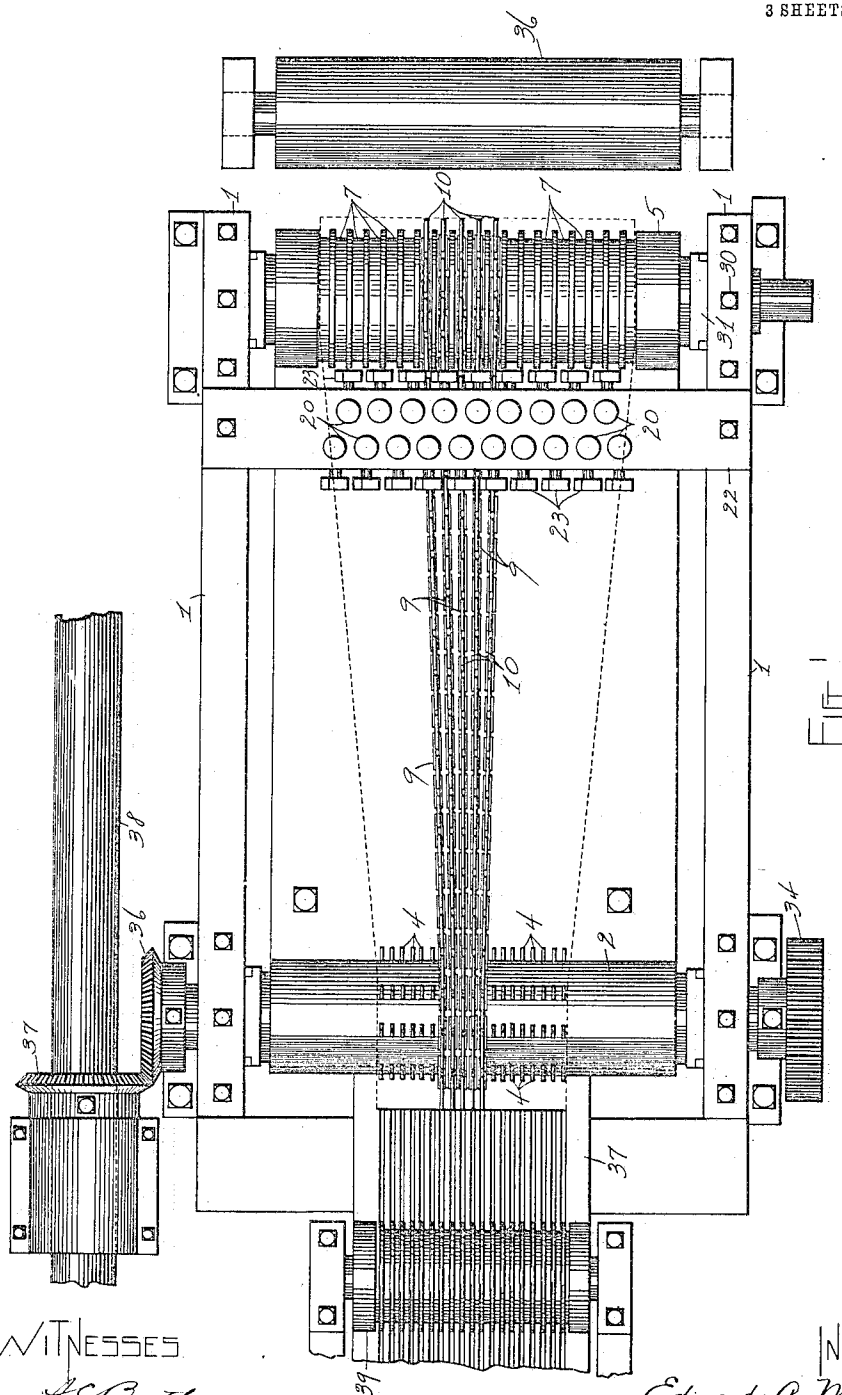


No. 793,316.

PATENTED JUNE 27, 1905.

E. A. McMILLIN.
CORRUGATING MACHINE.
APPLICATION FILED OCT. 24, 1903.

3 SHEETS—SHEET 1.



WITNESSES

A. C. Booth
E. M. O'Keilly.

INVENTOR

Edward A. McMillin,
By Mosher & Curtis,
attys.

No. 793,316.

PATENTED JUNE 27, 1905.

E. A. McMILLIN.
CORRUGATING MACHINE.
APPLICATION FILED OCT. 24, 1903.

3 SHEETS—SHEET 2.

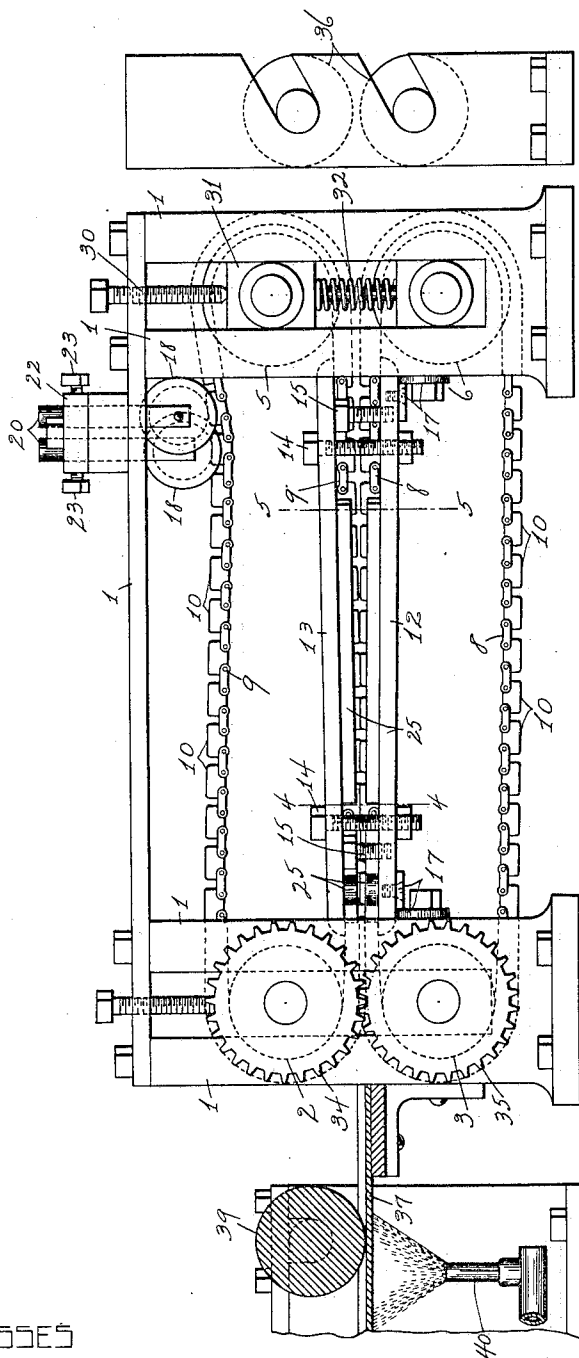


FIG. 2

WITNESSES

A. C. Beach
E. M. O'Reilly.

INVENTOR

Edward A. McMullin,
By Mosher & Curtis,
Attys.

No. 793,316.

PATENTED JUNE 27, 1905.

E. A. McMILLIN.
CORRUGATING MACHINE.
APPLICATION FILED OCT. 24, 1903.

3 SHEETS—SHEET 3.

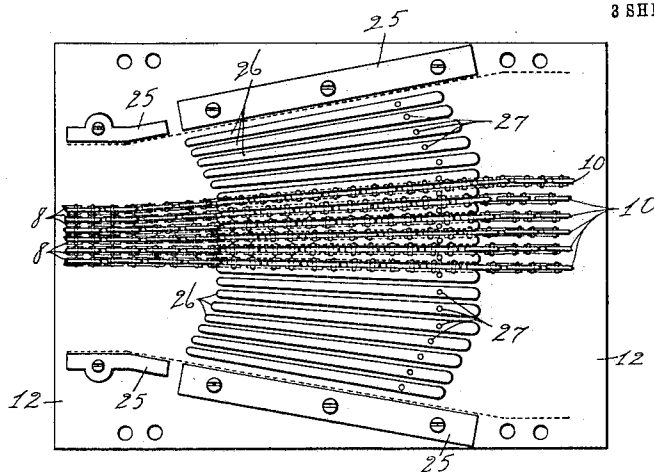


FIG 3

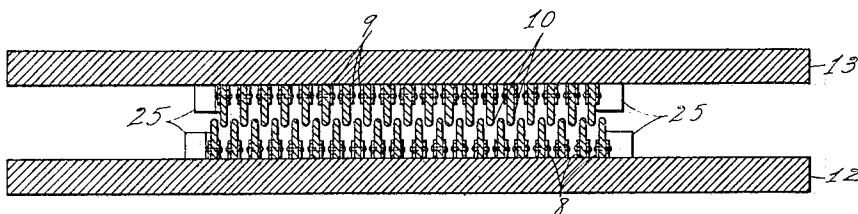


FIG 4

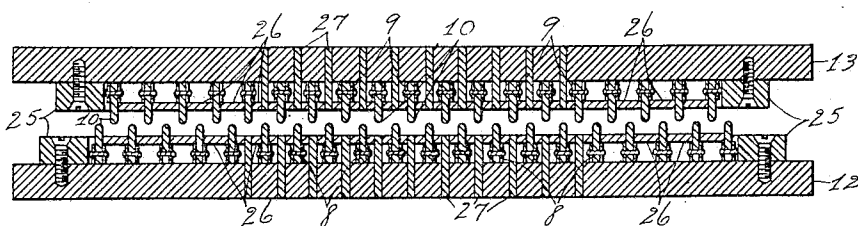


FIG 5



FIG 6

WITNESSES:

J. C. Brook
E. M. O'Reilly.

INVENTOR

Edward A. McMILLIN,
By Mosher & Curtis,
attys.

UNITED STATES PATENT OFFICE.

EDWARD A. McMILLIN, OF NORTH ADAMS, MASSACHUSETTS.

CORRUGATING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 793,316, dated June 27, 1905.

Application filed October 24, 1903. Serial No. 178,369.

To all whom it may concern:

Be it known that I, EDWARD A. McMILLIN, a citizen of the United States, residing at North Adams, county of Berkshire, and State of Massachusetts, have invented certain new and useful Improvements in Corrugating-Machines, of which the following is a specification.

The invention relates to such improvements; and it consists of the novel construction and combination of parts hereinafter described and subsequently claimed.

Reference may be had to the accompanying drawings, and the reference characters marked thereon, which form a part of this specification.

Similar characters refer to similar parts in the several figures therein.

Figure 1 of the drawings is a top plan view of my improved corrugating-machine. Fig. 2 is a view in side elevation of the same. Fig. 3 is a top plan view of the bottom guide-plate for the corrugating-chains. Fig. 4 is a vertical cross-section taken through the top and bottom guide-plates and interposed chains on the broken line 4 4 in Fig. 2. Fig. 5 is a similar section taken on the broken line 5 5 in Fig. 2. Fig. 6 is a cross-section of a portion of the corrugated material. Figs. 4, 5, and 6 are drawn on a larger scale than Figs. 1, 2, and 3.

The object of my invention is to corrugate sheet material, and more particularly to provide a strip of sheet material of indefinite length with corrugations extending longitudinally of the strip.

The invention is particularly adapted for corrugating various kinds of sheet material and is particularly adapted for corrugating paper or pasteboard.

I have shown in the drawings my invention embodied in its preferred form in a machine for corrugating paper or pasteboard.

Referring to the drawings, 1 is the frame of the machine, adapted to support in suitable bearings at one end thereof a pair of rolls 2 and 3, provided each with a plurality of sets of sprocket-teeth 4, and in suitable bearings at the other end thereof a pair of

rolls 5 and 6, provided with peripheral grooves 7. A plurality of endless chains 8 are passed around the lower rolls 3 and 6, being located in the respective grooves in the roll 6 and adapted to engage the respective sets of sprocket-teeth on the roll 3. A corresponding series of endless chains 9 are passed around the upper rolls 2 and 5, being located in the respective grooves in the roll 5 and adapted to engage the respective sets of sprocket-teeth on the roll 2. The grooves 7 and the sets of sprocket-teeth 4 on the respective rolls are so located that the chains 8 are arranged in alternation with the chains 9, and the respective rolls are so located that the upper reaches of the chains 8 between the lower rolls are in close proximity to the under reaches of the chains 9 between the rolls 2 and 5. The rolls 2 and 3 are also separated from each other by a less distance than are the rolls 5 and 6, the arrangement being such that the under reaches of the chains 9 occupy a plane inclined to that occupied by the upper reaches of the chains 8.

The alternate links in the chains 8 and 9 are provided with corrugating members 10, which project outwardly from the chains and are adapted to engage the opposite sides of sheet material passed through the machine by insertion between the rolls 5 and 6. The distance between the rolls 2 and 3 is such as to cause the corrugating members 10 of the chains 9 to lap the similar corrugating members 10 of the chains 8 as they approach said rolls, the extent of lap being substantially equal to the depth of the corrugations required to be formed in the sheet material. It will thus be seen that if a piece of paper or the like be passed through the machine by insertion between the rolls 5 and 6 and withdrawal from between the rolls 2 and 3 its opposite sides will be subjected to lines of pressure, the lines of pressure on one side alternating with those on the other and tending to form longitudinal corrugations in the material. It is found, however, that the unyielding nature of the sheet material, such as paper, requires provision for the contraction in width of the sheet or strip in accordance

with the depth of the corrugations formed therein. For this reason I arrange the neighboring sets of sprocket-teeth 4 on the rolls 2 and 3 in closer proximity to one another than are the guide-grooves 7 in the rolls 5 and 6, so that in passing from the rolls 5 and 6 to the rolls 2 and 3, respectively, the reaches of each set of chains are caused to converge toward each other as they approach the rolls 2 and 3.

For the purpose of guiding the corrugating-reaches of the chains those of each set relatively to the others in that set and those of each set relatively to those of the other set I interpose between the two sets of chain-supporting rolls top and bottom guide-plates 12 and 13, between which the corrugating-reaches of the chains are confined in their passage from the rolls 5 and 6 to the rolls 2 and 3. These guide-plates are formed substantially alike, the construction being illustrated in connection with the bottom plate in Fig. 3. These plates may be adjusted at the proper degree of inclination to each other by means of the screw-bolts 14, by means of which the plates can be drawn together, and the screw-bolts 15, by means of which the plates can be forced apart. The under plate 12 is rigidly mounted upon the frame of the machine by means of brackets 17. The upper reaches of the chains 8 rest by gravity upon the under plate 12 in passing from the roll 6 to the roll 3, and the under reaches of the chains 9 in passing from the roll 5 to roll 2 are held against the under side of the upper plate 13 by tension upon said chains induced by engagement with their upper reaches of the tension-rolls 18, a separate tension-roll being provided for each of said chains. Each of said tension-rolls is mounted upon the lower end of a spindle 20, vertically adjustable in a slideway in the cross-bar 22 of the frame of the machine and is adapted to be fixed in adjusted position by means of a set-screw 23. The guide-plates 12 and 13 are provided on their neighboring faces with convergent guide-flanges 25, between which the chains are confined, the chains of each set being separated one from another by tapering guide-tongues 26, convergently arranged upon the respective plates. The guide-tongues are pivotally mounted at their wider ends upon the respective plates by means of pins 27.

The guide-tongues are preferably separated one from another by a space adapted to receive the corrugating members 10 of a chain while permitting the connecting-links of the chain to pass between said tongues and the plate upon which the same are mounted, as shown in Fig. 5. The convergent ends of the guide-tongues 26 are left free to adapt themselves to positions induced by the confinement of the chains between the convergent ends of the guide-flanges 25, sufficient space only being left between the convergent ends of said guide-flanges 25

to accommodate the alternately-arranged chains and the corrugated material interposed therebetween.

The neighboring faces of the guide-plates 12 and 13 are substantially tangential to the rolls 2 and 3, respectively.

The rolls 5 and 6 can be adjusted toward and from each other by means of the set-screw 30, engageable with the movable bearing-box 31 of the roll 5, which is yieldingly supported by the spring 32. Adjustment of the roll 2 toward and from the roll 3 may be accomplished in like manner.

The rolls 2 and 3 are provided with inter-meshing gears 34 and 35, one of said rolls being provided on its opposite end with a bevel-gear 36, meshing with a similar bevel-gear 37 on the drive-shaft 38, to which power may be imparted in any known manner for the purpose of operating the rolls 2 and 3, by means of which the chains are operated.

The stock or sheet material may be fed to the machine and guided thereinto in any known manner, as by means of a pair of guide-rolls 36, supported in advance of the rolls 5 and 6.

In treating certain kinds of stock the material to be corrugated can be more successfully operated upon if dampened, and when so dampened means should be provided for maintaining the corrugations in the sheet until the stock has been sufficiently dried to fix the corrugations therein. This can be accomplished by feeding the stock from the rolls 2 and 3 over the bed 37, provided with longitudinal corrugations corresponding in position with the corrugations formed in the sheet by the corrugating-chains, the stock being held in the grooves in the corrugated bed by means of a peripherally-flanged roller 39 or other mechanism adapted for that purpose. The bed may be heated by means of a gas-burner 40, if desired, or in any known manner. The roller 39 may be duplicated in connection with the corrugated bed or other means provided for maintaining the form of the corrugated strip or sheet until the same has been sufficiently dried.

By means of my improved machine a strip or sheet of material of indefinite length can be fed through the machine and provided with continuous longitudinal corrugations.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a corrugating-machine, and in combination, two sets of flexible traveling cooperating, corrugating members, the members of each set being convergent toward each other and arranged in alternation with the members of the other set, and means for operating said members.

2. In a corrugating-machine, and in combination, two sets of flexible traveling cooperating, alternately-arranged, corrugating members, the members of each set being con-

vergent toward each other and inclined relatively to the members of the other set, and means for operating said members.

3. In a corrugating-machine, and in combination, two sets of flexibly-mounted, coöperative, traveling corrugating members, the members of each set being convergent toward each other and arranged in alternation with the members of the other set, and means for operating said members.

4. In a corrugating-machine, and in combination, two sets of flexibly-mounted, alternately-arranged, traveling corrugating members, the members of each set being convergent toward each other and inclined relatively to the members of the other set, and means for operating said members.

5. In a corrugating-machine, and in combination, two sets of chains provided with corrugating members, the chains of each set being convergent toward each other, and arranged in alternation with the chains of the other set.

6. In a corrugating-machine, and in combination, two sets of alternately - arranged chains provided with corrugating members, the chains of each set being convergent toward each other and inclined relatively to the chains of the other set.

7. In a corrugating-machine, and in combination, two sets of alternately - arranged chains provided with corrugating members; a pair of convergent guide-plates between which said chains pass, and means for operating the chains.

8. In a corrugating-machine, and in combination, two sets of alternately - arranged chains provided with corrugating members; a pair of guide-plates between which said chains pass; and convergent guides on said plates engageable with said chains.

9. In a corrugating-machine, and in combination, two sets of alternately - arranged chains provided with corrugating members; a pair of convergent guide-plates between which said chains pass; convergent guides on the guide-plates engageable with the respective chains; and means for operating the chains.

10. In a corrugating-machine, and in combination, two sets of alternately - arranged chains provided with corrugating members; a pair of guide-plates between which said chains pass; convergent guide-flanges on the guide-plates between which said chains are confined; convergent guide members interposed between the neighboring chains; and means for operating the chains.

11. In a corrugating-machine, and in combination, two sets of alternately - arranged chains provided with corrugating members; a pair of convergent guide-plates between which said chains pass; convergent flanges on the guide-plates between which said chains are confined; convergent guide members be-

tween the neighboring chains; and means for operating the chains.

12. In a corrugating-machine, and in combination, two sets of alternately - arranged chains provided with corrugating members; a pair of guide-plates between which said chains pass; convergent guide-flanges on the plates between which the chains are confined; convergent guide members interposed between neighboring chains pivotally mounted at their divergent ends upon said plates.

13. In a corrugating-machine, and in combination, a pair of rolls, one provided with chain-guides, and the other with a plurality of sets of sprocket-teeth peripherally disposed side by side thereupon and separated one from another by a space less than the distance between said chain-guides, on the other roll; a set of chains provided with corrugating members stretched upon said rolls engageable with the respective sets of sprocket-teeth on one roll and occupying the respective chain-guides on the other roll; means for operating the sprocket-roll; and corrugating members arranged in alternation with the corrugating members on said chains and adapted to coöperate therewith.

14. In a corrugating-machine, and in combination, a pair of guide-rolls provided each with a plurality of chain-guides; a pair of sprocket-rolls each provided with a plurality of sets of sprocket-teeth peripherally disposed side by side thereupon, and separated one from another by a space less than the distance between said chain-guides on the other pair of rolls, the sets of teeth on one sprocket-roll being arranged in alternation with those on the other sprocket-roll; a set of chains provided with corrugating members stretched upon one of said sprocket-rolls and one of said guide-rolls; a set of chains provided with corrugating members stretched upon the other sprocket-roll and guide-roll, said chains occupying the chain-guides and being engageable with the sprocket-teeth on the respective rolls and adapted to coöperate with each other; and means for operating the sprocket-rolls.

15. In a corrugating-machine, and in combination, a pair of guide-rolls provided each with a plurality of chain-guides; a pair of sprocket-rolls each provided with a plurality of sets of sprocket-teeth peripherally disposed side by side thereupon, and separated one from another by a space less than the distance between said chain-guides on the other pair of rolls, the sets of teeth on one sprocket-roll being arranged in alternation with those on the other sprocket-roll; a set of chains provided with corrugating members stretched upon one of said sprocket-rolls and one of said guide-rolls; a set of chains provided with corrugating members stretched upon the other sprocket-roll and guide-roll, said chains occupying the chain-guides and being

engageable with the sprocket-teeth on the respective rolls and adapted to coöperate with each other; means for operating the sprocket-rolls; a pair of convergent guide-plates between which the neighboring reaches of said sets of chains pass; and convergent guide-flanges on said plates between which said chains are confined.

16. In a corrugating-machine, and in combination, a pair of guide-rolls provided each with a plurality of chain-guides; a pair of sprocket-rolls each provided with a plurality of sets of sprocket-teeth peripherally disposed side by side thereupon, and separated one from another by a space less than the distance between said chain-guides on the other pair of rolls, the sets of teeth on one sprocket-roll being arranged in alternation with those on the other sprocket-roll; a set of chains provided with corrugating members stretched

upon one of said sprocket-rolls and one of said guide-rolls; a set of chains provided with corrugating members stretched upon the other sprocket-roll and guide-roll, said chains occupying the chain-guides and being engageable with the sprocket-teeth on the respective rolls and adapted to coöperate with each other; means for operating the sprocket-rolls; a pair of convergent guide-plates between which the neighboring reaches of said chains pass; convergent guide-flanges on said plates between which said chains are confined; and convergent guide members interposed between neighboring chains.

In testimony whereof I have hereunto set my hand this 15th day of October, 1903.

EDWARD A. McMILLIN.

Witnesses:

A. E. SPENCER,

A. J. LANDRY.