A. W. D. WEIS.

PAPER CORRUGATING MACHINE.

APPLICATION FILED APR. 24, 1912.

1,115,265.

Patented Oct. 27, 1914.

2 SHEETS—SHEET 1.

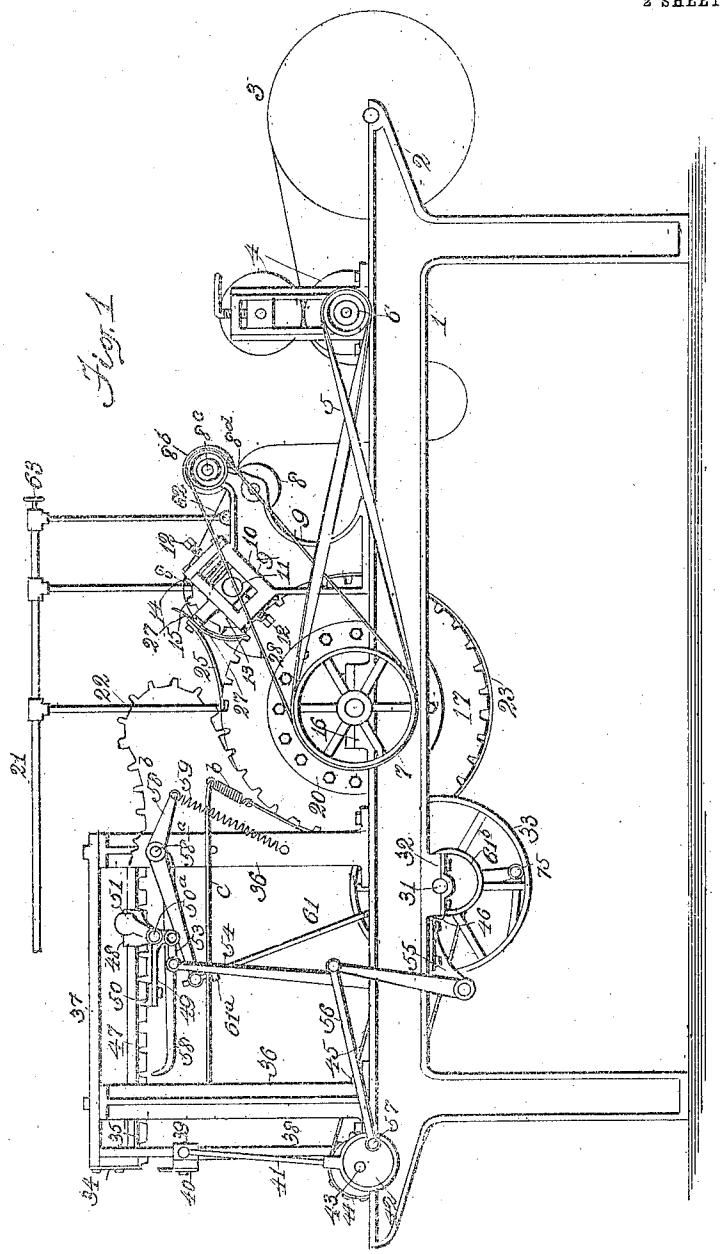


Fig. 1.

Witnesses:
L. A. St. John
Edith St. John

Inventors:
Alwin W. D. Weis.
By J. W. St. John,
Atty.

A. W. D. WEIS.

PAPER CORRUGATING MACHINE.

APPLICATION FILED APR. 24, 1912.

1,115,265.

Patented Oct. 27, 1914.

2 SHEETS—SHEET 2.

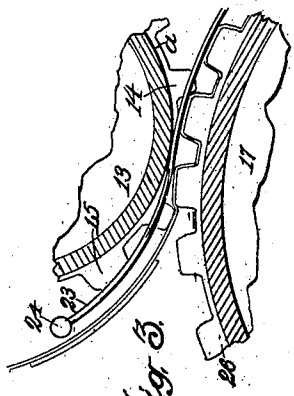


Fig. 3.

Fig. 2.

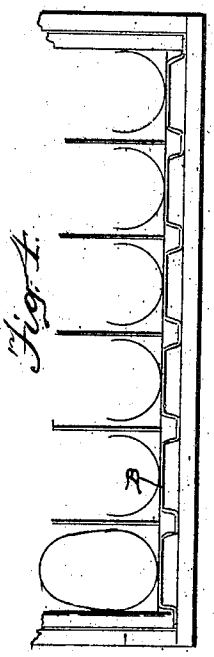


Fig. 4.

Fig. 6.

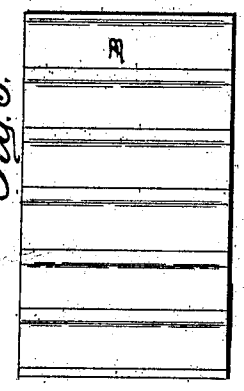


Fig. 5.

Witnesses:
L. A. St. John.
Edith St. John.

Inventor:
Alcoin W. D. Weis.
By J. M. St. John
Atty.

UNITED STATES PATENT OFFICE.

ALWIN W. D. WEIS, OF QUINCY, ILLINOIS.

PAPER-CORRUGATING MACHINE.

1,115,265. Specification of Letters Patent. Patented Oct. 27, 1914.

Application filed April 24, 1912. Serial No. 693,012.

To all whom it may concern:

Be it known that I, ALWIN W. D. WEIS, a citizen of the United States, residing at Quincy, in the county of Adams and State of Illinois, have invented certain new and useful Improvements in Paper-Corrugating Machines, of which the following is a specification.

This invention relates to machines for corrugating paper, and more particularly for corrugating strawboard in the manufacture of cushion layers or pads to be used in connection with cell cases in the packing and transportation of eggs.

The invention is fully disclosed in the description and claims following, reference being had to the accompanying drawing forming a part of this specification.

Figure 1 of the drawings is a side elevation of a machine embodying the invention. Fig. 2 is a top plan view of the same. Fig. 3 is a fragmentary detail illustrating the corrugating rolls and related parts. Fig. 4 shows the manner of applying the corrugated blanks to an egg-case. Fig. 5 is a plan view of one of the finished blanks. Fig. 6 is a fragmentary view illustrating the steam sprayer for the strawboard preparatory to corrugating.

The machine is designed specifically to form cushioning blanks for the bottom, top, and, if desired, the sides and ends of egg-cases and prevent contact therewith. Commonly this space is filled with some fibrous material, such as excelsior, hay, straw, or the like, the use of which not only involves expense for materials, but much more for labor. The corrugated strawboard is designed to serve the same purpose, and with much less labor in packing. The material itself is not expensive, and the machine herein described has a capacity for a very large and rapid production, so that the cost of the finished article is but little, if any, more than excelsior, and it is much less troublesome to use.

Referring now to the drawing, 1 denotes the main frame, which has rearwardly extending brackets 2 to take the supply roll 3 of thin strawboard, the length of which roll corresponds to the desired width of the cushion sheet when completed. In front of this is mounted a pair of feed rolls 4, of a familiar type, driven by a belt 5 running on pulleys 6 and 7. These rolls are speeded so as to draw forward, by their constant revolution, just enough material to furnish slack for the intermittent feed, to be described presently. From the feed rolls the sheet passes over a roll 8 mounted on a pair of brackets 9 provided with housings 10 taking journal bearings 11, adjustable by means of screws 12, with reference to the material passing between the corrugating rolls. In these bearings is mounted a fluted roller 13 having ribs 14 and doubly wide ribs 15 at every seventh space. In bearings 16 of the main frame is mounted a large fluted drum 17, the exact converse of the roller just described. The roller and drum are given concurrent rotary motion by spur gears 18 and 19. The drum is made hollow and fitted with steam tight heads 20, and is supplied with steam through one of its bearings by a pipe 22 from a supply pipe 21, communicating with a steam generator not shown. Similar provision is made for the smaller roll, and by virtue of the heat thus imparted to them a permanent set is given to the corrugations in the paper passing between them. In order, however, to so thoroughly dry and "iron" the corrugated material that the corrugations will not change form when they leave the drum, it is desirable to hold the paper in contact with the drum as long as possible. This is accomplished by passing the sheet over the small roller and under a pair of retaining wires or bands 23, almost fully encircling the drum. One end of each wire connects with a cross-bar or rod 24 over which the sheet is passed in feeding it to the rolls. The corrugated sheet finally emerges from under the retaining bands at the top of the drum in a loop, as shown in Fig. 1. To prevent its passing back under the smaller roll again, suitable strippers 25 are provided, the forward ends of which enter grooves 26 in the drum, and lift the sheet out of the corrugations, as indicated. These strippers are attached to a suitable cross-bar 27. To the same cross-bar is attached a curved deflecting plate 28, the purpose of which is to curve the front end of the strawboard sheet in the initial operation of threading it into place between the corrugating rolls. As the encircling wires 23 pass between the corrugating rolls, it is necessary that the teeth of the smaller rolls should be grooved at *a a*, to receive said wires, as shown in Fig. 2. Tensile springs *b*

attached to supports *c* serve to hold the wires taut, and so keep the crimped paper in close contact with the hot drum until released.

Rotary motion is imparted to the corrugating rolls by spur gears 29 and 30, the latter attached to a cross-shaft 31 mounted in suitable bearings 32 on the main frame, and driven by a pulley 33, the pinion 29 being merely an idler to transmit motion to the large drum in the same direction as that of the driving pulley.

Near the front end of the machine is mounted a fixed shear blade 34, the lower edge of which is in line with the top surface of the corrugated sheet as it is fed forward. The sheet passes under a plate 35 suitably attached to a framework mounted on the main frame. This framework comprises a pair of standards 36, at each side, and connecting top bars 37. Between these bars and the main frame are mounted vertical guides 38 bearing a cross head 39, to which is attached a shear blade 40. The cross head connects by suitable rods 41 with an eccentric 42 mounted on a cross shaft 43. The shaft is provided with a sprocket 44 connecting by a sprocket chain 45 with another and smaller sprocket 46 on the main driving shaft. The eccentrics are quite large, and the arrangement is such that the shear cuts only near the upper limit of the stroke of the moving cutter, which may thus have uninterrupted reciprocating movement instead of an objectionable intermittent movement by a cam.

Near the upper ends of the standards 36 are mounted horizontal guide-bars 47, and on these are mounted slides 48 carrying pivoted pawls or dogs 49. These are in the nature of bell-crank levers, and are provided at the forward ends with adjustable tips or dogs 50, of suitable size and shape to engage one of the smaller corrugations in the strawboard sheet. The tips might be parts of the bell-crank levers themselves, but are preferably adjustable thereon, as great exactness is here required in feeding the sheet straight forward, and to the proper line for cut-off. The bell-cranks are connected by a rock-shaft 50^a, and on the rock-shaft is mounted a counterweight 51, which rocks across the center of gravity at the alternate impulses of the feeding mechanism. To the depending ends of the bell-cranks 52 are connected links 53 coupled to levers 54 pivoted at their lower ends to brackets 55. Intermittent motion is imparted to these levers by a connecting rod 56 at each side engaging a wrist-pin 57 on the eccentric 42. The feed acts somewhat in advance of the cut-off.

To prevent recoil of the sheet after the forward impulse of the feed, a detent is provided, as shown. This in practice comprises a pair of levers 58 with tips corresponding to those of the feed levers, and at their rear ends attached to a rock-shaft 58^a Secured to the same shaft is a double lever 58^b, one arm of which is provided with a spring 59 tending to hold the detent against the corrugated material. The other end of the lever engages with a slip-rod 61 provided with a collar 61^a, and at the other end connecting with an eccentric 61^b on the main shaft. The detent may thus act alternately with the feed, as will be evident.

In some conditions of the material, as when especially dry, it is desirable to moisten it somewhat before passing it between the corrugating rolls. This is accomplished by delivering to one of its surfaces light jets of steam through a suitable nozzle 62 across the path of such material. A valve 63 shuts off the steam when not needed.

The action of the machine in the process of forming the corrugated sheet and severing will be evident from the foregoing. It will be seen that the mechanism is so constructed and its action so timed that material is supplied to the corrugating rolls as fast as it is cut off at the front end, and there is thus no chance for the intermittent feed to tear or jerk the material. All that the intermittent feed is required to do is merely to push forward the exposed part of the corrugated sheet looped up over the corrugating roll. At the extreme forward movement of the feed the cut-off comes into action, and the sheet is severed midway of the wide corrugation. The back action of the feed throws the engaging fingers straight down and out of the groove in the paper, and it travels thence back to its extreme rearward position. At the first forward movement of the feed the finger is thrown straight up and back into a new notch, and the operation is repeated. Provision is also made for slitting the paper before passing between the corrugating rolls. For this purpose the roll 8 may be grooved at 8^a to take the edge of a rotary shear 8^b on a shaft 8^c driven by a belt 8^d. When not needed the slitter may be dispensed with.

It is to be noted that the upper corrugating roll is mounted in yielding bearings. This is in part to compensate for any want of uniformity in the thickness of material passing between the fluting rolls, but its more important function is to permit a little yielding motion on the part of the smaller fluting roller made necessary by the presence of some flutes wider than the rest. In practice this variation in the width of the flutes produces a slight aberration in the mesh of the two fluting rolls, and unless provision is made for one or the other to yield a little the effect would be to tear the material passing between them, as well as to rapidly wear out intermeshing gear teeth and flutes.

Having thus described my invention, I claim:

1. In a paper corrugating machine, the combination of fluted rolls, the toothed roll being circumferentially grooved, encircling wires partially inclosing the other roll, and lying within said grooves, and elastic means for holding said wires snugly in such roll-inclosing position.

2. In a paper corrugating machine, the combination of a pair of corrugating rolls, one of them circumferentially grooved as described, retaining wires lying in the groove between said rolls, and connecting at their initial ends to a cross-bar or rod, a deflecting plate adapted to feed the entering material between said rolls, and oppositely disposed inclined fingers attached to the cross-rod and lying in the open spaces in said grooves for stripping the finished material from the retaining roll.

3. In a machine for corrugating packing paper, a pair of rolls fluted in regular groups of a plurality of uniform channels and engaging ribs, and single, wider intermediate channels and ribs, a shear adapted to sever the corrugated paper through the wider flutes, means for actuating said shear and rolls, and feed mechanism adapted to feed forward the corrugated sheet a predetermined distance, so as to be severed in the middle of the wide flutes.

In testimony whereof I affix my signature in presence of two witnesses.

ALWIN W. D. WEIS.

Witnesses:

WALTER L. BERNZEN,

E. A. CRAWFORD.