T. E. RAFFEL.

MACHINE FOR MANUFACTURING DOUBLE FACED CORRUGATED BOARD.

APPLICATION FILED FEB. 2, 1912.

1,050,292.

Patented Jan. 14, 1913.

2 SHEETS—SHEET 1.

Fig. 1

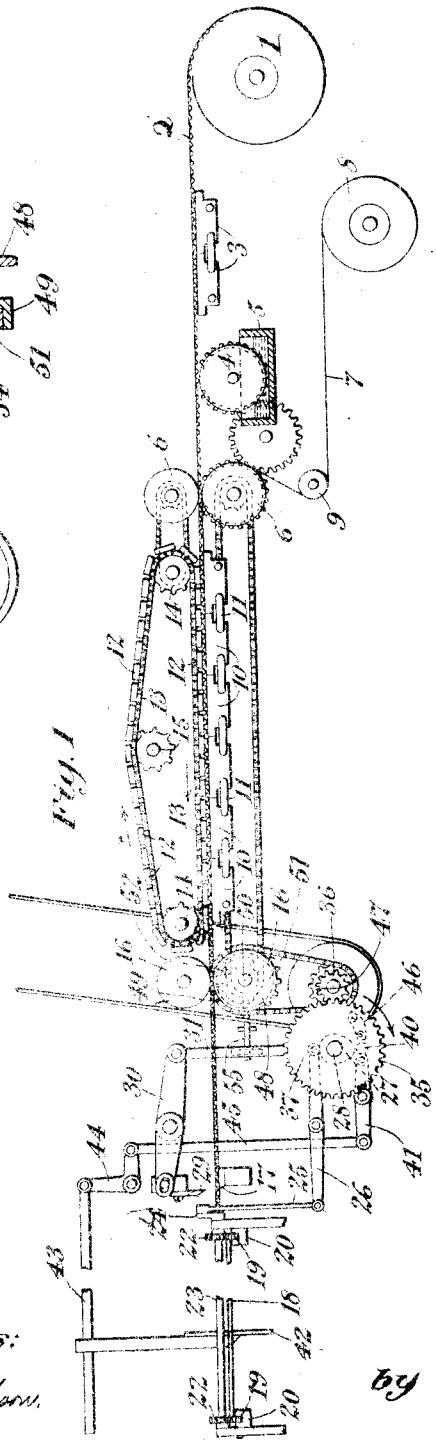


Fig. 11

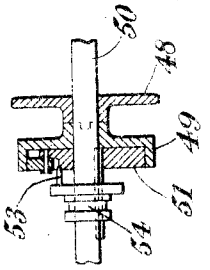


Fig. 10

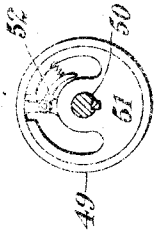


Fig. 4

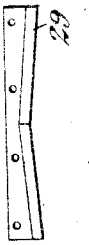


Fig. 3

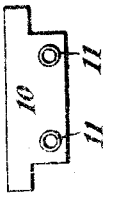
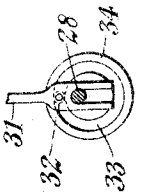


Fig. 2



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MACHINE FOR MANUFACTURING DOUBLE FACED CORRUGATED BOARD.

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1,050,292.

Patented Jan. 14, 1913.

2 SHEETS—SHEET 2.

Fig. 5

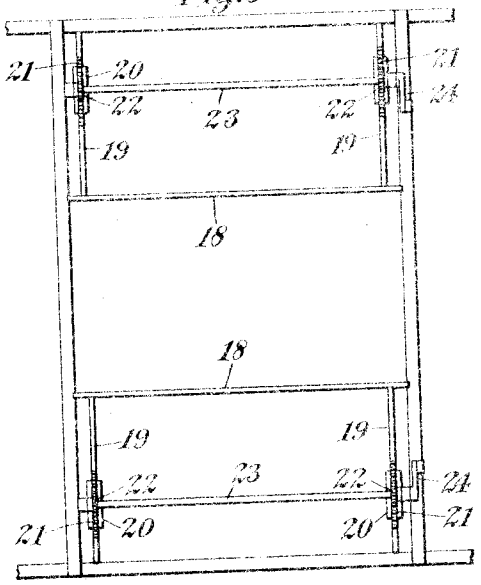
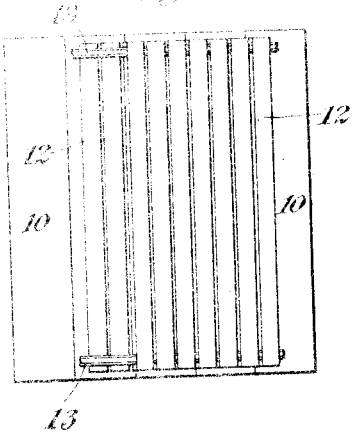


Fig. 7



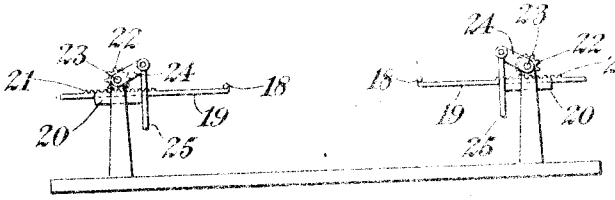


Fig. 6

Fig. 9

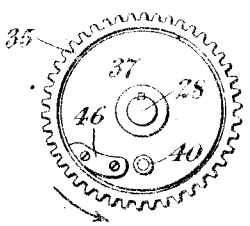
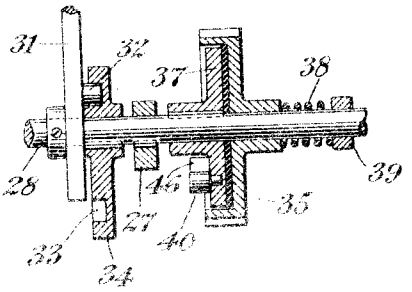


Fig. 8



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UNITED STATES PATENT OFFICE.

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MACHINE FOR MANUFACTURING DOUBLE-FACED CORRUGATED BOARD.

1,050,292. Specification of Letters Patent. Patented Jan. 14, 1913.

Application filed February 2, 1912. Serial No. 674,976.

To all whom it may concern:

Be it known that I, TOBIAS E. RAFFEL, a citizen of the United States, and a resident of the city of New York, county and State of New York, have invented certain new and useful Improvements in Machines for Manufacturing Double-Faced Corrugated Board, of which the following is a full, clear, and exact specification.

My invention relates particularly to a machine for manufacturing double-faced corrugated board by applying a web of plain facing paper to a web of corrugated paper that has been previously faced on one side, thereby constructing a flat board consisting of two plane surfaces having an intermediate corrugated web.

The object of my invention is to provide a machine of novel construction and arrangement of parts for manufacturing corrugated paper board in continuous lengths, automatically cutting it into sheets of desired size and delivering the severed sheets from the machine.

In carrying out my invention, a web of single faced corrugated paper having its corrugated face downward, is carried over a heated surface which subjects the web to a preliminary drying so as to remove such moisture as may be contained therein, after which paste is applied to the corrugations and the web is fed or drawn into the machine simultaneously and in juxtaposition with a web of plain facing paper. In transit through the machine the paper passes over a stationary drying table which thoroughly dries it, while at the same time, pressure is being applied thereon by m ns of a plurality of movable ironing plates secured to an endless carrier, so as to firmly unite the webs into a stiff composite board.

An important feature of my invention consists in having these movable plates arranged to slide on the surface of the composite web at a slower rate of speed than that at which the web travels, thereby creating a dragging or ironing effect which tends to smooth its surfaces and to remove any air bubbles which may be held therein so as to prevent blistering of the surface or imperfect adhesion of the parts. As the board leaves the machine it passes beneath a cutting knife on to a delivery table on which it is automatically cut into sheets of any desired length and automatically delivered from the machine.

In the accompanying drawings illustrating my invention, Figure 1 is a side elevation showing the arrangement of the parts of my improved machine. Fig. 2 is a detail elevation of the cutter actuating cam. Fig. 3 is a detailed elevation of a heater plate. Fig. 4 is a front elevation of the knife. Fig. 5 is a top plan view of the delivery bed. Fig. 6 is an end elevation of the same. Fig. 7 is a top plan view of a section of the drying table showing the movable ironing plates in position above the table. Fig. 8 is a section in elevation through the cutter controlling clutch. Fig. 9 is a detail elevation of the friction disk. Fig. 10 is an end elevation of the feeding mechanism clutch, and Fig. 11 is a side elevation partly in section of the same.

Referring to the drawings (1) represents a suitable supply roll carrying a web (2) of single faced corrugated paper which is arranged to be drawn, with its unfaced surface downward, over one or more heated plates (3) so as to thoroughly dry the web before applying a coat of adhesive to the corrugations thereof by means of a paste roll (4) rotating in a suitable paste receptacle (5). A pair of feed rolls (6) draws the web (2) and progresses it through the machine simultaneously and in juxtaposition with a facing web (7) which is drawn from a supply roll (8) and passes over an idler (9). The feed rolls may be adjustably mounted, in the usual manner, on the frame of the machine (not shown) so that the pressure exerted on the webs can be regulated as desired. The pressure of the feed rolls on the webs will cause the facing web to adhere to the pasted unfaced surface of the other web and thereby form a composite web. This composite web is progressed over a drying table which serves to evaporate all of the moisture from the web and thereby stiffen it so as to convert it into a rigid double faced corrugated board. The drying table consists of a plurality of contiguously disposed heater plates (10) whose upper surfaces are flat and smooth and are arranged to be heated by means of live steam, or other suitable source of heat, cir ulating

through a continuous line of piping (11) which is carried transversely under each plate.

In order to firmly unite the component webs of the board and to smooth its surfaces while it is being dried, I provide a plurality of ironing plates disposed above the drying table and mounted for movement on the upper surface of the board in the direction of travel thereof, but at a relatively slower rate of speed. The ironing plates or slats (12) have flat smooth faces and are fastened, transversely of the drying table to an endless carrier (13). The carrier is supported on a pair of sprockets (14) one at each end of the drying table, and it travels over an adjustable idler (15) which is adapted to regulate the tension thereof. The sprockets (14) are mounted relatively to the drying table in such a manner that the plates or slats on the under side of the carrier will bear directly on the upper surface of the board. The mountings of these sprockets may be made adjustable to permit of the carrier and its attached plates being raised from the board to give access thereto as occasion may require.

The carrier sprockets are actuated in any suitable manner, preferably by means of a belt extending from one of the feed rolls (6) so as to drive the plates in the direction indicated by the arrows in Fig. 1, but at a slower rate of speed than the surface speed of the feed roll, or, in other words, at a slower rate of speed than that at which the board travels. It will be observed that as the movable plates bear upon and are dragged over the upper surface of the board while it is traveling on the drying table, they will press or iron out all of the air bubbles and thus give the board an absolutely smooth finish. After the board leaves the drying table it is engaged between a pair of auxiliary feed rolls (16) the surface of which may be covered with some flexible material to form a cushion and at the same time grip the stock and assist in carrying it beyond the cutter (17) on to the delivery bed forming a part of the machine and located at the end thereof.

The delivery bed is arranged to support the board while it is being cut and then to automatically deliver the severed sheets from the machine. To this end I provide a pair of parallel supports (18), spaced apart a distance slightly less than the width of the board, each of which is carried on the two adjustable arms (19) mounted for endwise movement in a frame (20). By adjusting the position of the arms (19) the distance between the supports (18) may be varied to accommodate boards of different width.

Each of the movable arms (19) is provided with a rack (21) on which is mounted a pinion (22). The pinions of the two arms of each support (18) are connected by a suitable spindle (23) so as to rotate together. It will be seen that in order to separate or bring together the supports (18) it is necessary to cause the opposed pairs of pinions to rotate in opposite directions. This may be accomplished by securing to the spindles (23) the lever arms (24), which are inclined toward each other as seen in Fig. 6, and are connected by means of the rods (25) to the rear ends of the rocker arms (26), the forward ends of which bear upon the cams (27) fixed to the rotatable shaft (28) of the cutter actuating mechanism. These cams (27) are arranged to tilt the rocker arms (26) immediately after the movable cutter blade (29) has descended, and thereby cause the supports (18) to separate, thus allowing the cut sheet to drop from the machine, after which the supports are returned to their original position. To this end it is necessary to have the position of the cams (27) lag slightly behind the cam (34) which actuates the cutter.

The cutting mechanism comprises a stationary blade (47) and a vertically reciprocating blade (29) disposed transversely of the machine. I prefer to have the movable blade (29) formed with a double beveled edge as shown in Fig. 4 so that in descending it will first engage the board at its edges and cut toward the center, thus holding the board in position during the operation. The blade is secured to the rear end of a pivoted beam (30), the forward end of which is reciprocated by a pitman (31) having a pin (32) which works in an eccentric groove (33) formed in the cam (34) fixed to the rotatable shaft (28). The shaft (28) is normally at rest and the rotation thereof is controlled by a suitable friction clutch which is arranged to be thrown by means of a tripping device automatically actuated by the edge of the board as it advances in the machine. The friction clutch, as preferably constructed, comprises a toothed flanged disk (35) which is loosely carried on the shaft (28) and meshes with a pinion (36) fastened to the main driving shaft of the machine. The disk (35) is held in surface contact with a friction disk (37), keyed to the shaft (28), by means of a spring (38) coiled about the shaft and acting against a fixed collar (39). The friction disk (37) is normally held against rotation by the engagement of the projecting pin or stud (40) with the forward end of the rocker arm (41) of the tripping device. It will be seen that when the pin (40) is released the friction disk (37) will be free to rotate with its companion driven disk (35). As the shaft (28) is fixed to the disk (37) it will also be caused to rotate, and through the cams (27)

and (34) carried on said shaft it will operate the delivery bed and cutter mechanism.

The clutch tripping device comprises a measuring pan (42) which is adjustably suspended, in the path of travel of the board, from a horizontal bar (43) conveniently supported for endwise movement above and approximately parallel to the longitudinal center line of the machine. As the advancing edge of the board strikes the pan it will carry the latter slightly rearwardly and the motion transmitted through the bar (43), the bell crank (44) and the connecting rod (45) will depress the forward end of the rocker arm (41) thereby releasing it from engagement with the pin (40) and freeing the disk (37). The length of the cut sheets may be varied at will by simply adjusting the position of the measuring pan toward or away from the cutter. A cam plate (46) is secured to the inner face of the disk (37) immediately behind the pin (40). This cam is adapted to engage the free end of the rocker arm (41) after it is disengaged from the pin (40) and to further depress it so as to cause the pan (42) to be shifted slightly rearwardly in order to make allowance for the thickness of the cutting blade and thereby prevent the sheet from buckling while it is being cut.

It is desirable that the feeding mechanism should come to rest while the board is being cut. To this end I provide a suitable friction clutch which is arranged to automatically throw the feeding mechanism out of gear with the power shaft during the cutting operation.

A chain driven from a sprocket (47) fixed to the power shaft continuously rotates the sprocket (48) and its attached friction shell or drum (49) both of which turn loosely on the shaft (50). A split ring (51), disposed within the flange of the drum (49), and keyed to the shaft (50) is normally maintained in expanded position so as to rotate with the said drum, by engagement of the expanding wedge or lever (52) with the projecting stud (53), fixed to the movable member (54) which slides upon a key or feather fastened to the said shaft (50).

A lever arm (55) secured at its ends respectively to the pitman (31) and the movable member (54) is arranged for actuation by the upward movement of the pitman to slide the movable member out of engagement with the fixed parts of the clutch and thereby make the connection between the power shaft and the feeding mechanism inoperative during the cutting operation, after which, by a downward movement of the pitman, the clutch is again set in operative position.

The feed rolls (6) and (11) and the paste roll (4) are arranged to be driven in unison in any suitable manner as by means of the chains and gears shown in Fig. 1.

In the foregoing specification I have described the preferred form and mode of operation of my machine, but it will be apparent to those skilled in the art that various modifications may be made in the arrangement and construction of the parts thereof without departing from the spirit and scope of my invention.

What I claim is:

1. A machine for making double faced corrugated paper board comprising means arranged to progress a single faced corrugated web, having an adhesive applied thereto, simultaneously and in juxtaposition with a facing web over a heated flat stationary surface; and means for uniting said webs, while in transit over said heated surface, including a plurality of plates arranged to bear upon the upper surface of the composite web and to move longitudinally thereon, in the direction of travel of the web, but at a relatively slower rate of speed.

2. A machine for making double faced corrugated paper board, comprising means arranged to progress a single faced corrugated web simultaneously and in juxtaposition with a facing web; means for applying an adhesive to the crowns of the corrugations; a heated flat surface over which the composite web travels; and a member disposed above said heated surface and arranged for longitudinal movement on the upper surface of said composite web at a relatively slower rate of speed than the travel of said web.

3. A machine of the character specified, comprising a heater for drying a single faced corrugated web; means for applying an adhesive to the corrugations; means for drawing a web of facing paper in contact with said corrugated web; means arranged to simultaneously progress said webs over a heated flat stationary surface; and a longitudinally movable member arranged to slide on the upper surface of the composite web in the direction of movement thereof; but at a relatively slower speed so as to unite and smooth the webs.

4. A machine of the character specified, comprising means for drawing a single faced corrugated web over a heated surface so as to dry the web; means for applying an adhesive to the corrugations; means for feeding the corrugated web simultaneously and in juxtaposition with a facing web; a stationary heated table for drying the webs; and an endless carrier mounted for longitudinal movement above said table and carrying a plurality of flat plates arranged to slide on the upper surface of the composite web in the direction of travel thereof, and thereby unite the webs and smooth its faces.

5. In a machine of the character specified,

the combination with a web feeding mechanism and a stationary drier table over which the web passes, of an endless carrier mounted for longitudinal movement directly over the drier table and provided with a plurality of presser plates which are adapted to bear upon and to be dragged over the web in the direction of its travel, so as to smooth the faces thereof, said carrier being arranged to be driven at a slower rate of speed than the feed of the web.

6. In a machine of the character specified, the combination with means for feeding a single faced corrugated web, of a mechanism for applying an adhesive to the corrugations thereof, and a heater plate located in advance of said adhesive applying mechanism for drying said web.

7. In a machine of the character specified, the combination with a mechanism for progressing and uniting a web of single faced corrugated paper with a facing web, of means automatically actuated by the longitudinal movement of the paper, for severing said paper transversely into pieces of pre-determined length.

8. A machine of the character specified comprising feed rolls for propelling the paper, a drier table having a flat surface over which the paper passes, a longitudinally movable member supported above said table and bearing upon the surface of the paper, connections between the feed rolls and said member whereby the latter is driven in the direction of movement of the paper but at a relatively slower speed, a cutter mechanism disposed relatively to the drier table for severing the paper into sheets after it leaves said table, a power shaft having a continuous rotary motion, normally operative connections between the power shaft and the feed rolls, normally inoperative connections between the power shaft and the cutter mechanism, means actuated by the movement of the paper at some predetermined point in its travel beyond the cutter to operatively connect the cutter mechanism with the power shaft and to disconnect the feed rolls therefrom during the cutting operation, means, including two parallel members capable of movement toward and from each other, normally supporting the paper under its lateral edges while it is being cut, and means coöperative with the cutter mechanism arranged to separate the paper supporting members after the sheet has been cut so as to deliver it from the machine and then to return said members to their initial position.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

TOBIAS E. RAFFEL.

Witnesses:

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