United States Patent [19]

Bodendoerfer

[11] **3,745,891**

[45] **July 17, 1973**

[54] **BLANK WRAPPING MECHANISM AND METHOD FOR FRUSTO-CONICAL CUP-MAKING MACHINES**

[75] Inventor: **Raymond E. Bodendoerfer,** Brookfield, Wis.

[73] Assignee: **Paper Machinery Corporation,** Milwaukee, Wis.

[22] Filed: **Aug. 5, 1971**

[21] Appl. No.: **169,452**

[52] **U.S. Cl.** ..... **93/36.1,** 93/39 C, 93/39.1, 93/39.3

[51] **Int. Cl.** **B31b 1/28**

[58] **Field of Search** ..... 93/36.1, 39.1, 39 CD, 93/39.3, 41, 77, 94

[56] **References Cited**

UNITED STATES PATENTS

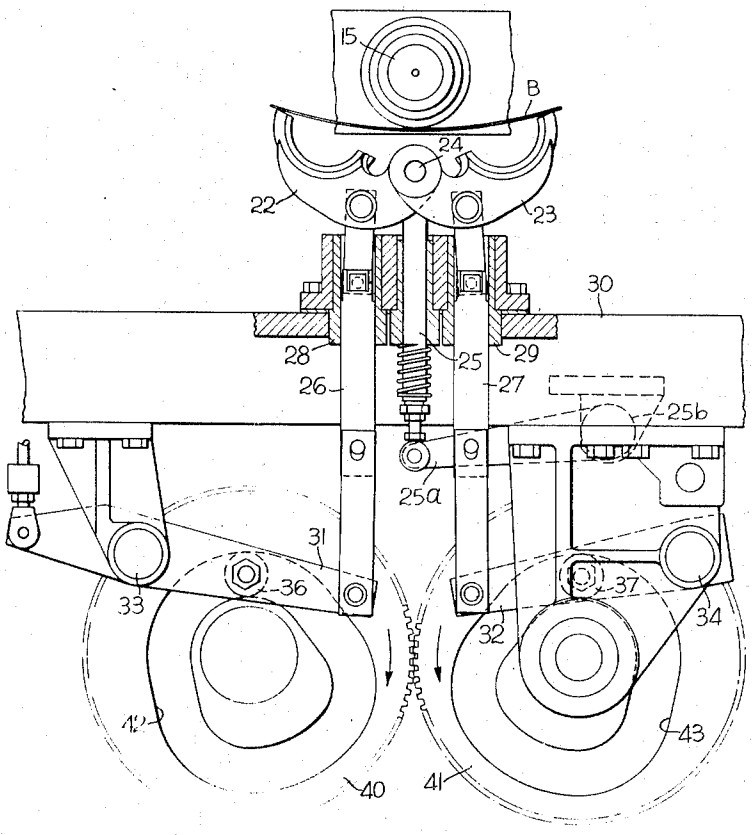
1,892,675	1/1933	Lyon et al.	93/39.1 R
872,835	12/1907	Maxwell	93/39.3
3,157,096	11/1964	Schmidt	93/39.3
369,638	9/1887	Godfrey et al.	93/39.1 R
R21,072	5/1939	Wessman et al.	93/39.3
1,077,496	11/1913	Taylor	93/39.3

Primary Examiner—Andrew R. Juhasz
Assistant Examiner—James F. Coan
Attorney—James E. Nilles

[57] **ABSTRACT**

A machine for making two-piece paper cups including individually actuated folding wings for wrapping the blank around a frusto-conical mandrel. The wings are actuated by cams which swing the folding wings rapidly through the initial wrapping phase without applying any appreciable clamping pressure, and then apply a final squeezing action to the blank against the mandrel just prior to the sealing of its longitudinal seam. A method of wrapping a blank around a mandrel with a fast initial wrapping action followed by a final squeezing of the blank tightly against the mandrel.

1 Claim, 8 Drawing Figures



PATENTED JUL 17 1973

3,745,891

SHEET 1 OF 4

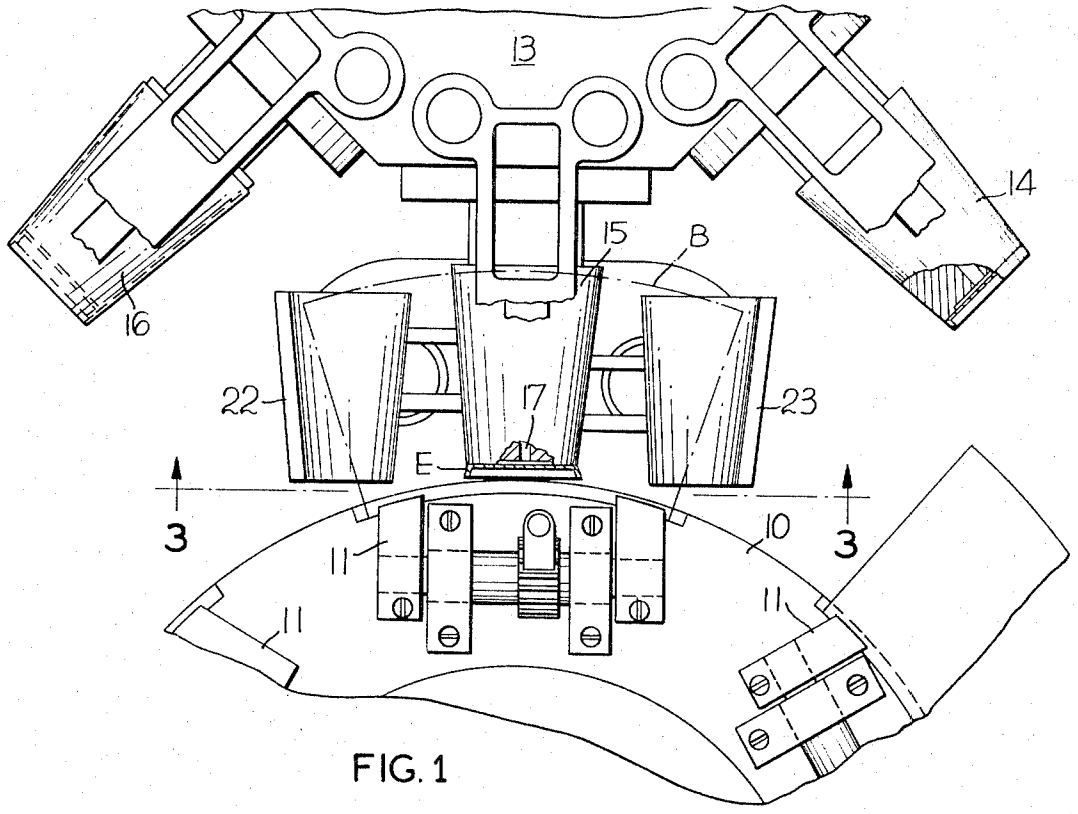


FIG. 1

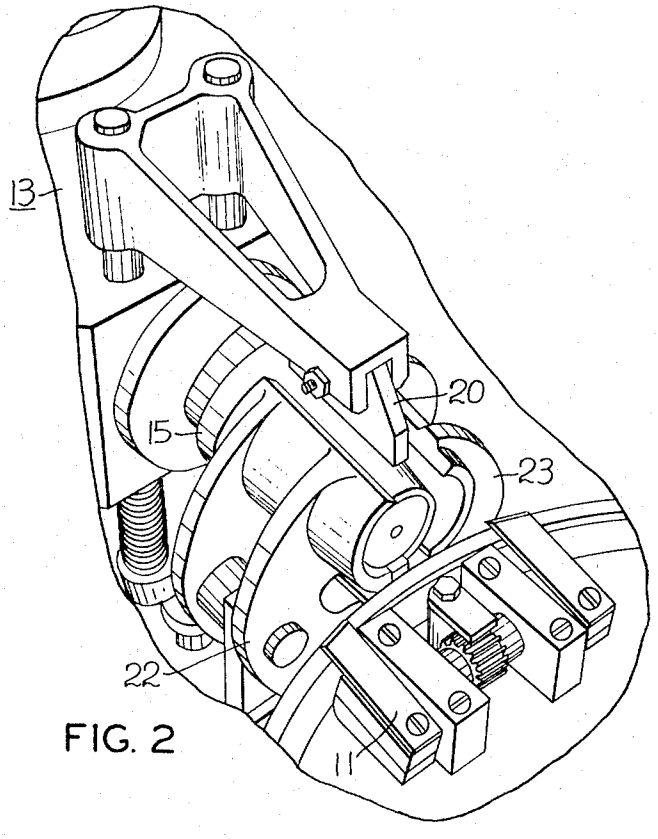


FIG. 2

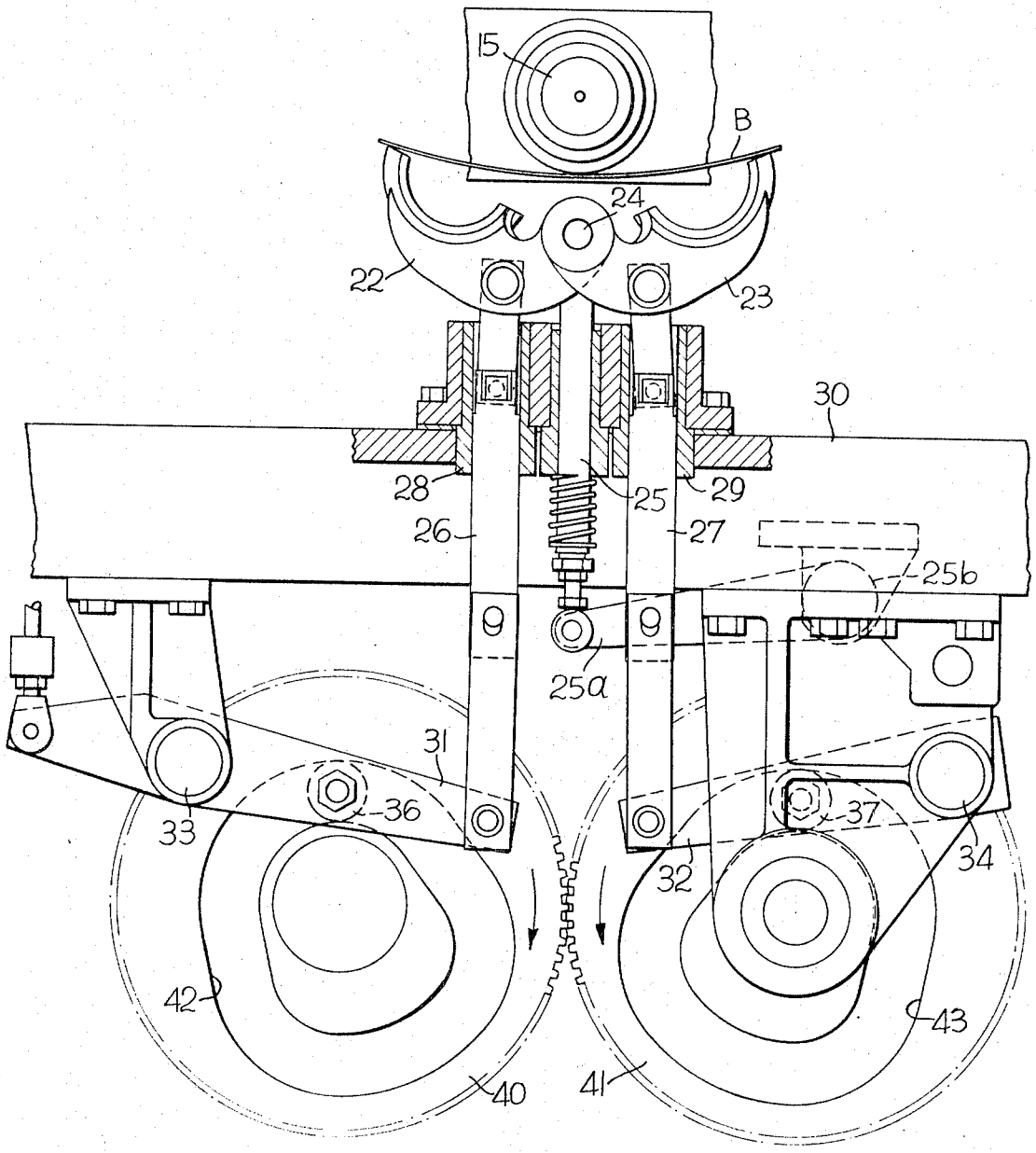


FIG. 3

FIG. 5

FIG. 4

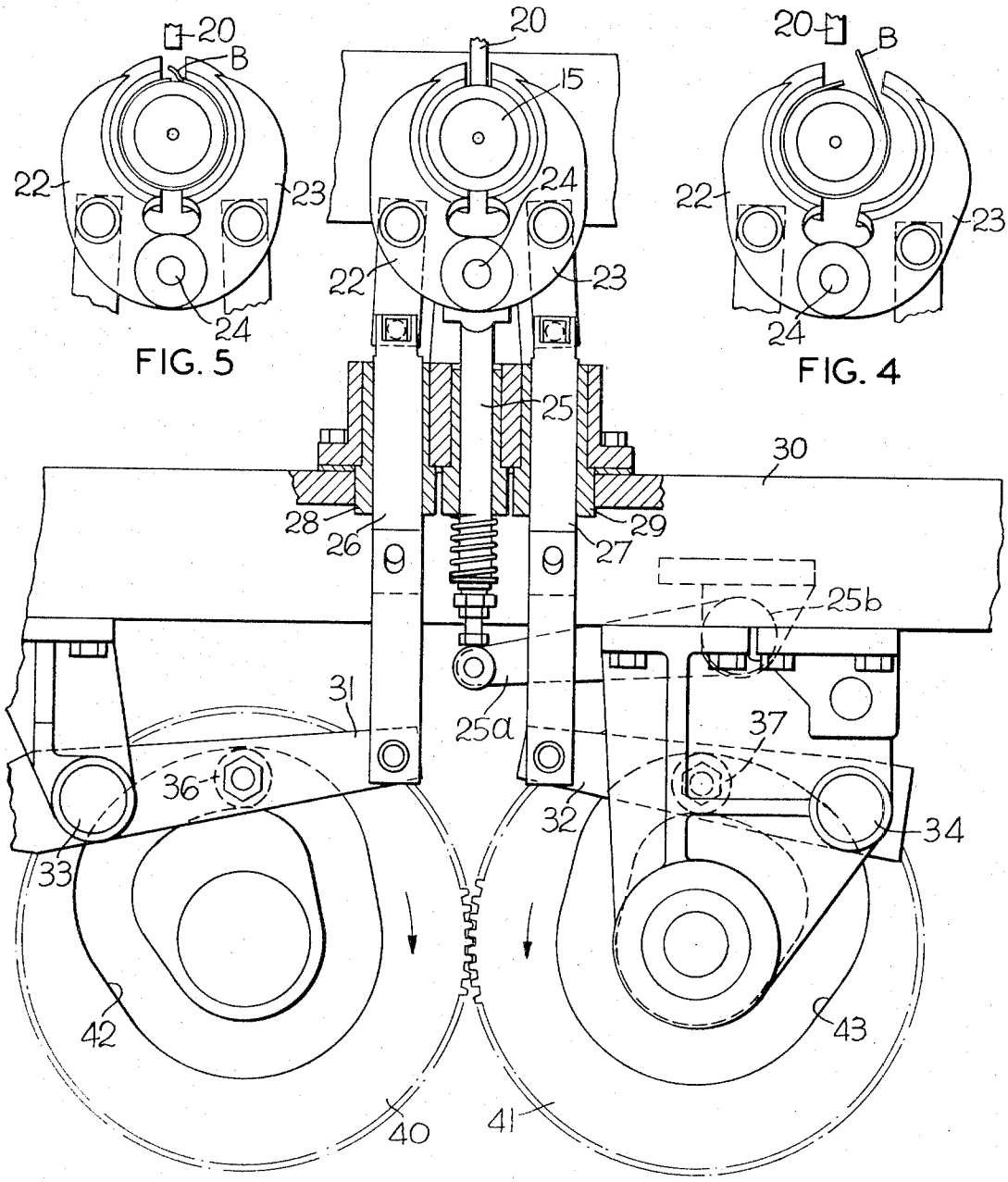


FIG. 6

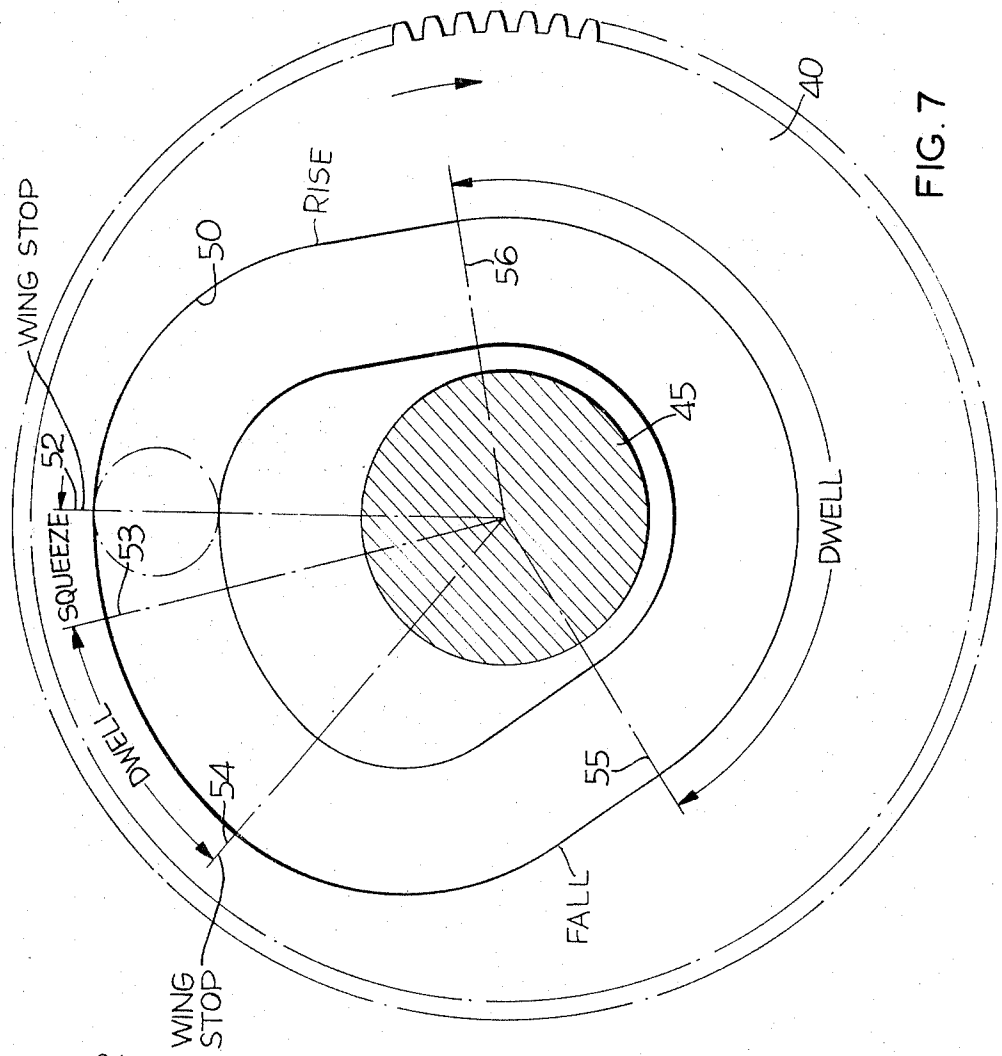

40
RISE
50
56
WING STOP
52
45
SQUEEZE
53
DWELL
DWELL
54
55
FALL
WING STOP

FIG. 7

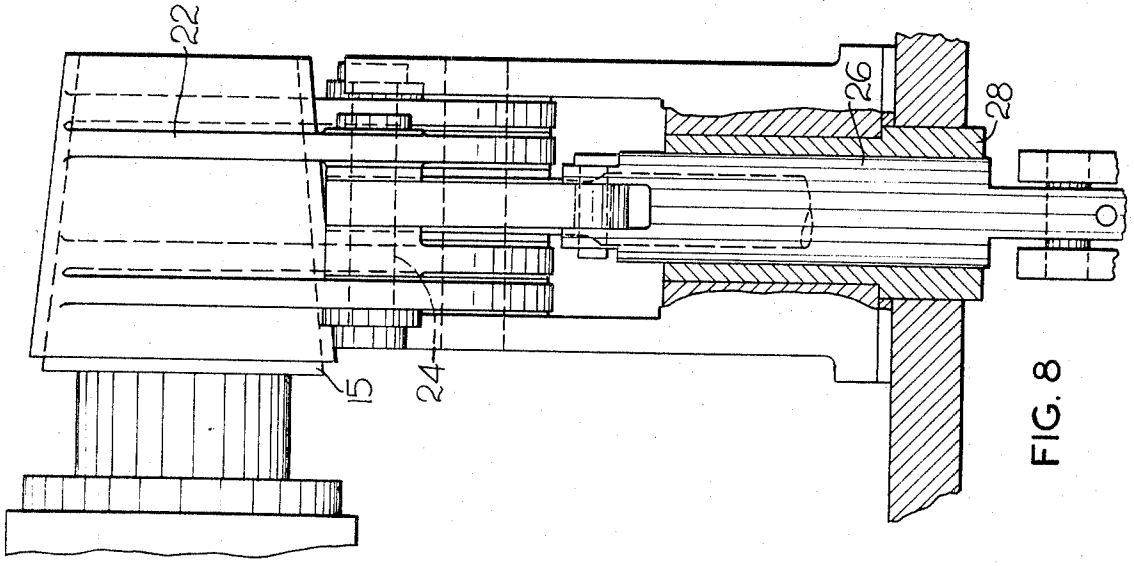

22
26
28
15
24

FIG. 8

BLANK WRAPPING MECHANISM AND METHOD FOR FRUSTO-CONICAL CUP-MAKING MACHINES

BACKGROUND OF THE INVENTION

This invention pertains to machines for making two-piece paper cups of the type having a frusto-conical shape and a flat, separate bottom. More particularly, the invention pertains to improved actuating means for actuating the swinging wings for wrapping the paper blank around the mandrel where the overlapped edges of the blank are then sealed together.

The invention is in the nature of an improvement over the mechanism for operating the folding wings shown in my U. S. Pat. No. 2,942,530 issued June 28, 1960 and entitled "Blank Wrapping Mechanism for Frusto-Conical Cup-Making Machines".

SUMMARY OF THE INVENTION

The present invention provides a blank wrapping machine and method for forming a tow-piece, flat bottom cup and includes a pair of individually operated folding wings which are swung from an open blank-receiving position to a closed position in which the blank is fully wrapped around the mandrel and the overlapped seams are then sealed together. Means are provided for actuating the folding wings in timed sequence, which means includes an individual cam for each wing, the timing of which is such that the wings are swung through their initial blank-wrapping movement without applying any appreciable clamping pressure to the blank against the mandrel, and then at the end of this initial wrapping operation, the wings apply a final squeezing, pressure clamping action against the blank to firmly wrap the blank around the mandrel and just prior to the sealing of the overlapping longitudinal edges of the blank.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a plan view of a portion of a two-piece cup-making machine embodying the present invention, the folding wings being shown in the open, blank-receiving position, and the blank being indicated by a broken line.

FIG. 2 is a fragmentary perspective view of the device as shown in FIG. 1, but with the folding wings in an intermediate position just prior to the application of the final squeezing operation, no blank being shown in this view;

FIG. 3 is a vertical view taken generally along the line 3—3 in FIG. 1 certain parts being shown in section or broken away;

FIG. 4 is a fragmentary view of the portion of the device shown in FIG. 3 but showing the wings in an intermediate position in which the blank has been wrapped around the majority of the mandrel but prior to overlapping of the longitudinal edges;

FIG. 5 is a view similar to FIG. 4 but showing the blank being further wrapped around the mandrel as when the final squeezing is being applied and just prior to the seam clamp coming down to seal the longitudinal edges;

FIG. 6 is a view similar to FIG. 3 but showing the folding wings in the fully clamped position and the seam clamp in the sealing position;

FIG. 7 is an elevational view of one of the gears for one of the wings and showing the various portions of the cam track; and

FIG. 8 is an enlarged side view of the folding wings and mandrel shown in FIG. 6 with parts shown in section.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The two-piece cup-making machine closed for the purposes of illustrating the present invention includes a rotatable table **10** having a plurality of blank gripper means **11** spaced around its periphery for holding the body blanks B and transferring them from the blank cutting and blank glue-applying stations (not shown) to the srapping station illustrated in FIG. **1.** A rotatable turret **13** carries a plurality of tapered mandrels **14, 15** and **16,** among others, around its periphery, which mandrels have vacuum passages **17** for for holding the circular cup bottoms E on the end of the mandrel.

As the structure and function of the mandrels and the gripper means are fully described in my said U.S. Pat. No. 2,942,530, further reference to them is not believed to be necessary nor desirable. It is also believed sufficient to say that a seal clamp **20** is mounted above each of the mandrels and is adapted to be lowered at the appropriate time to bear against the glued and overlapped longitudinal edges of the blank to thus seal them togther.

A pair of folding wings **22** and **23** are pivotally mounted about the common center shaft **24** and in themselves are conventional.

The center shaft **24** is vertically shiftable by the vertically shiftable rod **25** which is activated by the lever **25***a* pivoted at **25***b*. Lever **25***a* is actuated by a means (not shown). Rod **25** causes the entire wing assembly to shift bodily between a lower position away from the mandrel (FIG. **3**) to an upper position (FIG. **6**) adjacent the mandrel.

The wings are swingable between the lowermost position shown in FIG. **3** and the uppermost wrapping position shown in FIG. **6,** by means of their respective compound links **26** and **27,** respectively, which are vertically shiftable and guided in the bushings **28** and **29** fixed in the table **30** of the machine. The lower ends of these compound arms are pivotally attached to their respective levers **31** and **32** which, in turn, are pivotally mounted at one end to a shaft **33** and **34** carried by the table **30.** Each of the levers **31** and **32** have a cam follower **36** and **37,** respectively, intermediate their length. A separate cam **40, 41** is provided, respectively, for each of the cam followers **36** and **37.** More specifically, the cam tracks **42** and **43** are formed in the side of the cam members **40** and **41** and these tracks are continuous and of the shape shown in detail in FIG. **7.** The cam members **40** and **41** have teeth around their periphery which are in constant mesh and, consequently, in time with one another. One of the cams is driven by its shaft **45** from the power source not shown.

Referring in greater detail to FIG. **7,** the cam track portion **50** is formed to cause the actuating arms of the wings to initially rise until the point **52** on the cam is reached. This rising movement is relatively fast and quickly raises the arms from the position shown in FIG. **3** to the position shown approximately in FIG. **5.** In the FIG. **5** position, the wings do not yet apply any appreciable pressure on the blank against the mandrel.

The machine shown in my U.S. Pat. No. 2,942,530 was and is capable of producing approximately **130** cups per minute. The production on that particular ma-

chine was limited by the violent slapping action of the wings against the mandrel during the last portion of the wrapping function. This created considerable noise and wear on the machine parts which restricted increased production rates.

In accordance with the present invention and as shown in portion of the cam from radial line **52** to **53** is formed so that the wings apply a final, firm but gentle squeezing pressure around the blank and mandrel during the last wrapping phase and that squeezing phase is shown as occurring in FIG. **5.** The cam than has a dwell portion between radial lines **53** and **54** during which time the longitudinal edges of the blank are overlapped and the seam clamp **20** descends to effect a seal. In other words, during the sealing operation, the cam is formed so as to provide a dwell period during which the sealing of the joint is completed.

The arcuate portion of the cam from line **54** to **55** is provided to cause the wings to all again to their original position shown in FIG. **3.** A dwell portion of the cam is then provided between lateral lines **55** and **56** in FIG. **7** before the next folding operation commences.

RESUME

By means of the present invention, a two-piece paper cup-making machine is provided having individually actuated folding wings, each of which is actuated by a separate cam. The cams provide for a fast initial swinging movement of the folding wings to substantially complete the wrapping operation, but without applying any appreciable pressure against the blank and mandrel. Immediately thereafter, the cams provide for a final squeezing operation of the blank tightly against the mandrel.

With this timed movement and two distinct phases of wrapping, the slapping and violent action of the wings against the mandrel during the final stage have been eliminated. This invention has substantially reduced the noise and wear on the various parts and greatly increased the production rate of the improved cup-making machine.

I claim

1. A high speed two-piece paper cup-making machine comprising, tapered mandrel, a pair of wrapping wings for shaping the body blank around the mandrel, said wings being mounted on a common shaft which is located centrally beneath said mandrel, each of said wings being of one piece construction, one of said wings operating in advance of the other to overlap the longitudinal edges of the blank; means for operaring said wings and comprising a rotatable cam member for each of said wings, each of said cam members having gear teeth around their periphery, the teeth one cam member meshing with the teeth of the other cam member for providing timed relationship between said cam members, each of said rotatable cam member having a cam track therein, said cam tracks each having a rise portion for causing an intitial fast wrapping action of said wings so as to cause said blank to be wrapped around said mandrel without any appreciable clamping pressure, said cam tra ks each also having a subsequent mandrel squeezing portion for them causing said wings to apply a final squeezing action to said blank round said mandrel, and linkage means for each cam member and including a cam follower engageable in its respective cam track and connecting each of said cam members with its respective wing.

* * * * *