May 2, 1967 E. M. ALSMAN 3,317,371

APPARATUS FOR PRODUCING MOLDED PULP ARTICLES

Filed May 11, 1964

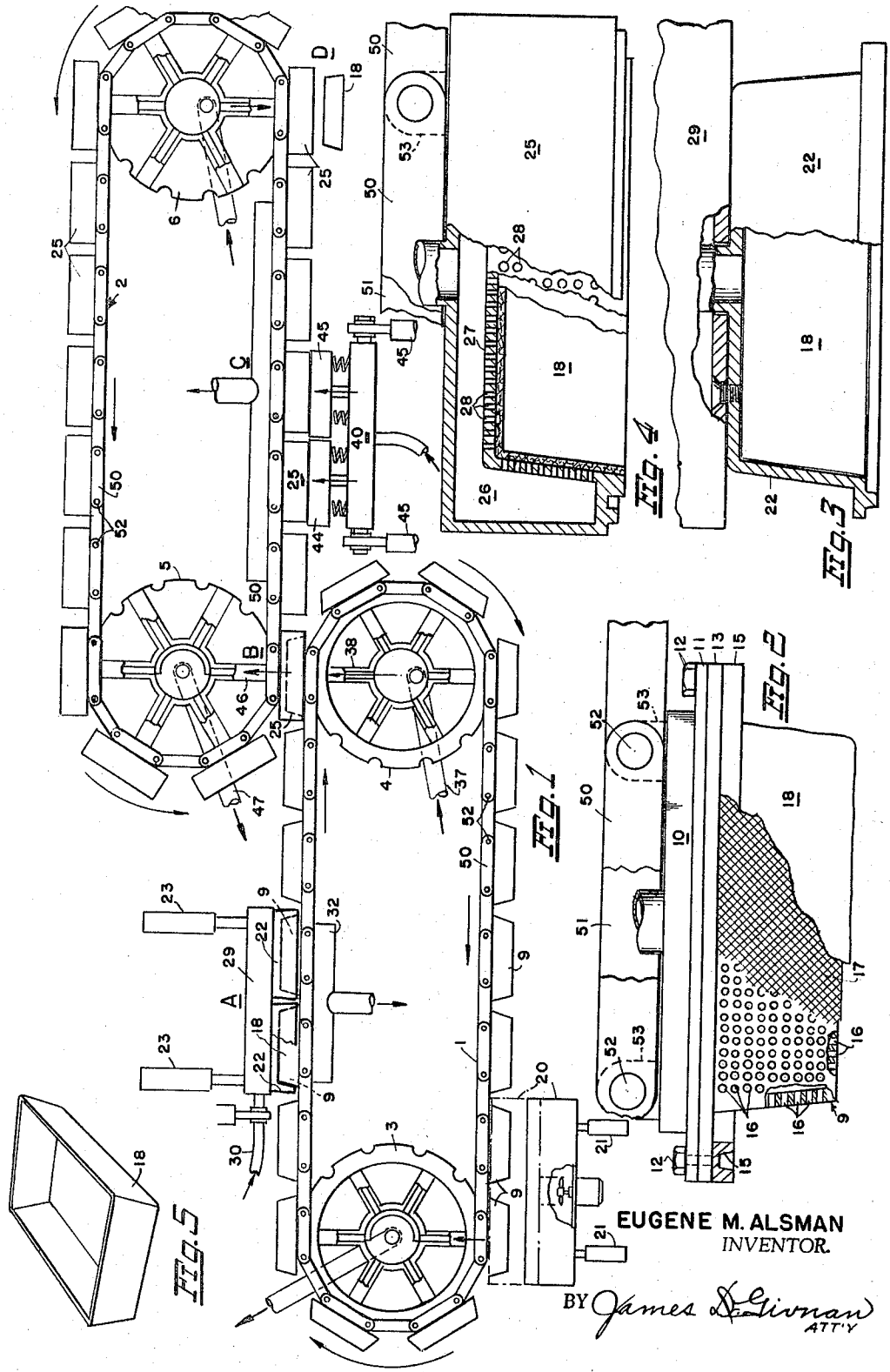


FIG. 1

FIG. 2

FIG. 3

FIG. 4

FIG. 5

EUGENE M. ALSMAN
INVENTOR.

BY James D. Givnan
ATT'Y

United States Patent Office

3,317,371

Patented May 2, 1967

3,317,371

APPARATUS FOR PRODUCING MOLDED PULP ARTICLES

Eugene M. Alsman, 5104 SE. Long St., Portland, Oreg. 97206

Filed May 11, 1964, Ser. No. 366,315
3 Claims. (Cl. 162—385)

This invention relates to improvements in a method of and means for producing cartons, boxes or the like made of molded pulp primarily consisting of a mixture of rag or wood fibers when ground up and suspended in water.

It is one of the principal objects of the invention to provide apparatus in greatly simplified form for producing containers of the character described in greater quantities in less time and more economically than heretofore possible by any other method that I am aware of.

A further object of the invention is to produce containers of this character which are of strong, durable construction capable of repeated use and produced at a minimal cost so that they can be economically disposed of after each use if desired or necessary.

The foregoing and other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawing forming a part hereof and in which:

FIGURE 1 is a diagrammatic side elevational view of two cooperating conveyors exemplary of various types capable of use for producing containers, originating from fibrous ground up material primarily suspended in water, by mold and mold components made in accordance with my invention and for practicing the method of the invention.

FIGURE 2 is a side elevational view, on an enlarged scale, of what will be hereinafter sometimes referred to as a pick-up and preliminary forming die with fragments broken away for convenience of illustration.

FIGURE 3 is a similar view of a second die cooperating with the pick-up die of FIGURE 2 for final shaping of the pulp material clinging to the surfaces of the pick-up die; and also for withdrawing some moisture from the thus container shaped material.

FIGURE 4 is a view similar to FIGURE 3 showing a third die for finally drying the finished container by hot air or steam from below passing upwardly through the walls of the container and by vacuum from above, and

FIGURE 5 is a perspective view exemplary of various sizes and shapes of containers capable of production by the method of this invention.

With continuing reference to the drawings wherein like references of character designate like parts, reference numerals **1** and **2** indicate two identical endless chain conveyors entrained over sprocket wheels **3–4** and **5–6** respectively in any suitable manner and driven in the direction of arrows applied thereto.

For convenience in describing the dies of FIGURES 2, 3, and 4, they will be sometimes hereinafter respectively referred to as a pick-up die, a first stage drying die, and a second stage drying die which also serves as a finishing die and to convey the finished container to a point of discharge from the conveyor **2**.

The pick-up die, indicated generally at **9**, comprises a base **10** having a flange **11** extending entirely therearound and secured by bolts **12** to a matching base **13** forming a flange surrounding the die and provided with channel members **15** secured by the bolts **12** to both of its sides and ends. The five walls of the die **9** have openings **16** extending therethrough and are covered by a screen or wire mesh **17** for causing pulp material **18** to cling to the die or dies **9** (FIG. 1) when it is immersed in a headbox **20** as the box is forced upwardly against the die

by hydraulic pressure cylinders **21** and thereafter lowered from this die-dipping position.

The quantity of pulp material applied to the die is predetermined by the depth of its immersion into the pulp material within the headbox as regulated by the extent of upward movement of the headbox.

The chain conveyors **1** and **2** are synchronously advanced intermittently by the sprockets **3** and **4** in the direction of the arrows applied thereto and such movement will locate the pick-up die or dies **9** in the area of the first drying stage, indicated at A, where the die is covered by a second or cooperating first stage drying die shown in FIGURE 3 and indicated generally at **22**, forced downwardly by hydraulic cylinders **23** and lifted therefrom after completion of the first drying stage operation. Upon removal of the die **22**, the die **9**, and the container material **18** (hereinafter also referred to as the container) clinging thereto with its exposed outside surfaces dried or nearly so, is advanced to a second or transfer stage indicated at B where the container **18** is again covered by the die shown in FIGURE 4, indicated generally at **25**, and which is of spaced apart double wall thickness to provide a hot air chamber **26** surrounding the inner wall **27** which is provided with openings **28** over its entire area for the passage of hot air therethrough to the outer surfaces of the container **18**.

With continuing reference to these successive preforming, drying, and discharging stages and the progressive operation thereof, the preformed container **18** (carried by the die **9**) after leaving the headbox **20** is advanced to the first drying stage A. The first stage drying die or dies **22** operable as a unit are then forced downwardly over the container as aforesaid by the hydraulic cylinders **23** and so held to subject the enclosed surfaces of the container to the drying action of hot air directed thereagainst from a head **29** supplied by a conduit **30**, and to vacuum from a vacuumized manifold **32**.

At the second or transfer stage B the container **18** is withdrawn upwardly from the die **9** to the interior of a second stage drying die **25** by air pressure supplied from a source not shown through a conduit **37** and upwardly through one of the hollow spokes **38** of the sprocket wheel **4**. At this second stage B the container **18** is subjected to further drying action of the air pressure applied to it from below and suction from above through one of the hollow spokes **46** of sprocket wheel **5** from a source through a pipe **47**.

Following this, the container now held within the die **25** is advanced to the final drying stage C where its interior is subjected to hot air under pressure from a head **40** through a second head **44**. Both heads are movable upwardly and downwardly as a unit by pressure cylinders **45**. The container **18** at this stage is also subjected to vacuum now supplied through what previously served as a hot air chamber **26** in the die **25**. Following this final drying operation the heads **40** and **44** are lowered allowing the container still within the die **25** to be advanced to a point D where the finished container **18** is discharged from the conveyor **2** by air pressure from above.

Each conveyor chain **1** and **2** comprises spaced apart parallel links **50** and **51** interconnected by pins **52** in the conventional manner. Each of the dies **9** and **25** is provided with a pair of vertically disposed bearing blocks **53** substantially coextensive in length with the spacing between the links **50** and **51** and the dies are attached to the chains by their respective pins **52** extending through the bearing blocks.

While I have shown a particular form of embodiment of my invention, I am aware that many minor changes therein will readily suggest themselves to others skilled in the art without departing from the spirit and scope of the invention. Having thus described my invention,

what I claim as new and desire to protect by Letters Patent is:

1. Apparatus for producing hollow box-like containers originating from material comprising ground up fibrous pulp components suspended in water, comprising in combination,

a first endless conveyor and a second endless conveyor having a driving connection therebetween and each having a top run and a bottom run,

a series of material-gathering preliminary forming dies carried by the first conveyor,

means for applying to said dies predetermined quantities of said material,

suction means applied to said dies for maintaining said material thereon for advancement toward a first drying stage,

said first drying stage comprising means disposed above the top run of said first conveyor for directing hot air to the material carried by said dies and means therebelow for applying vacuum thereto,

a second series of dies carried by the second conveyor and engageable at one end thereof with the dies of said first series and the material carried thereby for removing the material from said first dies and advancing it to a final drying stage,

said final drying stage comprising means for directing air pressure and vacuum to the material for finally drying the same, and

pressure means at the opposite end of said bottom run of the second conveyor for discharging the finished material therefrom.

2. Apparatus as claimed in claim 1 wherein each of said material-gathering preliminary forming dies comprises a box-like main body having openings extending through the five walls thereof,

a covering of porous material-covering said walls of the main body for the passage of vacuum and pressurized air therethrough in one position,

each of said first stage drying dies comprising an imperforate downwardly opening body member conforming to the configuration of the main body of said preliminary forming dies and having an opening in one of its walls in communication with a vacuum and pressurized air both in one direction,

each of said second stage drying dies comprising a box-like body having an imperforate outer wall and a spaced apart perforated inner wall to provide an air space between said inner and outer walls and said outer wall having an opening therein in communication with a vacuum in an upward direction and pressurized air in the same direction.

3. An apparatus for producing hollow box-like containers originating from material comprising ground up fibrous pulp material components suspended in water, and including a first and second endless conveyor having a driving connection therebetween and each having a top run and a bottom run, the improvement comprising:

a series of material gathering preliminary forming dies,

means for attaching said dies to said first conveyor,

each of said dies comprising a main body member of box-like formation having a bottom wall and side and end walls,

said walls of the die having openings therein for the passage of a drying medium therethrough,

at least one drying die disposed above the top run of the first conveyor for engagement with the first mentioned dies and the material carried thereby,

said drying die having a top wall and imperforate side and end walls and the interior of the die in open communication through its top wall with a supply of hot air,

a second series of dies carried by said second conveyor each of inverted box-like formation of spaced-apart double wall thickness to provide a hot air chamber,

said inner wall having openings therein for the passage of suction therethrough for transferring said material from said pick-up dies and for advancing the same to a final drying stage for applying hot air and vacuum to the material contained therein for drying the same now in its final form.

References Cited by the Examiner

UNITED STATES PATENTS

1,845,830	2/1932	Chaplin	162—224
2,006,831	7/1935	Hawley	162—226
2,967,568	1/1961	Friday	162—382 X

DONALL H. SYLVESTER, *Primary Examiner.*

J. H. NEWSOME, *Assistant Examiner.*