Aug. 7, 1956 F. A. WENZEL 2,757,585

METHOD AND APPARATUS FOR REMOVING WASTE FROM BOX BLANK SHEETS

Filed Nov. 3, 1950 2 Sheets-Sheet 1

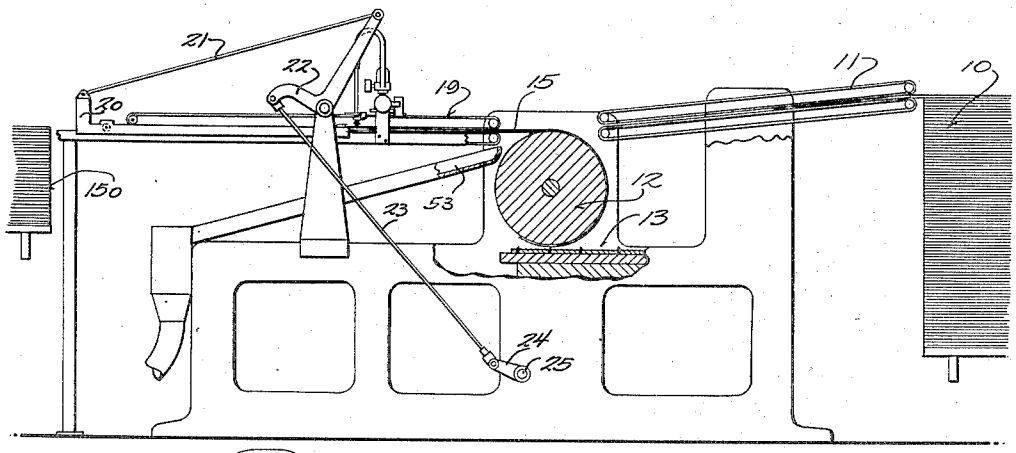


Fig. 1

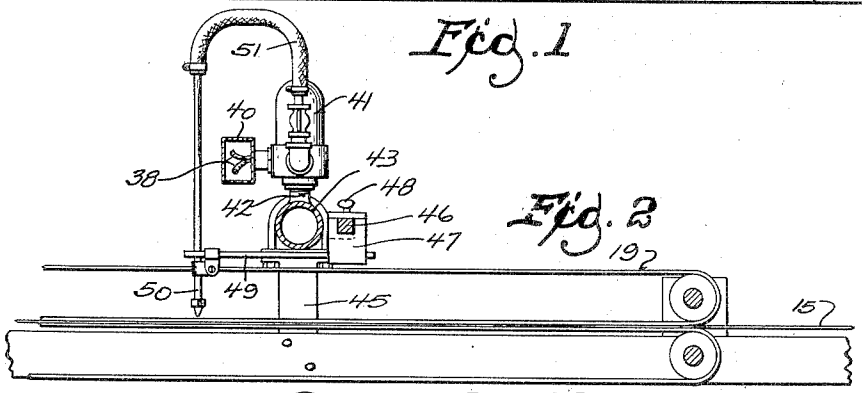


Fig. 2

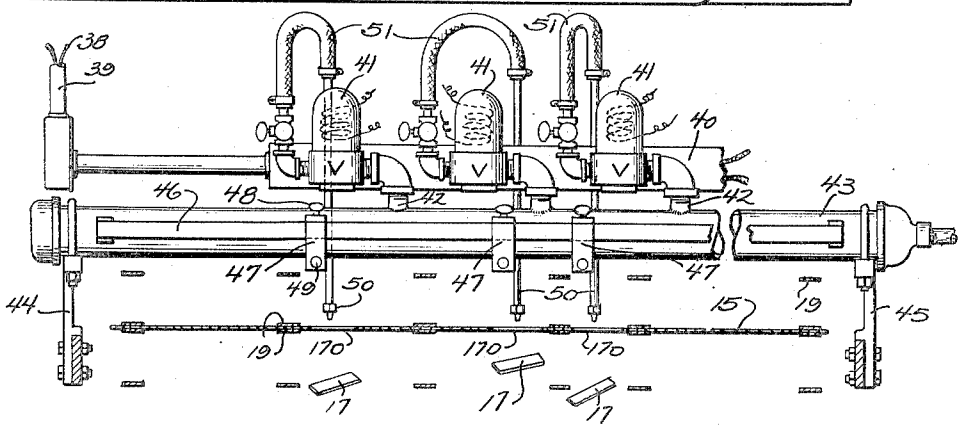


Fig. 3

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METHOD AND APPARATUS FOR REMOVING WASTE FROM BOX BLANK SHEETS

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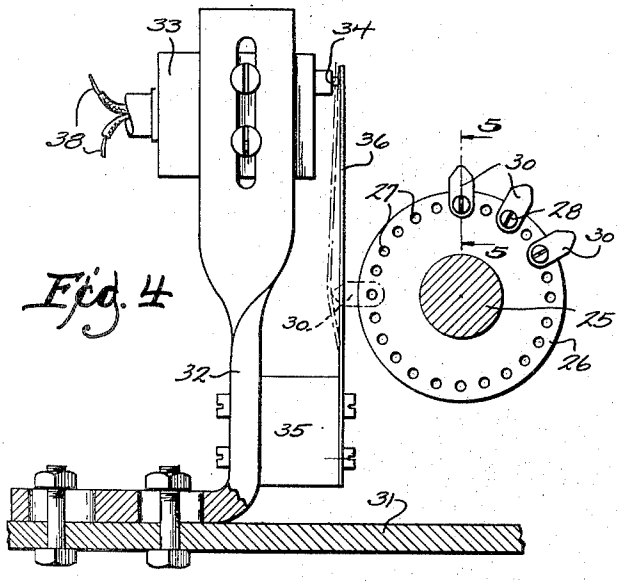
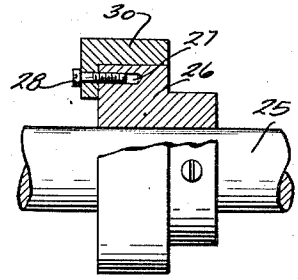


Fig. 4

Fig. 5



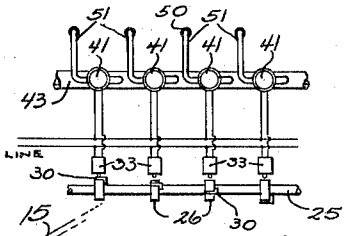


Fig. 8

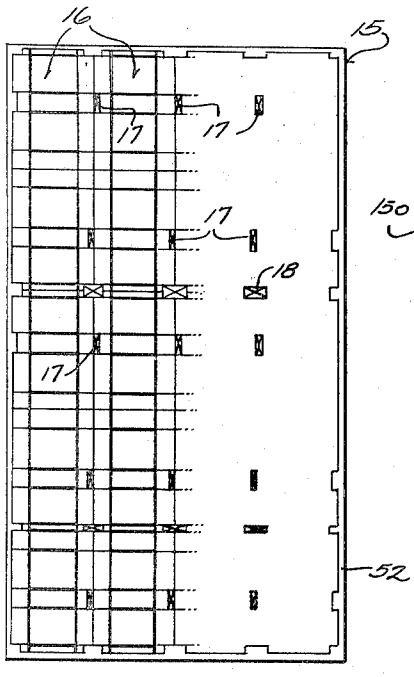


Fig. 6

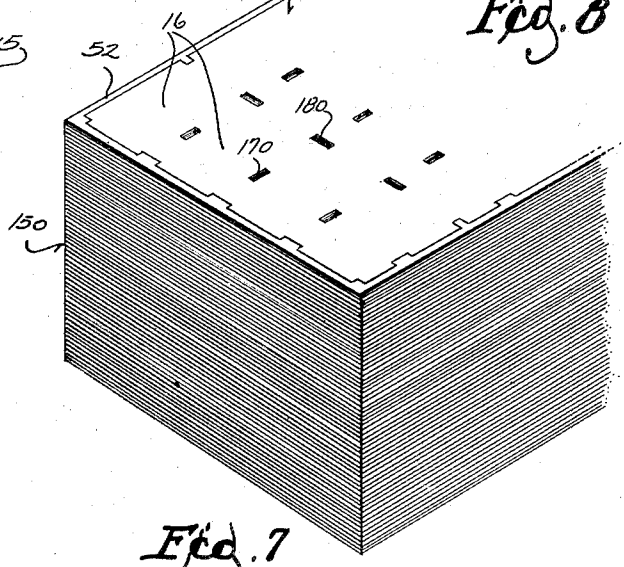


Fig. 7

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2,757,585

METHOD AND APPARATUS FOR REMOVING WASTE FROM BOX BLANK SHEETS

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Application November 3, 1950, Serial No. 193,891

4 Claims. (Cl. 93—36)

This invention relates to a method of removing waste from box blank sheets and a waste knock-out attachment for box blank machines.

In machines for the die cutting of box blanks from cardboard sheets, the dies are usually made to cut a number of blanks from a single sheet. None of the cardboard material of the sheet is ordinarily severed completely, and after the sheets have been deliverd and stacked, an operator using a manual or air-powered chisel cuts away the waste from around the edges of the sheet and from between the individual blanks as defined by the die cut lines which nearly penetrate the sheet.

The present invention deals with the removal of the small areas of the sheet lying between the blanks in the interior of the sheet, these areas being frequently so small and inaccessible as to offer considerable problems where their removal is dependent upon the use of a chisel. Numerous attempts have been made to eliminate such waste mechanically prior to the delivery of the sheet from the die cutting machine, but these have either resulted in damage to the blanks, or have resulted in breaking the blanks out of the sheet, thus increasing the difficulty of handling the blanks thereafter. The present invention uses an air jet operating in timed synchronism with the delivery of each blank to blow out the waste pieces from the interior of the sheet without requiring any mechanical tool to contact the sheet, and without injury to the blank, and without separation of any individual blank from the sheet as a whole.

The invention is further concerned with the manner in which the air jet waste eliminating nozzles of my invention are so mounted and operated as to be of universal utility regardless of the sizes and shapes of the box blanks. Not only are the nozzles adjustable from side to side across the path of travel of the sheets delivered by the die cutting machine, and also adjustable vertically respecting the sheets, but their timing is subject to adjustable control so that the air blast may be set to occur at any desired point or points in the course of sheet travel.

In the drawings:

Fig. 1 is a fragmentary side elevational view of a box blank machine to which my invention is applied, portions of the machine being broken away to a longitudinal section through the die roll.

Fig. 2 is an enlarged detail view in side elevation of an air jet nozzle positioned in accordance with my invention, the connections thereto being shown in section.

Fig. 3 is a front elevation of a device embodying my invention.

Fig. 4 is a fragmentary detail view in side elevation of a cam-operated switch for timing the function of the air blast.

Fig. 5 is a view of the cam partially in rear elevation and partially in section on the line 5—5 of Fig. 4.

Fig. 6 is a plan view of a sheet cut for the partial severance of box blanks.

Fig. 7 is a view in perspective showing a pile of such sheets from which waste stock at the center of the sheets

has been removed in accordance with the present invention.

Fig. 8 is a diagrammatic plan view of an arrangement for operating the air blast control valves at individually timed intervals.

The machine for die cutting the sheets to form box blanks therefrom constitutes no part of the present invention, and portions of the machine are illustrated merely to show the application of the waste eliminating means presently to be disclosed.

From a stack of sheets at **10**, individual sheets of cardboard or the like are successively delivered by conveyor **11** onto the matrix roll **12**, about which the sheets travel to be cut in predetermined patterns by the die **13**. This die reciprocates beneath roll **12** to co-act therewith and to divide the individual sheets **15** in any predetermined path of box blanks as, for example, those shown at **16** in Figs. 6 and 7.

The various flaps and tabs of the box blanks are desirably so designed as to leave a minimum of scrap between them. However, there are in the sheets shown in Fig. 6, small rectangles **17**, **18**, which are not used in the blanks and constitute waste. Since it is desired that the various sheets may be continued to be handled as such, even after the blanks have been partially severed, the waste cardboard at **17**, **18** should be removed to leave the openings **170** and **180** shown in Fig. 7. In such a stack of sheets as that shown at **150** in Fig. 7, it is a matter of considerable expense and difficulty to eliminate the small pieces of waste. I have succeeded in doing this on the die cutting machine.

As the die cut sheet **15** leaves the matrix roll **12**, it is engaged between the upper and lower belts of conveyor **19** which deliver the sheet onto the top of a stack **150**. The truing device **20** operated by link **21** from bell crank **22** is used to register each successive sheet at the top of stack **150**. The bell crank **22** is operated by the link **23** from the crank arm **24** on shaft **25**.

This shaft, which makes one rotation in the course of the delivery of each sheet, is a convenient one upon which to mount the cam disk **26** (Figs. 4 and 5) for the purpose of the present invention. The cam disk has about its periphery a series of holes **27** to receive the screws **28** which adjustably attach to the disk the radially projecting cams **30**. Any desired number of cams may be used. Since the particular sheet **15** shown in Figs. 6 and 7 has but three of the small rectangular pieces of waste **17** in any given line in the direction of sheet travel, it is only necessary, for the purposes of this sheet, to employ three of the cams **30**.

Attached to a portion **31** of the frame of the machine in proximity to shaft **25** and cam disk **26**, is a bracket **32** which adjustably supports near its upper end a switch **33** having a switch actuator **34**. Near the lower end of the bracket is a block **35** upon which is mounted a motion transmitting spring **36** having its intermediate portion in the path of movement of the successive cams **30** as they rotate with disk **26** on shaft **25**. Thus, in each rotation of shaft **25**, the spring **36** will engage the switch actuator **34** to close the switch circuit as many times as there are cams **30** upon disk **36** (three in each instance).

The electrical connections **38** controlled by switch **33** are led through suitable conduits **39**, **40** to the top of the machine where the wires are operatively connected for the actuation of solenoid valves **41** controlling the delivery of air through branch pipes **42** from the air supply means **43**.

The air supply means **43** may conveniently be carried by brackets **44**, **45** from the sides of the machine as best shown in Fig. 3, and it may be used to carry a bar **46** upon which the clamps **47** are adjustable laterally of the

machine, being anchored in any desired adjustment along the bar by their respective set screws **48** (Figs. 2 and 3).

Projecting forwardly beneath the pipe **43** from each of the clamps **47** is a rod **49** for the adjustable support of the air jet nozzle **50**. Each nozzle is connected by a flexible hose **51** with one of the branch pipes **42** controlled by a solenoid valve. Thus, each time one of the cams **30** on shaft **23** closes the switch **33**, the solenoid valves will admit air under pressure to the respective nozzles, thus instantaneously creating a blast downwardly in the direction of the sheet passing beneath the nozzles. By adjustment of the cams **30**, it is possible to time this blast to occur in accurate synchronism with the passage beneath the ring nozzles of the small pieces of waste **17** which are to be removed. The location of the individual nozzles may also be adjusted both laterally and longitudinally so that the nozzles will accurately register with the waste at the time the blast occurs. The air may be under any desired pressure sufficient to make the blast effective. I have found that in actual practice, air at a pressure of 80 pounds per square inch is adequate to blow out the waste pieces **17** as shown in Fig. 3, thereby leaving open the holes **170** without otherwise disrupting the sheet **15**.

A pan shown at **53** in Fig. 1 is located directly beneath the conveyor **19** to receive the waste pieces **17** and **18**. The pan is disposed at an angle as shown, to guide the waste pieces for collection.

If desired, the air blast nozzles may be selectively operated in any sequence by providing each solenoid valve with an individual control switch **33** and operating each switch with a separate cam on shaft **25** as shown diagrammatically in Fig. 8.

Since, in the particular sheets herein disclosed, it is desired not to separate the individual blanks, I make no effort, in the presently disclosed device, to remove the waste stock around the edges of the sheets as shown at **52** in Figs. 6 and 7. This stock, all of which is readily accessible, may readily be removed by hand in the conventional way. The hand labor required for removing the stock at the outer edge of the sheet is less than that which would be required to handle the sheets if such waste were removed. However, by removing in the machine the waste stock from the intermediate or central areas of each successive sheet, I have more than half of the labor heretofore required in the making of box blanks.

While my improved method will be apparent from the foregoing disclosure, it may be summarized as comprising the following steps:

1. The die cutting of a sheet for the partial severance within the edges of the sheet of box blanks and intervening waste areas.

2. Directing intermittently operable air blasts at the waste areas of the sheet to complete the severance of such areas from the sheet and to dislodge the severed waste and discharge it from the sheet.

3. The alignment of successive sheets with other sheets using the unimpaired edges of the sheets, and

4. The severance of waste, if any, from the edges of stacked sheets.

More generically, the invention consists in the partial severance by a die cutting operation of waste areas from the center of the sheet, and the dislodgement and removal of the waste by directing an air blast at the waste in the course of sheet delivery from the die cutting operation.

I claim:

1. A method of cutting a plurality of box blanks from a sheet of board and removing internal waste from between the blanks, which method comprises the steps of die cutting the sheet upon the outlines of the desired box blanks within the boundaries of the sheet to define the individual blanks and internal waste by die cut lines which at least nearly penetrate the sheet on said outlines for at least partial severance of the blanks and internal waste pieces spaced within the sheet, completely dislodging internal waste pieces solely by intermittently directing pneumatic blasts substantially only against such internal waste pieces while effecting relative movement between the sheet and said blasts, and substantially cutting off the blasts between internal waste pieces whereby the margins of the sheet are left intact with the box blanks remaining in assembly therein.

2. The method recited in claim 1 in which the sheet is advanced past successive pneumatic blasts in the direction in which waste pieces are spaced in the sheet, said blasts being intermittently timed in synchronism with sheet advance.

3. An attachment for a machine which cuts box blanks and intervening waste from a sheet of paper board by die cutting at least nearly through the sheet on the outline of the box blank and waste, such attachment comprising means for advancing successive sheets unitarily containing such box blanks and waste, and means for completely dislodging all waste from the sheet without displacing the sheet margins or the box blanks therein, said last mentioned means comprising solely a pneumatic nozzle directed toward the path of sheet advance in alignment with the waste therein, high pressure pneumatic connections for said nozzle, and valve means controlling said connections and provided with means for actuating said valve means in synchronism with sheet advance upon registry of each piece of waste with the nozzle to blast the waste from the sheet, each successive blast from the nozzle being directed substantially only against a piece of waste independently of the rest of the sheet to leave the box blanks and the margins of the sheet intact while completely removing the internal waste.

4. The device of claim 3 in further combination with sheet aligning means acting upon the intact margins of successive sheets from which internal waste pieces have been wholly removed by said blast for the accurate stacking of successive sheets.

References Cited in the file of this patent

UNITED STATES PATENTS

640,878	Curley	Jan. 9, 1900
865,523	Peters	Sept. 10, 1907
932,738	Wilson	Aug. 31, 1909
1,117,738	Winton	Nov. 17, 1914
1,644,226	Bedard	Oct. 4, 1927
1,732,683	Hubl	Oct. 22, 1929
1,820,619	Hubl	Aug. 25, 1931
1,856,832	Halvorson	May 3, 1932
1,914,405	Cummings	June 20, 1933
1,981,974	Vernimb	Nov. 27, 1934
1,983,708	Ruble et al.	Dec. 11, 1934
1,987,224	Bergstein	Jan. 8, 1935
2,011,585	Lippincott	Aug. 20, 1935
2,032,746	Grant	Mar. 3, 1936
2,035,857	Adsit	Mar. 31, 1936
2,073,320	Smith	Mar. 9, 1937
2,193,412	Southam	Mar. 12, 1940
2,298,890	Leonard	Oct. 13, 1942
2,359,059	Somes	Sept. 26, 1944
2,547,884	Paasche	Apr. 3, 1951
2,548,370	Hedstrom	Apr. 10, 1951
2,561,348	Dunham	July 24, 1951
2,577,424	Luehrs	Dec. 4, 1951
2,655,841	Anness	Oct. 20, 1953