed upon the curling ring hub shaft 8 which is journaled in bearings 9 in the bearing hub 10 centrally mounted through the main table 2.

A miter gear 11 is fixed upon the lower end of the curling ring hub shaft 8 and meshes with a miter gear 12 fixed upon the main drive shaft 13, one end of which is operatively connected to an electric motor 14 as indicated in FIG. 7.

A support ring 15 is vertically adjustably mounted concentrically between the inner and outer curling rings, being connected to the main table 2 as by spring-loaded screws 16. The support ring 15 is a broken ring, as best shown in FIG. 1, one end thereof being adapted to receive can ends 17 as they are delivered by a conveyor 18 from the press (not shown). The can ends 17 are discharged from the other end of the support ring 15 to a chute 19 which may lead to a stacker.

The can ends 17 are formed in the press with peripheral flanges which are curled in the opposed circular grooves 20 and 21, in the outer and inner curling rings 3 and 5, respectively, as shown at 22 in FIG. 3.

For economic reasons, two sets of grooves 20 and 21 may be formed in the curling rings so that when one set of grooves becomes worn, the curler may be adjusted so that the other set of grooves may be used for curling the flanges on the can ends.

It occasionally happens that two of the flanged can ends are accidentally delivered to the curler in telescoped condition. IF such a double end is not removed, it will cause trouble later by jamming the seamer in the cannery.

All of the apparatus so far described herein are now in general use for curling the peripheral rims on can ends, and in itself forms no part of the present invention, which relates only to means for detecting a double end in the curler and automatically stopping operation of the curler, as well as the press which forms the can ends for delivery to the curler.

The double-end detector to which the invention pertains comprises an elongated rectangular base 23 having a central, longitudinal tongue 24 on its underside at one end thereof.

This tongue is slideably received in the groove 25 in the upper end of the mounting block 26. This mounting block is connected to the peripheral flange 27 on the main table 2 by cap screws 28.

The base 23 has longitudinal slots 29 therein, through which are located cap screws 30 for longitudinally adjustably mounting the vase 23 upon the mounting block 26.

A vertical mounting plate 31 is connected at its lower edge to one side of the base 23 by screws 32 and extends upward from the base, as shown in FIGS. 5 and 6. A limit switch housing indicated generally at 33 is vertically adjustably mounted upon the mounting plate 31 by means of screws 34 located through apertures 35, of greater diameter than the screws, in the mounting plate 31.

The limit switch housing 33 may thus be vertically adjustably mounted upon the mounting plate 31 by means of the nuts 34'. In order to provide a vernier adjustment for the limit switch housing 33 upon the mounting plate 31, the vernier screw 36 is threaded into a tapped socket 37 in the top of the mounting plate 31, one edge of the head 38 of the vernier screw being received in a notch 39 in the housing 33 of the limit switch.

The limit switch, located within the housing 33, is of conventional construction and is provided on its underside with a plunger or button 40 which is normally spring-biased downward or outward to urge the limit switch to open position.

The limit switch is normally held in closed position by a cam lever, indicated generally at 41, fulcrumed intermediate its ends at 42 between the transversely disposed bifurcations 43 depending from the inner end of the base 23.

A spring 44, interposed between the undersurface of the base 23 and a socket 45 in the cam lever 41, normally holds the upper end 46 of the lever 41 in the position shown in FIG. 5 pushing the plunger 40 of the limit switch inward to hold the limit switch in closed position.

The other or lower end of the lever 41 has a cam surface 47 located in the path of the can ends 17, as they are moved around the support ring 15 of the curler toward the discharge chute 19.

As shown in FIG. 5, the lever 41 is normally held in such position that the curled flange 22 of a single-can end 17 will pass beneath the cam end 47 of the lever without contacting the same.

However, should a double-can end pass under the lever 41, as shown in FIG. 6, the curled flange 22 of the inner or uppermost of the two telescoped can ends will strike the cam surface 47 of the lever 41 raising the same against the pressure of the spring 44 and permitting the spring 48 (FIG. 7) in the limit switch housing 33 to force the plunger 40 downward as the upper end 46 of the lever is lowered, opening the switch as shown diagrammatically in FIG. 7.

The circuit indicated in FIG. 7 comprises the conductor wires 49 and 50 leading from a power source, the motor 14, which drives the curler, and the limit switch in the housing 33 being located in said circuit.

As indicated at 51, wires from said circuit may lead to the motor 52 which operates the press 53 in which the can ends are formed so that operation of the press 53 and curler 1 will be simultaneously stopped when such a double end passes under the limit switch.

The press operator may then go to the curler and remove the double end from the curler whereupon the lever 41 will automatically assume the position of FIG. 5 closing the limit switch and again starting operation of the press and curler.

From the above, it will be evident that a detector is provided for a can end curler which will automatically stop operation of the curler and the press whenever a double end is accidentally delivered to the curler, thus enabling the press operator to go to the curler and remove the double end therefrom permitting normal operation of the press and curler to be automatically resumed.

It will also be seen that the detector my be easily and readily adjusted both horizontally and vertically to compensate for variations in the dimensions of can ends being processed through the curler.

What I claim is:

1. In combination with a curler for curling the flanges of peripherally flanged can ends, said curler including a main table, an outer stationary curling ring fixed upon said main table, an outer stationary curling ring fixed upon said main table, an inner rotatable curling ring concentric with the outer curling ring, a support ring concentric with and located between the inner and outer curling rings for supporting can ends as they are carried around the curler between said curling rings, an electric motor for rotating said inner curling ring and an electric circuit in which said motor is located, a double-end detector, means supporting the detector above the support ring, said means comprising an elongated base connected at its outer end to a mounting block fixed upon the peripheral portion of the main table, the detector being mounted upon the inner end of said base, the detector comprising a limit switch located in said electric circuit, a spring-biased cam lever having one end normally holding the switch in closed position, the other end of the cam lever being located in the path of the can ends and adapted to be raised by a double end passing there under to open said switch.

2. In a combination as defined in claim 1, the limit switch being vertically adjustably mounted upon a vertical mounting plate connected to the inner end portion of the base.

3. In a combination as defined in claim 2, the limit switch being connected to the vertical mounting plate by screws located through apertures in the mounting plate, said apertures being of larger diameter than said screws, and an adjusting screw threaded into the upper edge portion of the mounting plate, a portion of the head of said adjusting screw being received in a notch in the limit switch housing.

4. In combination with a press for forming flanged can ends, a curler for curling the flanges of the can ends, said curler including a main table, a stationary curling ring fixed upon said table and a rotatable curling ring, motor means for operating the press and the rotatable curling ring, an electrical circuit in which the motor means is located, a double end detector comprising a limit switch located in said electrical circuit, a spring-biased cam lever having one end normally holding the switch in closed position and the other end located in the path of the can ends and adapted to be raised by a double end passing thereunder to open said switch, and means supporting the double-end detector, said means comprising an elongated base connected at its outer end to a mounting block fixed upon the peripheral portion of the main table, the detector being mounted upon the inner end of said base.

5. In a combination as defined in claim 4, the limit switch being vertically adjustably mounted upon a vertical mounting plate connected to the inner end portion of the base.

6. In a combination as defined in claim 5, the limit switch being connected to the vertical mounting plate by screws located through apertures in the mounting plate, said apertures being of larger diameter than said screws and an adjusting screw threaded into the upper edge portion of the mounting plate, a portion of the head of said adjusting screw being received in a notch in the limit switch housing.