S. M. LANGSTON.

MACHINE FOR MAKING CARTONS.

APPLICATION FILED JUNE 2, 1908.

929,450.

Patented July 27, 1909.

3 SHEETS—SHEET 1.

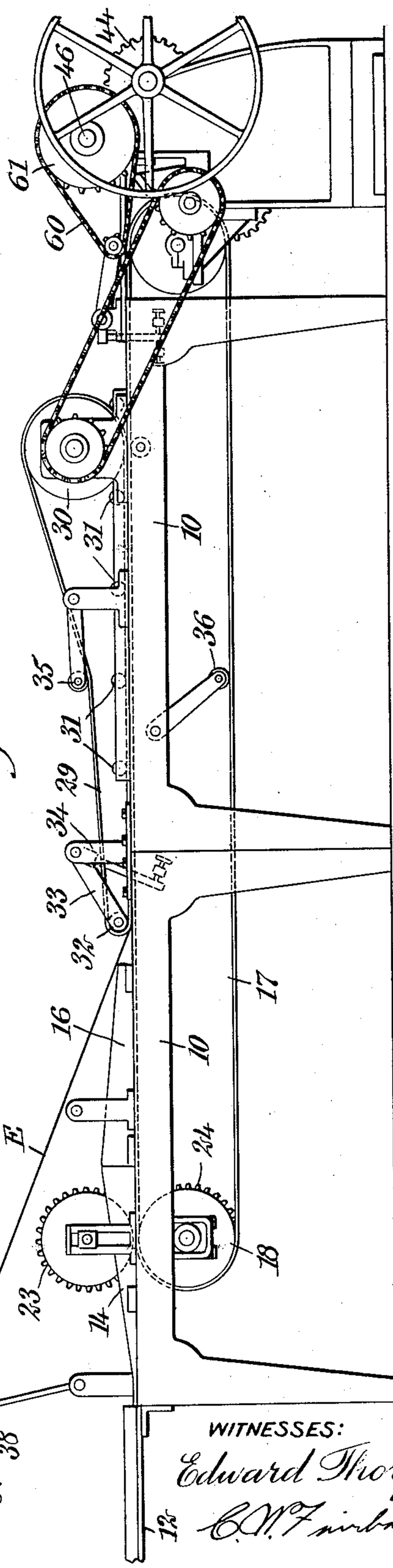

Fig. 1.

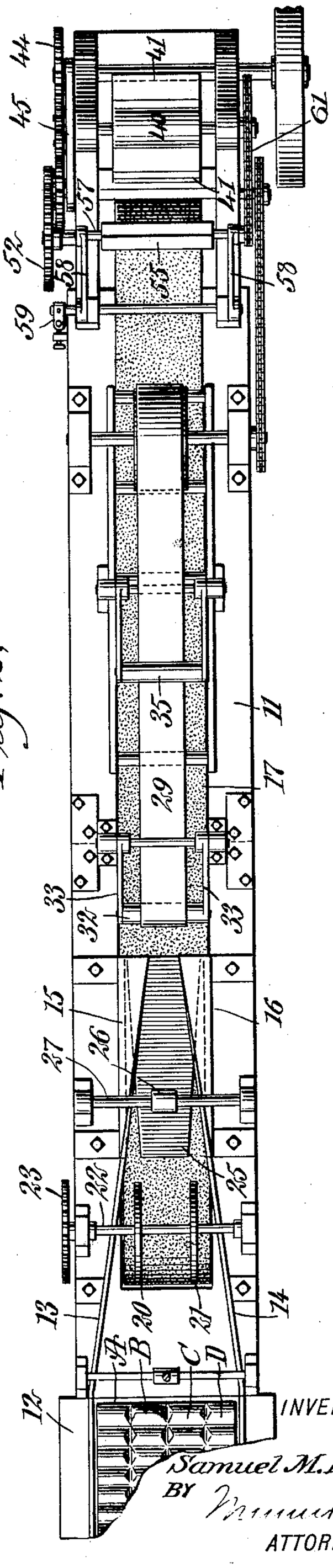

Fig. 2.

WITNESSES:

Edward Thorpe.

C. W. Zinbrunk

INVENTOR

Samuel M. Langston

BY Munn & Co.

ATTORNEYS

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Fig. 3,

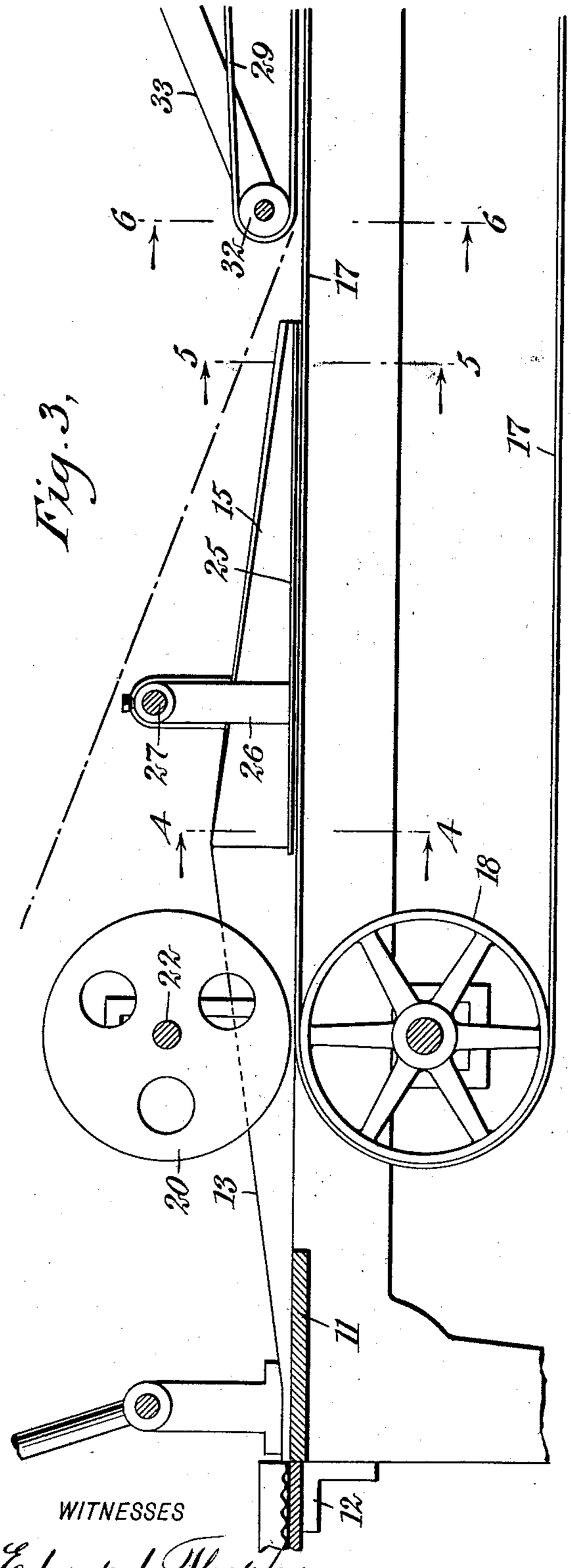


Fig. 6,

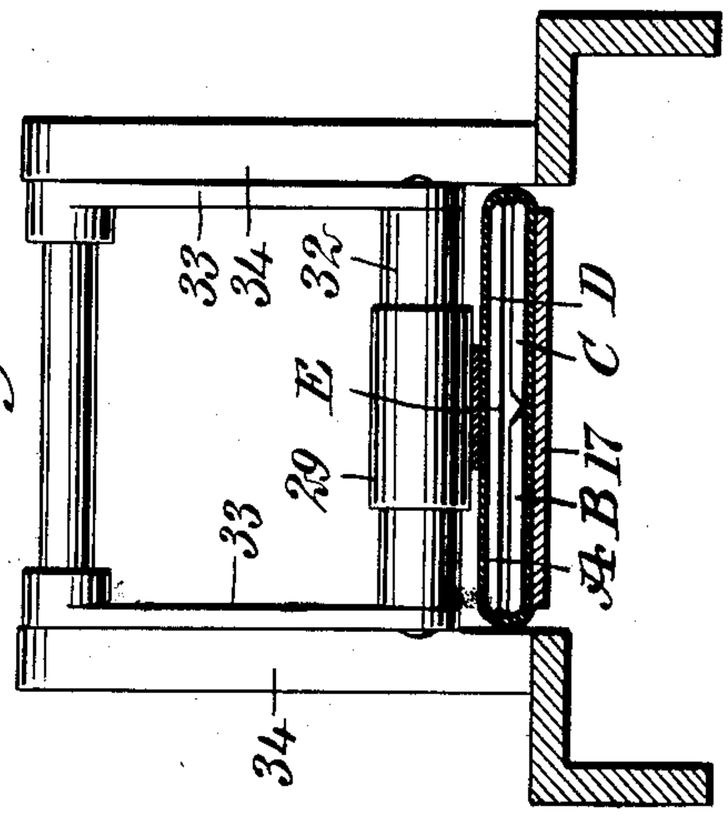


Fig. 5,

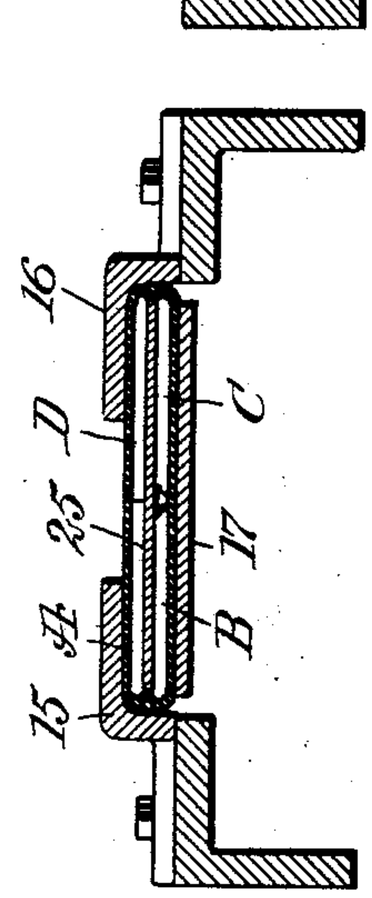
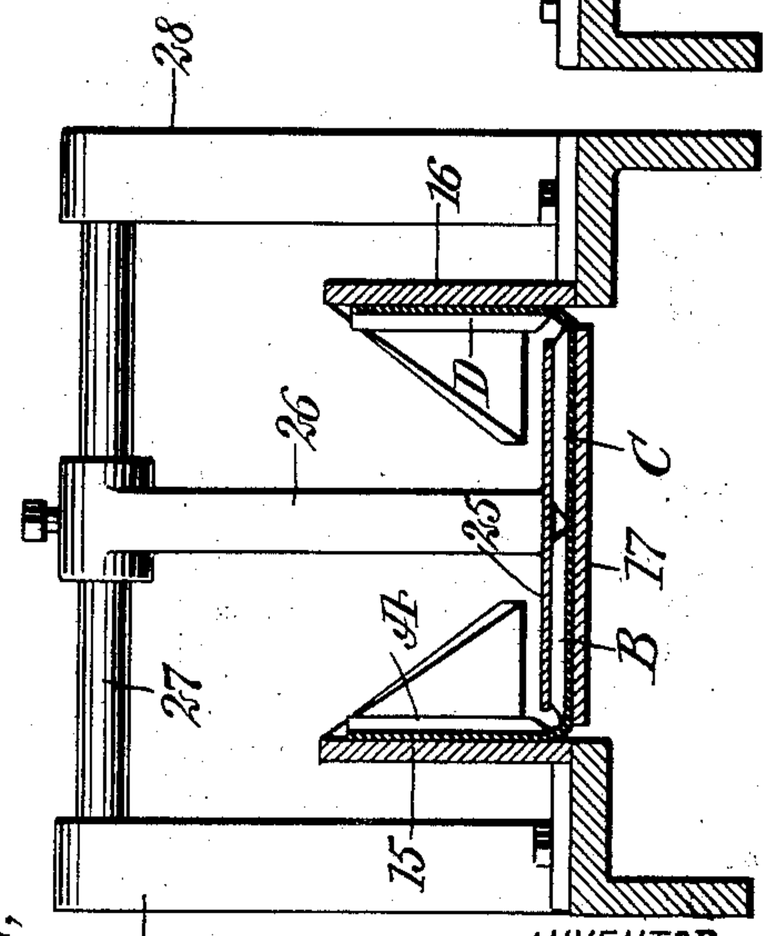


Fig. 4,



WITNESSES

Edward Thorpe.

C. W. Fairbanks

INVENTOR

Samuel M. Langston

BY Munn & Co.

ATTORNEYS

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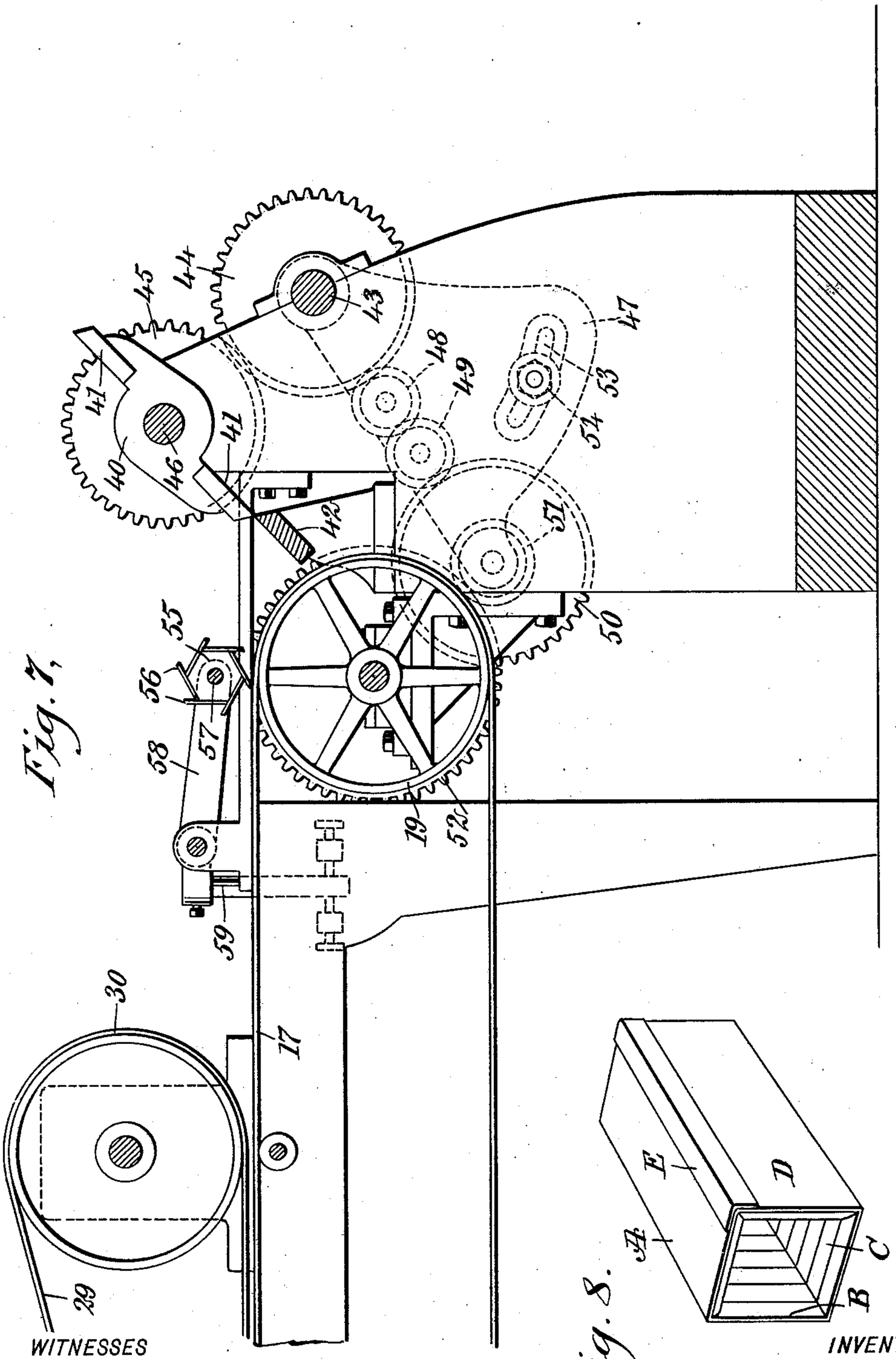

Fig. 1.

Fig. 8.

WITNESSES

Edward Thorpe.

C. W. Fairbank

INVENTOR

Samuel M. Langston

BY Munn & Co.

ATTORNEYS

UNITED STATES PATENT OFFICE.

SAMUEL M. LANGSTON, OF CAMDEN, NEW JERSEY.

MACHINE FOR MAKING CARTONS.

No. 929,450. Specification of Letters Patent. Patented July 27, 1909.

Application filed June 2, 1908. Serial No. 436,285.

To all whom it may concern:

Be it known that I, SAMUEL MACDONALD LANGSTON, a citizen of the United States, and a resident of Camden, in the county of Camden and State of New Jersey, have invented a new and Improved Machine for Making Cartons, of which the following is a full, clear, and exact description.

This invention relates to certain improvements in machines for making cartons, and more particularly for making that type of carton in which a strip of sheet material is bent to form a tube, and in which the meeting edges are secured together by a strip of tape or the like.

One object of my invention is to provide means for facilitating the folding of the tube, so that all of the sections will be of uniform size and so that the edges of the material will properly meet without overlapping or leaving an intervening space.

A further object of my invention is to provide means whereby the folded continuous tube may be cut into sections of uniform width without interrupting the continuous feeding of the material through the machine to the continuously-operated rotary cutter.

A still further object is to provide certain improvements in the means for subdividing the material into sections.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures, and in which—

Figure 1 is a side elevation of a machine embodying my invention; Fig. 2 is a top plan view thereof; Fig. 3 is a central vertical section through the left-hand end of the machine, as shown in Figs. 1 and 2; Figs. 4, 5 and 6 are transverse sections on the lines 4—4, 5—5 and 6—6, respectively, of Fig. 3; Fig. 7 is a central vertical section through the right-hand end of the machine as shown in Figs. 1 and 2; and Fig. 8 is a perspective view of the completed carton or bottle wrapper as manufactured by the machine.

The specific form of machine illustrated is particularly adapted for the manufacture of bottle wrappers from corrugated paper or cellular board, and is constructed to operate in many particulars substantially the same as the machine illustrated in United States patent to Thompson and Wilson, Number 406,971, issued July 16, 1889. The specific machine illustrated is adapted to receive a continuous strip of material having creases or score lines extending longitudinally thereof, fold over the edges of the strip, bring them adjacent each other, apply adhesive to a strip of tape, apply the tape to the meeting edges of the strip to hold the edges together, and subdivide the strip into sections of uniform length.

The machine includes a main frame 10, which may, if desired, be separable into a plurality of sections to facilitate shipment. The frame supports a platform or table 11, along which the material passes from one end of the machine to the other, and also serves to support the mechanism which operates upon the material.

At one end of the machine is the feed table 12 onto which is delivered a continuous strip of corrugated paper or cellular board having a plurality of creases or score lines extending longitudinally thereof, so as to weaken it and permit of its being bent along predetermined lines. The number of lines will depend upon the number of sides which the completed carbon or wrapper is to have. In the present case, I have illustrated the strip subdivided by score lines into four separate sections A, B C and D. The material passes onto the platform and comes between oppositely-disposed folders 13 and 14 which engage with the two outermost portions A and D of the material and fold them upward substantially at right angles. Beyond the folders 13 and 14, are two folders 15 and 16 which receive the upturned sections A and D of the strip and fold them down upon the sections B and C beneath the folders.

Extending the major portion of the length of the machine is a belt 17, serving as a support and conveyer for the material. The belt extends around a pulley 18 mounted beneath the platform 11, adjacent one end, and over a pulley 19 beneath the platform 11 at the opposite end. The pulley 18 is preferably intermediate the ends of the folders 13 and 14, and above this pulley and in engagement with the belt are two holding wheels 20 and 21, which prevent the two central sections B and C of the material from rising and causes the material to bend on the

score lines. The holding wheels 20 and 21 are mounted on a shaft 22 carried by suitable brackets on the frame of the machine, and at the end of the shaft is a gear wheel 23 intermeshing with a gear wheel 24 mounted on the same shaft as the pulley 18. The gear wheels 23 and 24 are of the same size, so that the holding wheels 20 and 21 rotate with the material, and aid the belt in feeding it along. The holding wheels serve to prevent the two central sections from rising away from the belt or platform while they are passing between the folders 13 and 14, but it is evident that holding wheels cannot be employed between the folders 15 and 16. As the material passes between these last-mentioned holders, the exact line upon which the material folds, may vary slightly, so that the completed tube is not always of a uniform size.

It often happens that the adjacent edges of the outer sections A and D as they come together, will overlap and form a tube of smaller diameter than is desired. In order to overcome this objection, I provide as one of the important features of my invention, means intermediate the folders 15 and 16 for holding the material in position and preventing the sections A and D from folding along such lines, as will permit of their overlapping. The particular means illustrated for limiting the minimum diameter of the tube includes a plate 25, disposed adjacent the upper surface of the sections B and C, and adapted to have the sections A and D folded down onto said plate. The plate is of substantially the entire length of the folders 15 and 16, and is preferably held suspended by a link 26, the upper end of which is connected to a transverse bar 27. The bar is supported by suitable standards or brackets 28 upon opposite sides of the machine. The plate may be of any suitable material, as, for instance, a thin wooden board, and is of such width as to hold the material into the innermost recesses beneath the folders 15 and 16. The oppositely-disposed edges of the plate may, if desired, be slightly tapered or converged to reduce the surface friction with the material. The plate will be of its greatest width at the outlet end of the folders 15 and 16 where it defines the exact location of the fold in the material. At the opposite end of the folders 15 and 16, the plate may be of slightly less width so as to permit the folded material to slide past the plate more readily.

As the material leaves the end of the folders, it passes beneath a second belt 29 disposed above the belt 17 and traveling at the same rate as the last-mentioned belt. The two belts together grip the material and act as the main advancing mechanism for the material. The belts also serve to press in place the adhesive tape which is employed for securing together the meeting edges of the sections A and B. The belt 29 passes over a drum 30 of substantially the same size as the drums of the belt 17, and adapted to be rotated at the same speed. The lower run of the belt is parallel with the upper run of the belt 17 and passes beneath a series of rollers 31 which hold the two belts closely adjacent each other. The belt 29 passes over a second pulley 32, adjacent the discharge end of the folders, and this pulley is preferably mounted on swinging arms 33, so that the distance between it and the lower belt may be varied. The arms are preferably pivoted upon suitable standards 34 and may be locked in position by any suitable means. Intermediate the ends of the belt, the upper run may, if desired, engage with a belt-tightening pulley 35, serving to maintain the belt taut, and a similar belt-tightening pulley 36 may, if desired, be employed with the lower belt.

Disposed in any suitable position upon the machine, is a support 37 for a roll of tape E, and adjacent the roll is a suitable container 38 for paste, glue or other adhesive. The tape passes from the roll over a roller 39 immersed in the adhesive and passes thence to the outer surface of the folded material, so as to cover the meeting edges of the sections A and D after they leave the folder and as they pass beneath the belt 29. The belt 29 not only coöperates with the belt 17 to advance the material, but it also firmly presses the tape to the material, so that it will adhere thereto. As the folded and pasted material emerges from beneath the belt 29 at the pulley 30, it passes to the cutting mechanism which serves to subdivide it into sections of short tubes of the desired length. The cutting mechanism is preferably of the rotary type and includes a rotary cutter 40, having two oppositely-disposed cutting blades 41. Adjacent the pulley 19, and having its upper edge substantially in the plane of the upper surface of the belt 17, there is provided a stationary knife blade 42, adapted to coöperate with the movable blades 41 for subdividing the material. The cutter is adapted to rotate at constant speed, the length of the sections into which the material is cut being varied by varying the speed at which it is advanced through the machine. The machine is provided with a main drive shaft 43 adjacent the cutter and motion is transmitted from the drive shaft to the cutter through intermeshing gears 44 and 45, the former being on the drive shaft 43 and the latter being on the shaft 46 of the cutter.

For driving the advancing means from the drive shaft 43, I provide the mechanism shown in dotted lines in Fig. 7. This mechanism includes an arm 47 pivoted on the drive shaft 43 and having a series of gears 48, 49 and 50 mounted on stub shafts car-

ried by the arm. Concentric with the gear wheel 50 and mounted on the same shaft, I provide a pinion 51 adapted to be rigidly secured to the gear wheel 50 and adapted to mesh with a gear wheel 52 mounted on the same shaft as the pulley or drum 19. The arm is provided with a slot 53 and the frame of the machine is provided with a stud or bolt 54 extending out through said slot. By loosening the nut on the bolt 54, the arm may be swung about the shaft 43 as a center and the pinion 51 may be removed and replaced by a larger or smaller one to vary the relative rates of rotation of the gear wheel 52 and the drive shaft 43. The larger the pinon 51, the faster will the material be advanced in respect to the speed of rotation of the cutter and the longer will be the section.

During the cutting action, an appreciable length of time is required for the cutter to pass through the material and out of its path, so that the material may be advanced in readiness for the next cutter blade, but during this interval of time the belts are advancing the material continuously and the material in the machines commonly employed bulges up between the cutter and the drum. If the material does not straighten out again immediately after the cut is completed, the next section removed will be somewhat shorter than the last preceding one. Sometimes it will straighten out immediately and sometimes it fails to and the sections often vary considerably in length. In order to obviate this, I place the cutter closely adjacent the drum or pulley 19 and mount above the pulley a buffer or beater for straightening out the material. In the specific form shown this device comprises a rotatable member 55 polygonal in cross section and having secured to the sides thereof flexible wings or baffles 56. These extend out from one edge of each side and are so mounted that as the member rotates the free edges of the flexible wings or baffles strike or beat upon the upper surface of the material. The distance between the device hereinafter referred to as the "straightener" and the cutter is preferably less than the total length of the sections into which the material is to be subdivided. The straightener is mounted on a shaft 57 carried by swinging arms 58, so that its elevation in respect to the material may be varied, and is provided with a suitable arm 59 extending between adjusting screws, so as to hold it in a predetermined position. The end of the shaft carries a sprocket wheel to which a chain 60 conveys motion from a sprocket wheel 61 on the shaft 46 of the cutter. As the cutter blade 41 strikes the material, it interrupts the free lengthwise movement of the latter, and the material bulges up between the drum 30 and the straightener. As soon as the blade 41 passes out of the path of the material, so that it may advance again, the straightener which is rotated at far higher speed than the material is traveling, immediately forces the material forward to remove any bulge or curvature of the material between the straightener and the drum 30 and draws it taut. The distance between the straightener and the blade being less than the length of the section cut off from the material the curvature in this portion will have no effect upon the length of the section. Even though the distance between the straightener and the blade be greater than the length of the section, the curvature in this space would be so slight that the variation in length would not be appreciable.

By means of the mechanism above described, I insure the formation of cartons or wrappers having a definite and predetermined interior diagonal and also having a definite and predetermined length, the plate or bars 25 serving to insure the even meeting of the edges A and D, and the straightener or buffer serving to insure a uniform length of the sections. After the material leaves the machine, it may be opened up diagonally to form the carton or wrapper shown in Fig. 8.

By maintaining the speed of the cutter uniform and varying the speed at which the material advances in order to vary the length of the section, more advantageous results are obtained than if the advancement be uniform and the speed of the cutter be varied. The cutter works to best advantage when rotated at a certain predetermined speed and less efficiently if rotated at a higher or lower speed. The speed of the cutter may be held uniform at the point at which it operates most advantageously.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. In a machine for folding paper and the like, the combination of folders adapted to turn the side edges of the material over above the intermediate portion, a plate above the intermediate portion of the material and below the turn-over edges thereof and engaging with the material in the angle of each fold, said plate being of greatest width adjacent the discharge end of the folders and supported directly by the material at said end, and means for supporting the plate at the opposite end thereof independently of the material and preventing its longitudinal movement.

2. A machine of the class described, comprising means for folding a strip of paper or the like to bring the opposite edges adjacent each other, means for advancing the folded paper including parallel belts engaging with opposite sides of the folded material, and a

straightening member adjacent the delivery end of said advancing means and including a rotatable block polygonal in cross section and flexible wings or baffles for engagement with the material and rotatable at a rate of speed in excess of the speed of advancement of the material.

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

SAMUEL M. LANGSTON.

Witnesses:

ROBERT JENNETT,

LEONARDO J. LIST.