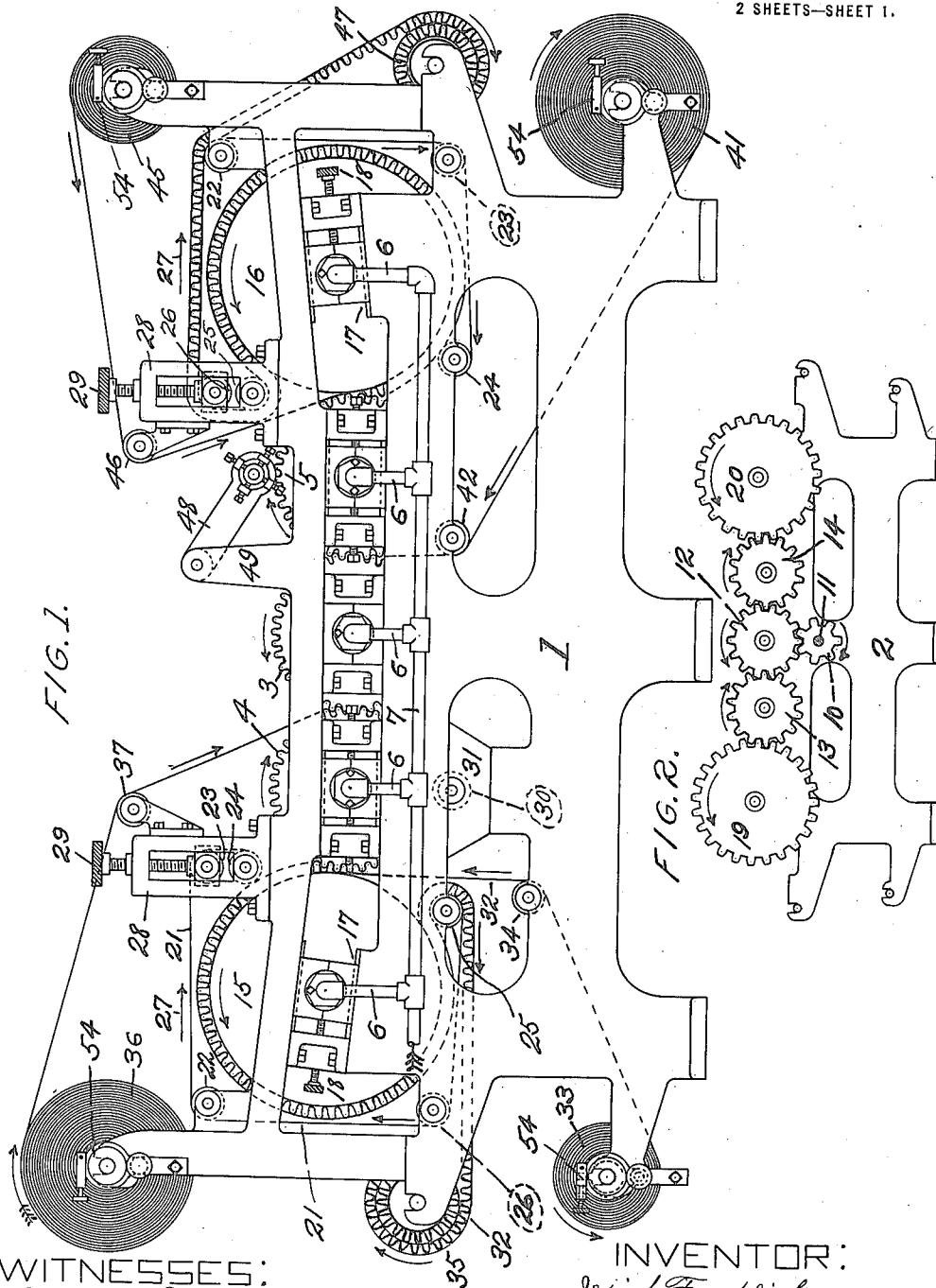


J. F. CRANE.
MACHINE FOR MAKING CORRUGATED PAPER AND PACKING BOARD.
APPLICATION FILED OCT. 20, 1915.

1,180,828.

Patented Apr. 25, 1916.

2 SHEETS—SHEET 1.



WITNESSES:
John Joseph Tighe
Karlau Schuchardt

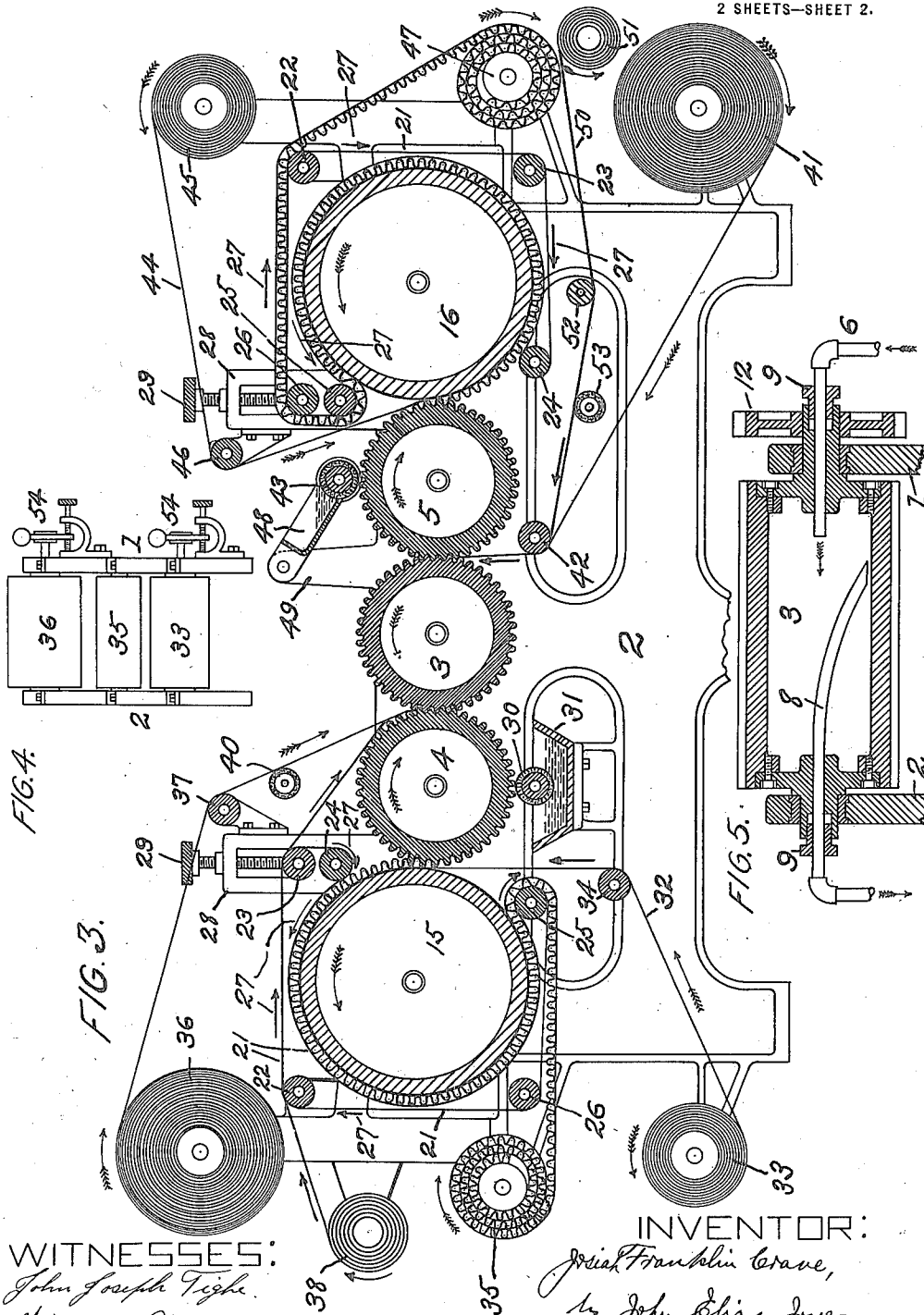
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Josiah Franklin Crane,
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William Schuchardt

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UNITED STATES PATENT OFFICE.

JOSIAH FRANKLIN CRANE, OF COVINGTON, OHIO.

MACHINE FOR MAKING CORRUGATED PAPER AND PACKING-BOARD.

1,180,828.

Specification of Letters Patent.

Patented Apr. 25, 1916.

Application filed October 20, 1915. Serial No. 56,975.

To all whom it may concern:

Be it known that I, JOSIAH FRANKLIN CRANE, a citizen of the United States, and a resident of Covington, in the county of Miami and State of Ohio, have invented a certain new and useful Improvement in Machines for Making Corrugated Paper and Packing-Board, of which the following is a specification.

This invention relates to machines containing corrugating-rolls, pasting devices, presser-rolls and drier devices used in the manufacture of corrugated paper having a backing or lining and adapted to the packing of goods for shipping or the like.

The main object of the invention is to provide in a single machine or within the bounds of a single casing or supporting-frame a set of devices that is adapted to be operated either single or double, or, in other words, a set that will produce either a single roll or winding of corrugated and lined paper, at one time, or a pair of rolls or windings of corrugated and lined paper one at each end of the machine simultaneously.

Another object is to produce a sheet of double thickness that is suitably stuck together before entering the corrugating-rolls.

Still another object is to produce a corrugated sheet of single or double thickness of material, on a single or on a double lining or backing, the latter form giving added strength.

The machine herein is preferably intended for use in working double, without increasing the amount of space it occupies over that of machines of a similar type that work but a single roll of single-ply paper to be corrugated, or materially increasing the power and attention needed to operate it.

All the features of the invention will be fully hereinafter described and particularly pointed out in the claims that follow.

In the accompanying several sheets of drawings, Figure 1 is a longitudinal side-elevation showing the entire machine as it appears in its preferred double-operating use; Fig. 2, a miniature, longitudinal side-elevation introduced merely to show the arrangement of the train of gear along that face of the machine seen in Fig. 1, but omitted from the latter view for the purpose of better disclosing the structure and arrangement of the corrugating, pressing and final drier-rolls and their adjusting de-

vices that would be otherwise concealed; Fig. 3, a longitudinal sectional-elevation; Fig. 4, an end-view on a small scale; and Fig. 5, a transverse section of one of the corrugating-rolls and its bearings, including its heat-introducing tube and condensation drain-tube.

1 indicates one longitudinal side frame-member and 2 a corresponding opposite side frame-member suitably spaced apart and coupled so as to form a supporting-frame for the mechanism of the machine herein. It has been deemed best not to encumber the drawings herein with said spacing and coupling cross or transverse members that would otherwise obscure the view to the several essential elements forming the features of the invention herein.

3 indicates a centrally-disposed master or transmitter roll transversely mounted between and journaled in the longitudinal side-members 1 and 2, its periphery being suitably corrugated to serve as a shaper-roll.

4 indicates a corrugated roll horizontally alined with roll 3 and adapted to mesh therewith, and 5 is another corrugated roll, corresponding to and in horizontal alinement with the said rolls 3 and 4, and with its corrugations meshing with those of the master shaper-roll 3 but diametrically opposite to the meshing point of roll 4 with roll 3, as best shown in Fig. 3.

Rolls 3, 4 and 5 thus form a train of corrugators, the middle one 3 being practically the corrugator or active shaper-roll while the rolls 4 and 5 form toothed-surfaces into which the webs of paper are pressed by the teeth of roll 3 in forming corrugations in said webs of paper. These three corrugated rolls are thus arranged so that a pair of webs of paper of one or more thicknesses each can be passed through the machine at one time and a pair of corrugated lengths of boards or sheets produced and wound into rolls in the machine simultaneously and at one operation. These rolls are preferably made hollow and thereby adapted to receive a heating-medium of steam or the like that is introduced through the side-nozzles 6 that branch from a main steam conductor-pipe 7, the latter being shown in Fig. 1 and horizontally-alined along the outer face of the side frame-member 1. A downwardly-turned drain-tube 8 is extended through each axis of the said

corrugating-rolls, as best shown in Fig. 5, whereby the water of condensation may be readily drawn off under siphoning-pressure that is augmented by the pressure from the nozzle 6, whereby the corrugating-rolls are kept hot and free from the water-load that would be carried therein if no drainage therefor was provided.

The hollow rolls 3, 4 and 5 are mounted on bearings that have stuffing-boxes 9 and are free to turn around the nozzles 6 and drain-tubes 8.

10 indicates a driving-pinion mounted on a shaft 11, the latter extending to any source of power whereby the machine is driven.

12 indicates a spur-gear mounted on the outer end of the hub of the roll 3 and meshing with the driving-pinion 10. This spur-gear 12 meshes with opposite side spur-gears 13 and 14, in horizontal axial-alignment, and forms the real transmitter between them, the said spur-gears 13 and 14 being respectively mounted on the outer ends of the hubs of corrugated rolls 4 and 5 and whereby said rolls 4 and 5 are positively actuated without depending on the master or central shaper-roll 3 for driving-transmission, it being the intention to drive the three rolls by means of the pinion 10 and said outer spur-gears 12, 13 and 14. Thus the rolls 3, 4 and 5 are simply corrugator shapers or crimpers that are adapted to receive and feed webs of paper between them for forming the corrugations in said webs.

15 and 16, respectively, represent hollow rolls or drums at the opposite ends of the machine, the drum 15 having its smooth periphery adjacent to but not touching the outer edges of the teeth of the roll 4, and the smooth peripheral face of the drum 16 being mounted likewise adjacent to but not touching the tips of the teeth of the roll 5, as best shown in Fig. 3. These drums 15 and 16 are provided with heat-medium inlets 6, the same as the inlet 6 of the rolls 3, 4 and 5, such inlets for these drums being coupled to the main steam conductor-pipe 7, as shown in Fig. 1 for their heat supply.

The drums 15 and 16 are preferably mounted on inclined bearings 17, their axes being somewhat above that of the horizontal aligned-rolls 3, 4 and 5, whereby said drums can be adjusted by means of the screws 18 so that their peripheral faces can be brought into proper relation with the tips of the teeth of the rolls 4 and 5 to suit different thicknesses of webs of paper passing through the machine.

19 and 20, respectively, represent large spur-gears that are mounted on the axes of the said drums 15 and 16 and mesh with the gears 13 and 14, respectively, whereby driving-power is transmitted to them.

21 indicates an endless-belt at that end of the machine in which the drum 15 is mounted and encompassing about three-fourths of the peripheral-surface of said drum but suitably spaced away therefrom, the part of the said drum that is not inclosed by said endless-belt being that which lies adjacent to but not touching the tips of the teeth of the corrugating-roll 4, as best shown in Fig. 3. This endless-belt 21 travels in succession over transverse-idlers 22, 23, 24, 25 and 26 and in the direction of the arrows 27 that are placed closely thereto. The idler 23 is mounted in the uprights 28 and under control of the adjusting-screws 29 at each end thereof to exert the proper tension on the endless-belt 21 for the purpose hereinafter referred to. A similar endless-belt 21 is mounted at the opposite end of the machine on a successive series of idlers 22, 23, 24, 25 and 26, the succession being the reverse of that at the opposite end of the machine first described, and the arrows 27 adjacent the said belt also indicating its direction of movement, such direction of movement being the same as that of the endless-belt first described, as best seen in Fig. 3.

30 indicates a transverse paste-roller whose periphery takes the adhesive from the vat 31 that is mounted diametrically beneath the roll 4. The periphery of said paste-roller 30 lies closely to the circular path of the tips of the teeth of the corrugating-roll 4 so as to apply the paste to the now corrugated web of paper passing along the vat forward of said roll 4 to shortly meet with and adhere the backing strip or lining 32, the latter feeding from a supply-roll 33, thence under an idler 34 and thence in contact with the periphery of the heated-drum 15, the teeth of the roll 4 setting the corrugated strip of paper in contact with the simultaneously-passing backing strip or lining and both now traveling forward in the direction of the arrow 27 in close contact with the peripheral-surface of the said drum 15, whereby the paste is set and dried, the endless-belt 21 serving to properly confine the corrugated-sheet with its backing or lining along the peripheral-surface of said drum 15 until idler 25 is reached when the now properly lined or backed corrugated sheet or web is diverted from said drum 15 to a winding-roll 35, the latter being mounted transversely above the supply-roll 33 at one of the lower ends of the machine.

36 indicates a supply-roll of paper that constitutes the web or continuous sheet leading into the machine between the corrugating-rolls 3 and 4, and passing over an idler 37 for proper supporting-direction. The web of paper passing over the roll 36 is the one used to form the corrugated continuous sheet or strip that is finally wound on the

roll 35 and progresses through the rolls 3 and 4 and over the drum 15 and the idler 25 as hereinbefore stated.

If it is desired to use a double thickness of web, for greater strength of corrugated sheet, an extra roll of paper 38 is provided, the web therefrom passing along the endless-belt 21, thence with said belt 21 over the idler 23 and thence into the jaws of the rolls 3 and 4 between the web 36 and the roll 4, as best seen in Fig. 3. In order to stick the webs 36 and 38 together as they pass into the rolls 3 and 4, a paste-roller 40 is used that applies the adhesive to the underside of the web 36, the two webs 36 and 38 being then properly stuck together while passing between said rolls 3 and 4 and the web 36, which has now become corrugated, taking its paste from the roller 30 for the attachment of the backing or lining 32 thereto, as hereinbefore referred to. The paste-roller 40 is shown without any paste-vat in connection therewith, but such paste-vat can be conveniently mounted in juxtaposition and duly supported on the frame of the machine. I have not shown the extra web of paper 38 nor the extra pasting device 40 on Fig. 1, the latter simply showing a single web of paper that may be of greater or lesser thickness to suit the desired thickness of corrugated sheet.

At the opposite end of the machine another corrugated sheet is being formed from a lower supply-roll 41 of paper-webbing for the corrugated portion of the sheet, the webbing from roll 41 passing under an idler 42 and thence into the corrugator-jaws formed by the rolls 3 and 5, thence under a paste-roller 43 that applies the adhesive to the tips of the corrugations of the now corrugated sheet for attachment to the backing or lining formed by the paper-web 44, the latter feeding from a supply-roll 45, and thence over an idler 46 to the now stuck-together corrugated web and backing passing between the peripheral-surface of the heated-drum 16 and the tips of the teeth of the heated corrugating-roll 5 whereby the said corrugated web and lining are set and properly stuck for passing onward along the said peripheral-surface of the heated-drum 16 into the space between the endless-belt 21 and said peripheral-face of the drum 16 until the transverse idler 25 is reached, whence the now properly backed corrugated sheet is diverted from the drum 16 to the transverse idler 26 and thence passes onward over the idler 22 to the winding-drum 47.

The paste-roller 43 is mounted to turn in the lower end of a paste-vat 48 that is swung from uprights 49 on the main-frame.

In Fig. 1 a corrugated sheet, to the right, is made of a single-thickness webbing the same as that to the left, but in Fig. 3 I have

shown how the corrugated portion of the sheet can be made of two plies by utilizing an extra web 50 from a supply-roll 51, such extra web 50 passing under an idler 52, thence over a paste-roller 53, thence under the idler 42 where its paste-covered face meets the inner face of the web from supply-roll 41, and thence the now stuck-together webs 50 and 41 passing between the corrugating-rolls 3 and 5 for forming the corrugations therein, the double-thickness corrugated sheet thence passing beneath the paste-roller 43 and onward in the same manner as that described in connection with the single-web corrugated sheet hereinbefore described.

The paste-roller 53 is shown without a paste-vat, the same as that designated 40, but it is obvious that a suitable vat can be supplied and supported on the frame without showing just how herein.

Suitable adjusting devices 54 are provided in connection with each of the paper supply-rolls 33, 36, 41 and 45, as shown in Fig. 1, for the purpose of exerting the proper tension on the paper while it passes into and through the machine. Such tension devices can also be supplied in connection with the extra paper-rolls 38 and 51.

Adjusting-screws 29 are used in the uprights 28 in connection with the idler 26, for the proper tension to be exerted on the endless-belt 21 in the corrugating device to the right, the same as in connection with the same devices to the left in the machine.

The endless-belt 21 at each end of the machine is used to press the passing corrugated board with its backing or lining against the heated surface of the drums 15 and 16, respectively, whereby the paste is set and dried between the said corrugated boards and their backings or linings in a thorough and uniform manner and before passing onward to the succeeding winding-rolls 35 and 47, respectively.

I claim:—

1. A machine for corrugating paper, of one or more thicknesses, or the like comprising a supporting-frame, a pair of spaced, corrugating-rolls journaled in said frame, an intermediate master or transmitter corrugating-roll also journaled in said frame and whose toothed-surface engages the toothed-surfaces of said spaced pair of corrugating-rolls, a pair of plain-faced presser and drier rolls or hollow drums journaled in said frame so that each one thereof has its periphery closely adjacent but not touching one of the said pair of spaced corrugating-rolls, a multiple set of suitably-distributed paste-applying means, heated-medium conductors leading to the said three corrugating-rolls and pair of presser-rolls, and a gear-train for driving said train of corrugators and pressers in

unison, whereby a pair of single or a pair of double webs of paper may be passed through the one machine and both corrugated, lined and wound therein simultaneously and in one continuous operation.

2. A machine for corrugating paper, of one or more thicknesses, or the like comprising a supporting-frame, a pair of spaced corrugating-rolls adjustably mounted and journaled in said frame, an intermediate master or transmitter corrugating-roll also journaled in said frame and whose toothed-surface engages the toothed-surfaces of said pair of spaced corrugating-rolls, a pair of plain-faced presser and drier rolls or hollow drums adjustably mounted and journaled in the said frame so that each one thereof has its periphery closely adjacent but not touching one of the said pair of spaced corrugating-rolls, a multiple set of suitably-distributed paste-applying means,

heat-medium conductors leading to said three corrugating-rolls and pair of presser-rolls, a gear-train for driving said train of corrugators and pressers in unison, and a pair of continuous aprons or endless carrier-belts each running over pulleys and idlers at the opposite ends of the machine for carrying the two lengths or webs of paper and their backings or liners in continuous-contact with the heated peripheral-surface of each one of the pair of presser and drier rolls or drums adjacent thereto, whereby a pair of paper webs of one or more thicknesses each may be passed through the one machine and both corrugated, lined or backed and wound therein simultaneously and during one continuous operation.

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Witnesses:

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