G. W. SWIFT, Jr.

MACHINE FOR FACING CORRUGATED PAPER.

APPLICATION FILED JULY 15, 1908.

917,503.

Patented Apr. 6, 1909.

2 SHEETS—SHEET 1.

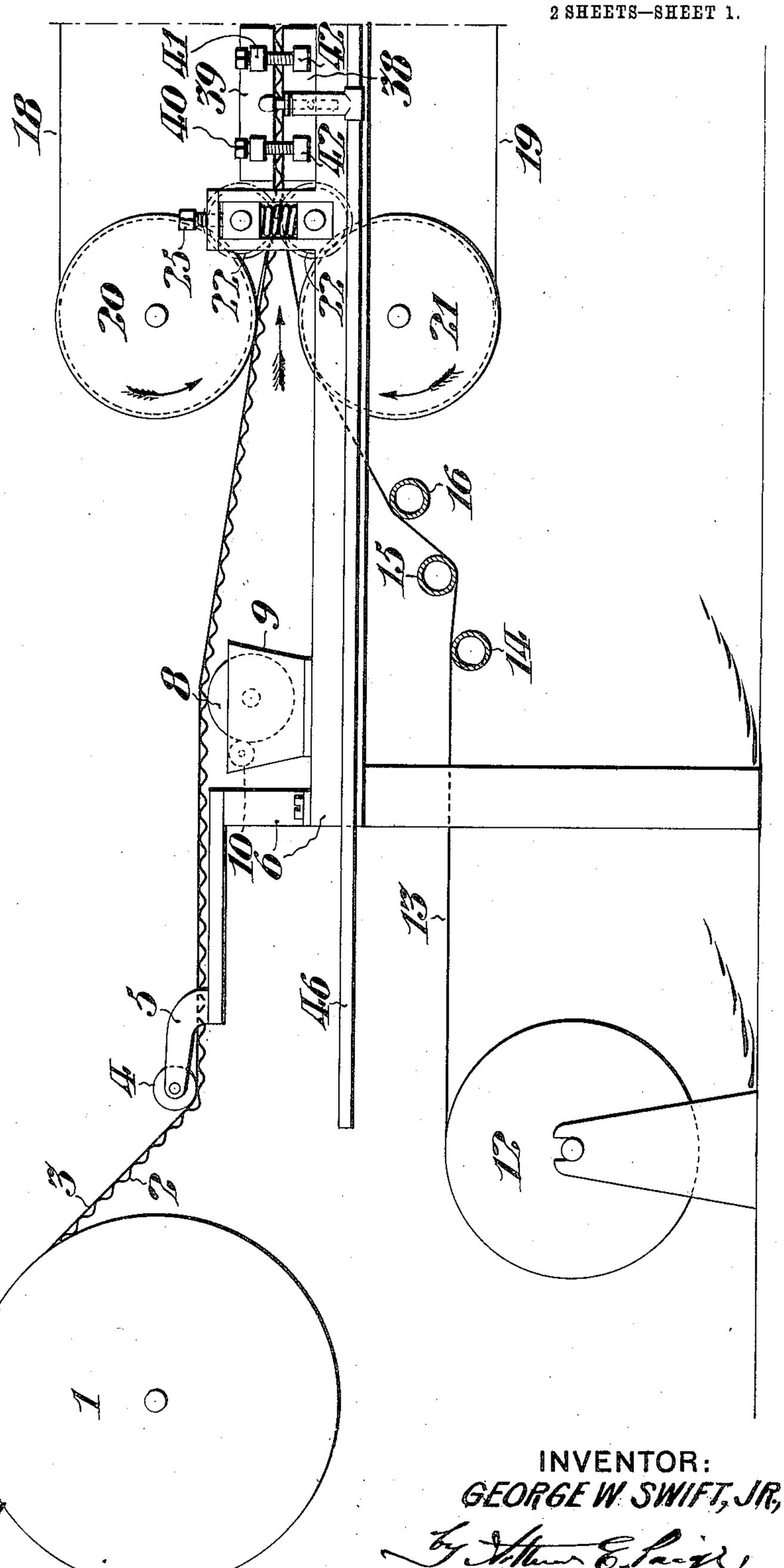

FIG. 1.

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2 SHEETS—SHEET 2.

FIG. II.

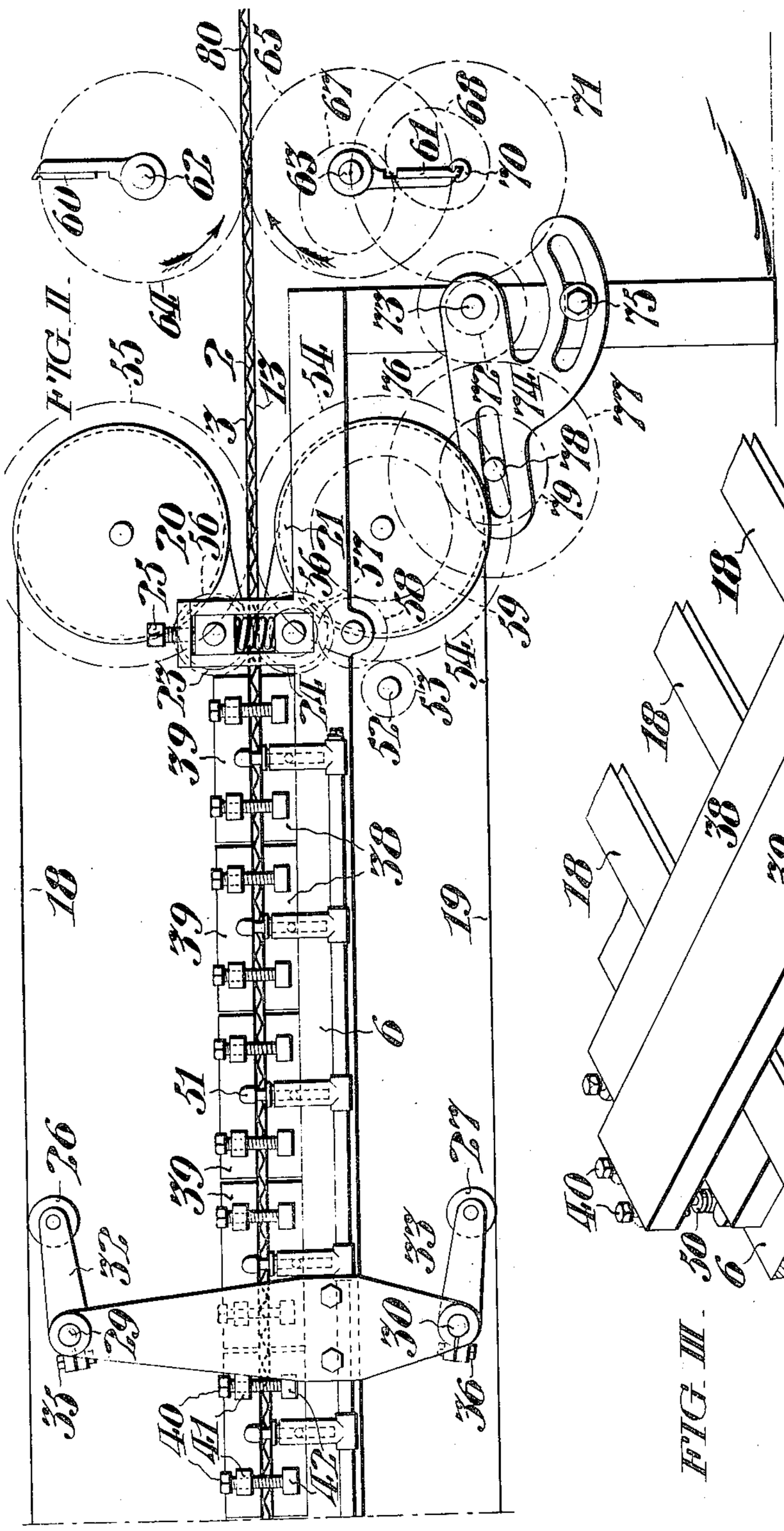
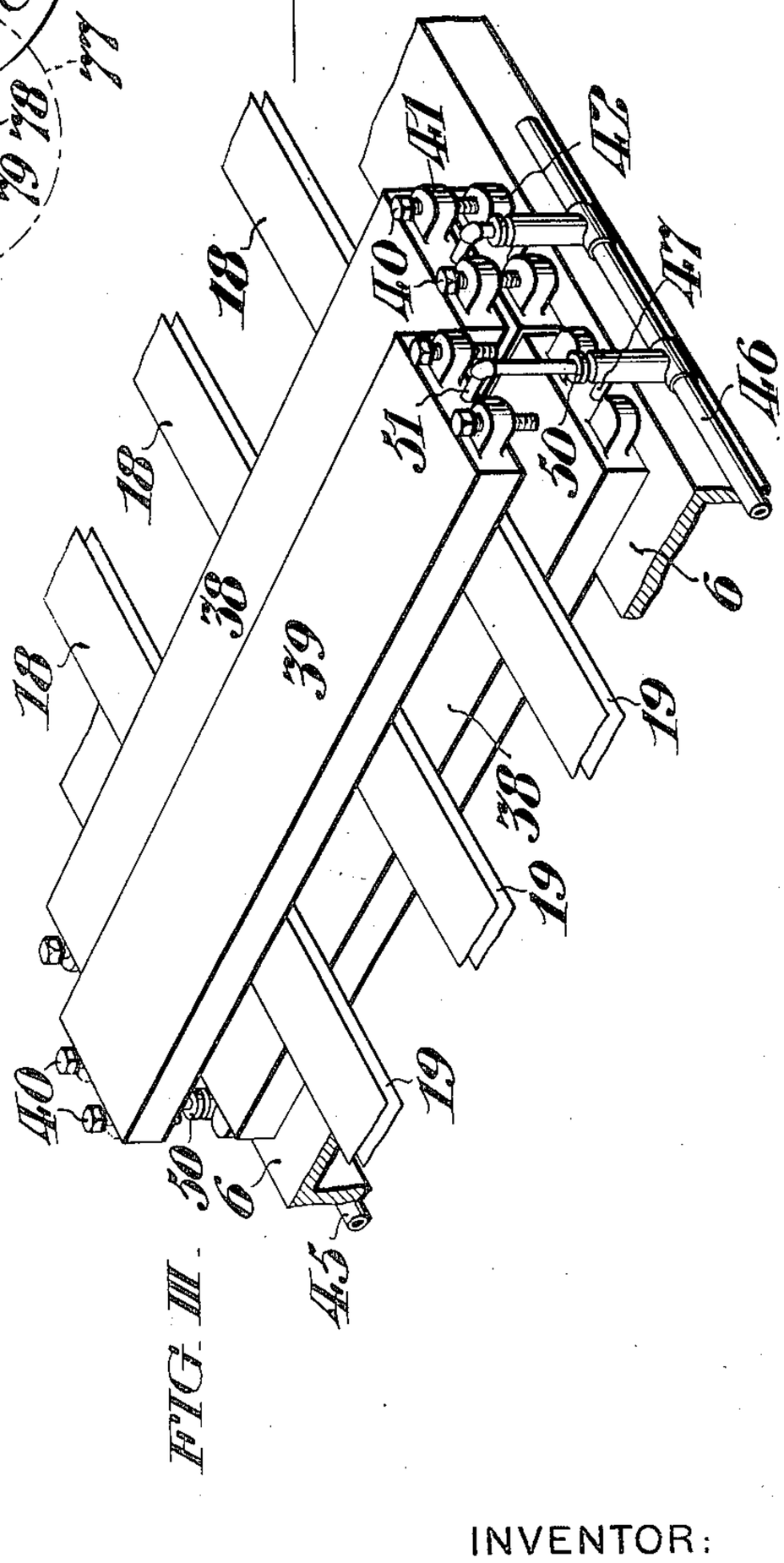


FIG. III.



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UNITED STATES PATENT OFFICE.

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MACHINE FOR FACING CORRUGATED PAPER.

No. 917,503. Specification of Letters Patent. Patented April 6, 1909.

Application filed July 15, 1908. Serial No. 443,604. REISSUED

To all whom it may concern:

Be it known that I, GEORGE W. SWIFT, Jr., of Bordentown, in the State of New Jersey, have invented a certain new and useful Improvement in Machines for Facing Corrugated Paper, whereof the following is a specification, reference being had to the accompanying drawings.

My invention relates to a machine which being supplied with a web of corrugated paper having plane paper webs upon opposite sides thereof and adhesive material at the contiguous surfaces of said webs, presses said plane webs into contact with said corrugated web and contemporaneously dries the same; thus producing a multiple web which is a plane faced cellular paper board.

The machine hereinafter described, comprises endless belts of flexible sheet metal having opposed runs between which the paper webs are fed; means for drying said webs comprising opposed stationary heaters embracing said belt runs; means arranged to feed the webs at a constant rate; shearing mechanism comprising rotary knives arranged to cut the final web sheets of different lengths; gearing operatively connecting said feeding mechanism with said shearing mechanism, changeable to vary the length of time required for a complete revolution of said knives; and, means comprising a pair of elliptical gears, arranged to make the peripheral speed of said knives momentarily equal to the speed of said web during the shearing operation, regardless of variation in the time of revolution of said knives. Moreover, I provide means to vary the space between said heaters in correspondence with the required thickness of the final multiple paper web, and means adjustably connecting said heaters with a steam supply, permitting such variation in the space between said heaters without disconnection of the steam conduits; such means comprising pipes extending from the upper heater in telescopic connection with pipes leading to the steam supply.

My invention comprises the various novel features of construction and arrangement hereinafter more definitely specified.

In the drawings: Figures I and II show complementary portions of a side elevation of a machine conveniently embodying my invention; said elevation being made in two views for convenience of illustration. Fig. III is a fragmentary perspective view showing one of the upper heaters raised from its normal position to afford access to the belts extending between the upper and lower heaters.

In said figures; 1 is a reel supporting a roll of corrugated paper web 2 which is wound with a plane paper web 3. Said two webs pass beneath the guide roller 4, conveniently supported in the brackets 5 extending from the machine frame 6. As shown in Fig. I, the corrugated paper web 2 passes in contact with the paste roll 8 which is mounted to rotate in the paste receptacle 9, which is provided with the doffer roll 10 and supported in a stationary position on said frame 6, and, said corrugated web 2 is thus coated with adhesive on its lower surface.

The reel 12, shown in Fig. I, carries a roll of plane paper web 13, which passes between the steam pipes 14, 15, and 16, so as to remove the curl from it before being brought into contact with the adhesive coated surface of said corrugated web 2. The opposed flexible sheet metal belts 18 and 19, are respectively supported on the drums 20 and 21 and their proximal runs pass between the pair of guide rolls 22, and the pair of feed rolls 23 and 24 which are so mounted in bearings on said frame 6, that the space between them, for the passage of the paper, may be adjustably varied by rotation of the screws 25. Said bolts 18 and 19 are maintained at the proper tension by the respective tightening rollers 26 and 27 which are respectively adjustable upon the studs 29 and 30 carried in rigid relation with said frame 6; such adjustment being conveniently effected by means of the arms 32 and 33 which have split hubs which may be tightened or loosened with respect to said studs 29 and 30 by means of the bolts 35 and 36. The proximal runs of said belts 18 and 19 pass between the opposed heaters which are conveniently formed of separable metal boxes 38 and 39, the former being maintained in stationary position on said frame 6 and the boxes 39 being vertically adjustable to vary the space between them and the boxes 38 by means of set screws 40 which extend through corresponding screw threaded sockets in the lugs 41, and bear upon the upper surfaces of the lugs 42.

Steam is supplied to and condensate withdrawn from said heaters 38 and 39, by means of the pipes 45 and 46 shown in Fig. III extending upon respectively opposite sides of

the frame 6 and conveniently supported in rigid relation with the latter. Said pipes have permanent branch connections 47 with the boxes 38, and have stuffing boxes 50 through which the branch connections 51 leading to the boxes 39 may be reciprocated without disconnection, so as to not only permit of such variation in the space between the upper and lower heaters as is necessitated by the differing thicknesses of the cellular board product of the machine, but also to permit the upper heaters 39 to be raised to an abnormal extent as shown in Fig. III so as to afford access to the space between the upper and lower heaters and the metallic belts extending between them, and thus permit the ready removal of any obstruction from said space.

It may be observed that by the arrangement above described, the opposed runs of the metallic belts 18 and 19, by and between which the paper webs are carried, may be heated to any desired degree independently of the other portions of the belts, and thus serve to distribute the heat rapidly and uniformly to said webs while maintaining the latter in predetermined assembled relation during their passage between the heaters 38 and 39, and, that the space between said belt runs determining the thickness of the plane faced cellular paper board product of the machine, may be adjustably varied by changing the relative position of the feed rolls 23 and 24, independently of the drums 20 and 21, which support and drive said belts.

In order to positively progress at constant speed said belts 18 and 19 and the cellular board formed between them; the main driving shaft 52 shown in Fig. II is provided with the driving gear 53 in mesh with the gear 54 on the drum 21; said gear 54 is meshed with the gear 55 on the drum 20; said feed rolls 23 and 24 are connected by the gears 56, and, said roll 24 has the gear 57 meshed with the gear 58 driven by the gear 59 carried by said drum 21. Said gears 56 have long teeth to permit variation of the space between them as above described.

As shown in Fig. II; the shearing mechanism comprises the opposite rotary knives 60 and 61 respectively carried by the shaft 62 and 63 and connected by the gears 64 and 65. Said shearing mechanism is operatively connected in variable relation with said driving shaft 52 and its gear 53 by the train of gearing comprising the elliptical gears 67 and 68, the former being on the shaft 63 of the knife 61 and the latter being on the shaft 70, and both being adjustable circumferentially on their shafts and having means to secure them in adjusted position. Said shaft 70 carries the gear 71 meshed with the gear 72 on the shaft 73 and the axis of the latter is the center of oscillation of the adjustable frame 74 which may be manually shifted to change the gearing, but is retained in a normally stationary position by the bolt 75 which engages the frame of the machine. Said shaft 73 carries the gear 76 meshed with the gear 77 on the shaft 78 carried by said frame 74, and, said shaft 78 is provided with the gear 79 meshed with the gear 59 on said drum 21. As above noted, said frame 74 and the gears carried thereby may be manually shifted to change the ratio of the gearing connecting the main driving shaft 52 with the shearing mechanism; for instance, said frame 74 may be turned on its center of oscillation co-incident with the shaft 73, to withdraw the gear 79 from engagement with the gear 59 and present the gear 77 in engagement with said gear 59, with the result that the shearing mechanism will be rotated slower than when the gears are connected as shown in Fig. II. As the speed of traverse of the webs forming the cellular board 80 is maintained constant as above described, the length of said board passed through the shearing mechanism during a single revolution of the latter will be greater, with the proposed change of gearing, and consequently the sheets cut from said board 80 will be longer than the sheets cut with the gearing connected as shown in Fig. II.

It may be observed that equal circular gears might be substituted for the elliptical gears above described if the shearing mechanism were always rotated at such speed that the length of the cellular board passed therethrough during a single revolution equaled the respective circumferences of the counterpart circles described by the complementary shearing radii of the knives 60 and 61; because, under such conditions, the speed of the knives at the instant of the shearing operation, as well as during the other part of their rotation, would equal the speed of traverse of said board and the latter would be cleanly cut. However, if while the speed of the webs is maintained constant, the shearing mechanism were caused to rotate faster, to cut sheets of less length than said described circumference, said knives would travel faster than said board at the instant of the shearing operation, and would tend to tear it, and, on the other hand, if the shearing mechanism were caused to rotate slower, to cut sheets of greater length than said circumference, the knives would travel slower than said board at the instant of the shearing operation and would tend to retard and crush it. Therefore, I include in the train of gearing to drive the shearing mechanism, the elliptical gears above described, which are circumferentially adjustable and may be secured in variable angular position on their respective shafts, so that, in accordance with such variations in the rate of rotation of said knives as are required to shear sheets of dif-

ferent lengths; said gears may be so set that the speed of the knives at the instant of each shearing operation shall be equal to the speed of traverse of said board, so as to cleanly cut the latter. In other words, it being characteristic of the machine above described that the webs are fed therethrough at a constant rate, by means of the frictional engagement of the metallic belts 18 and 19 between the feed rolls 23 and 24; the length of the sheets cut from the cellular board 80 is varied by varying the rate of rotation of the knives 60 and 61, and, to insure that the paper shall be sheared without tearing or crushing it, said knives are caused to move at the same speed as said webs while in engagement therewith, regardless of the time required for them to make a complete revolution, such momentary speed of the knives being determined by the adjusted angular position of the elliptical gears.

I do not desire to limit myself to the precise details of construction and arrangement above described, as it is obvious that various modificarions may be made therein without departing from the essential features of my invention as defined in the appended claims.

I claim:—

1. In a machine for facing corrugated paper, means arranged to progress a corrugated paper web with and between plane facing webs, including opposed endless belts of sheet metal respectively in contact with said facing webs; opposed heaters comprising plane faced boxes supplied with steam; mechanism supporting said heaters upon respectively opposite sides of said webs, with a predetermined space between them for the passage of said webs; mechanism whereby the space between said heaters may be varied; means arranged to connect the upper heater with a steam supply, permitting said heater to be raised and lowered and comprising a telescopic pipe connection; shearing mechanism for said webs, comprising opposed rotary knives connected by elliptical gearing; gearing variable to change the speed of rotation of said knives; and, means connecting said shearing mechanism to operate in definite relation with said belts.

2. In a machine for facing corrugated paper, means arranged to progress a corrugated paper web with and between plane facing webs, including opposed endless belts of sheet metal respectively in contact with said facing webs; opposed heaters upon opposite sides of said webs; means whereby the space between said heaters may be varied; shearing mechanism for said webs, comprising opposed rotary knives connected by elliptical gearing; gearing variable to change the speed of rotation of said knives; and means connecting said shearing mechanism to operate in definite relation with said belts.

3. In a machine for facing corrugated paper, means for progressing a corrugated paper web with plane facing webs upon opposite sides thereof, including opposed endless belts of sheet metal respectively in contact with said facing webs; opposed heaters upon opposite sides of said webs; shearing mechanism for said webs comprising opposed rotary knives connected by gearing; gearing variable to change the speed of rotation of said knives; and, means connecting said shearing mechanism to operate in definite relation with said belts.

4. In a machine for facing corrugated paper, means for progressing a corrugated paper web with plane facing webs upon opposite sides thereof; opposed heaters upon opposite sides of said webs; shearing mechanism for said webs comprising opposed rotary knives connected by elliptical gearing; gearing variable to change the speed of rotation of said knives; and, means connecting said shearing mechanism to operate in definite relation with said feeding mechanism and with said belts.

5. In a machine for facing corrugated paper; the combination with movable endless belts of flexible sheet metal having opposed runs; of means arranged to direct, between said opposed belt runs, a corrugated paper web, with and between plane facing webs; drums supporting said belts arranged to drive them in unison; feed rolls between which said belt runs pass, having means arranged to adjustably vary the space between said runs, whereby said webs are carried by and moved in unison with said belts; and means arranged to heat said belt runs independently of the other portions of the belts.

6. In a machine for facing corrugated paper, the combination with movable endless belts of flexible sheet metal having opposed runs; of means arranged to direct, between said opposed belt runs, a corrugated paper web, with and between plane facing webs; drums supporting said belts arranged to drive them in unison; feed rolls between which said belt runs pass, having means arranged to adjustably vary the space between said runs, whereby said webs are carried by and moved in unison with said belts; and means arranged to heat said belt runs independently of the other portions of the belts, comprising stationary plane faced steam boxes between which said belt runs extend.

7. In a machine for facing corrugated paper, the combination with movable endless belts of flexible sheet metal having opposed runs; of means arranged to direct, between said opposed belt runs, a corrugated paper web, with and between plane facing webs; drums supporting said belts arranged to drive them in unison; feed rolls between which said belt runs pass, having means arranged to adjustably vary the space between

said runs, whereby said webs are carried by and moved in unison with said belts; and means arranged to heat said belt runs independently of the other portions of the belts, comprising steam receptacles above and below said belt runs having telescopic connection with pipes leading to the steam supply.

8. In a machine for facing corrugated paper, the combination with movable endless belts of flexible sheet metal having opposed runs; of means arranged to direct, between said opposed belt runs, a corrugated paper web, with and between plane facing webs; drums supporting said belts arranged to drive them in unison; feed rolls between which said belt runs pass, having means arranged to adjustably vary the space between said runs, whereby said webs are carried by and moved in unison with said belts; means adjustable to vary the tension on said belts in correspondence with the adjustment of said feed rolls; and, means arranged to heat said belt runs independently of the other portions of the belts.

9. In a machine for facing corrugated paper, the combination with movable endless belts of flexible sheet metal having opposed runs; of means arranged to direct, between said opposed belt runs, a corrugated paper web, with and between plane facing webs; drums supporting said belts arranged to drive them in unison; feed rolls between which said belt runs pass, having means arranged to adjustably vary the space between said runs, whereby said webs are carried by and moved in unison with said belts; means adjustable to vary the tension on said belts in correspondence with the adjustment of said feed rolls, comprising independently adjustable rollers for the respective belts; and, means arranged to heat said belt runs independently of the other portions of the belts.

In testimony whereof, I have hereunto signed my name at Bordentown, New Jersey, this thirtieth day of June, 1908.

GEORGE W. SWIFT, JR.

Witnesses:
OSCAR G. CUNNINGHAM,
BLANCHE MCCAIN.