

No. 782,559.

PATENTED FEB. 14, 1905.

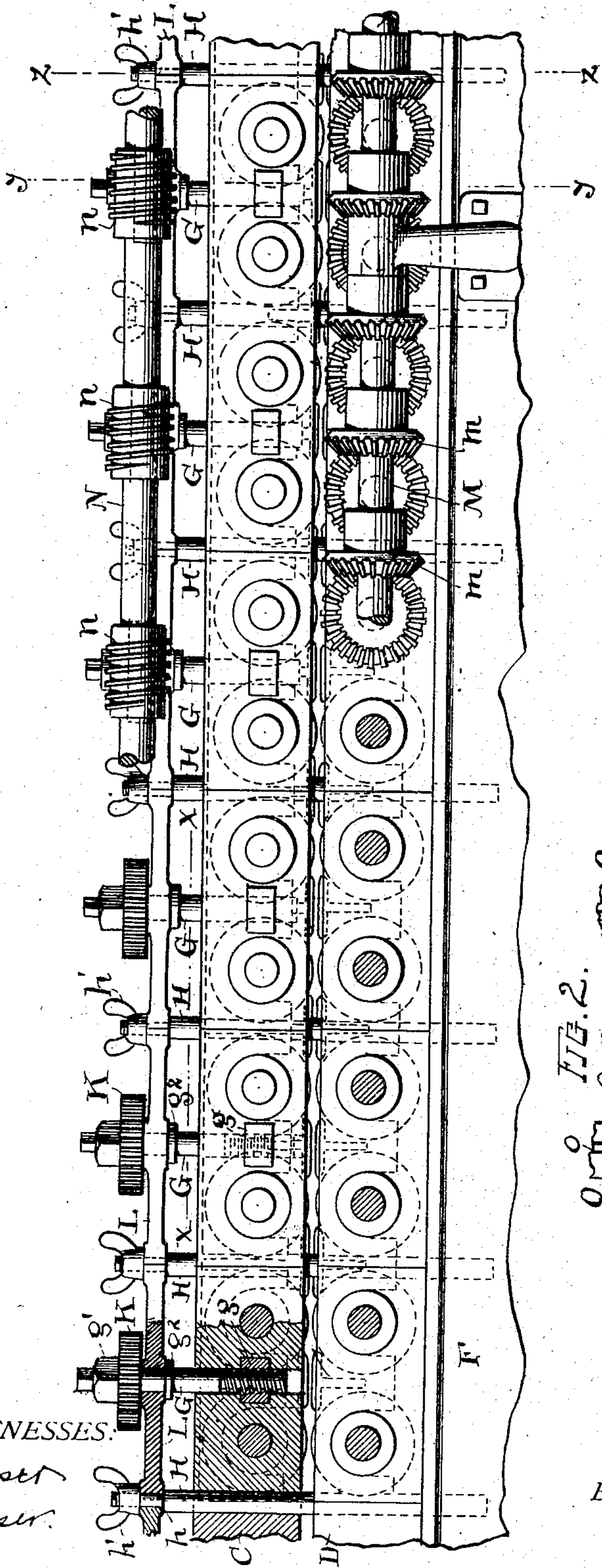
J. N. HAHN.

MACHINE FOR MAKING CORRUGATED PAPER BOARD.

APPLICATION FILED OCT. 28, 1904.

2 SHEETS—SHEET 1.

FIG. 1.



WITNESSES.

R. B. Moser  
A. M. Moser.

FIG. 3.

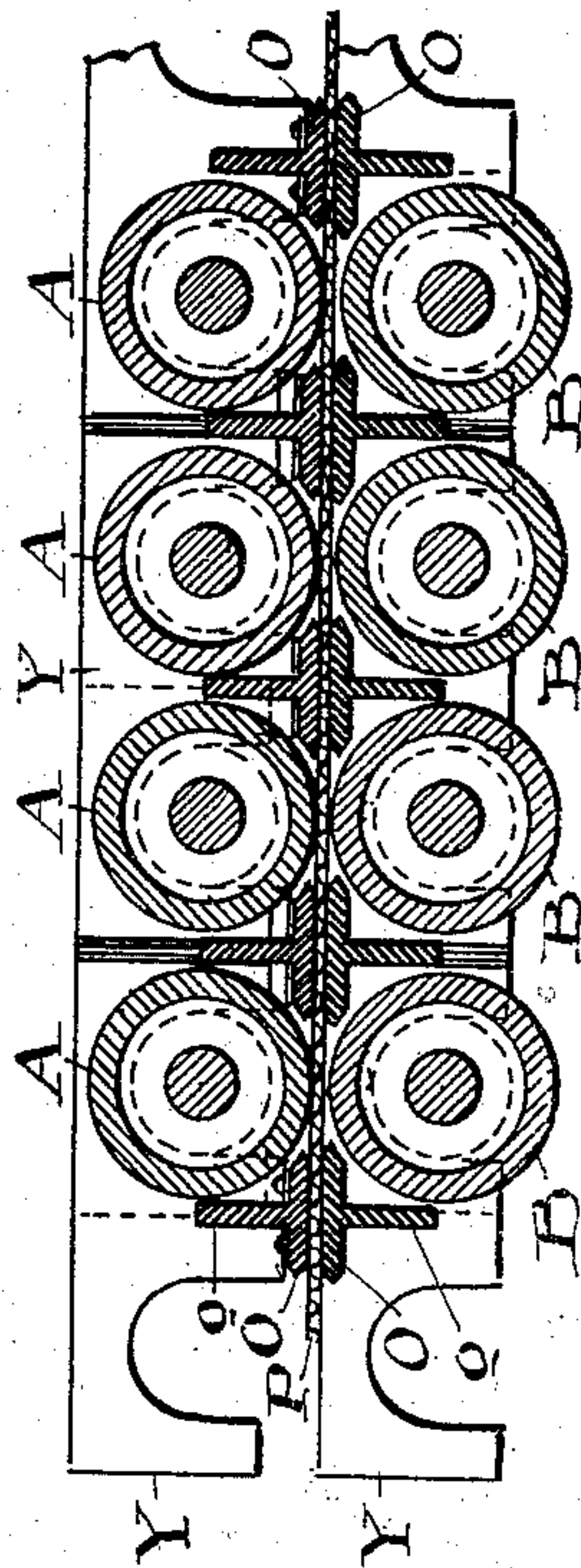
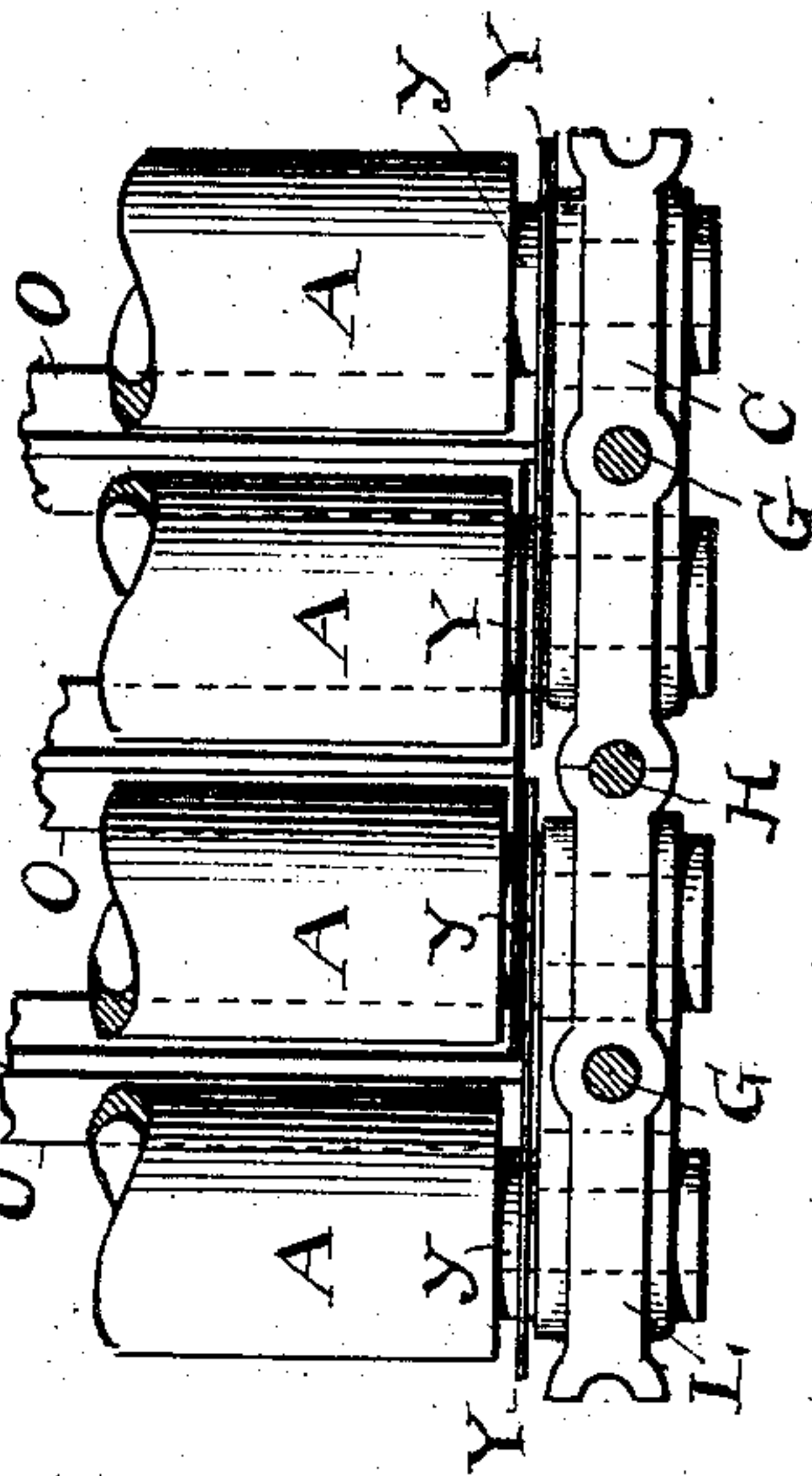


FIG. 2.



INVENTOR.

BY John N. Hahn  
H. J. Fisher  
ATTORNEY.

No. 782,559.

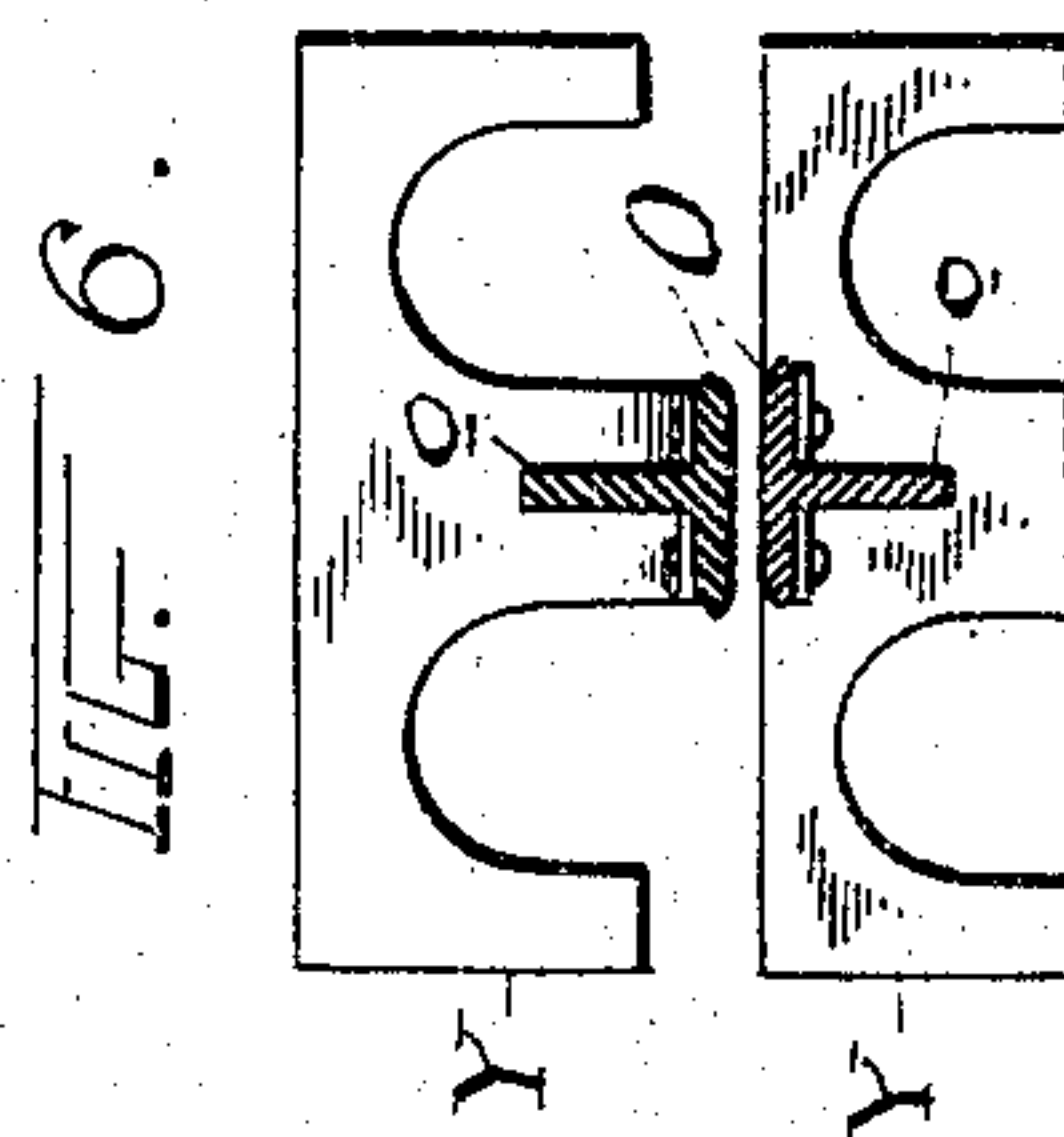
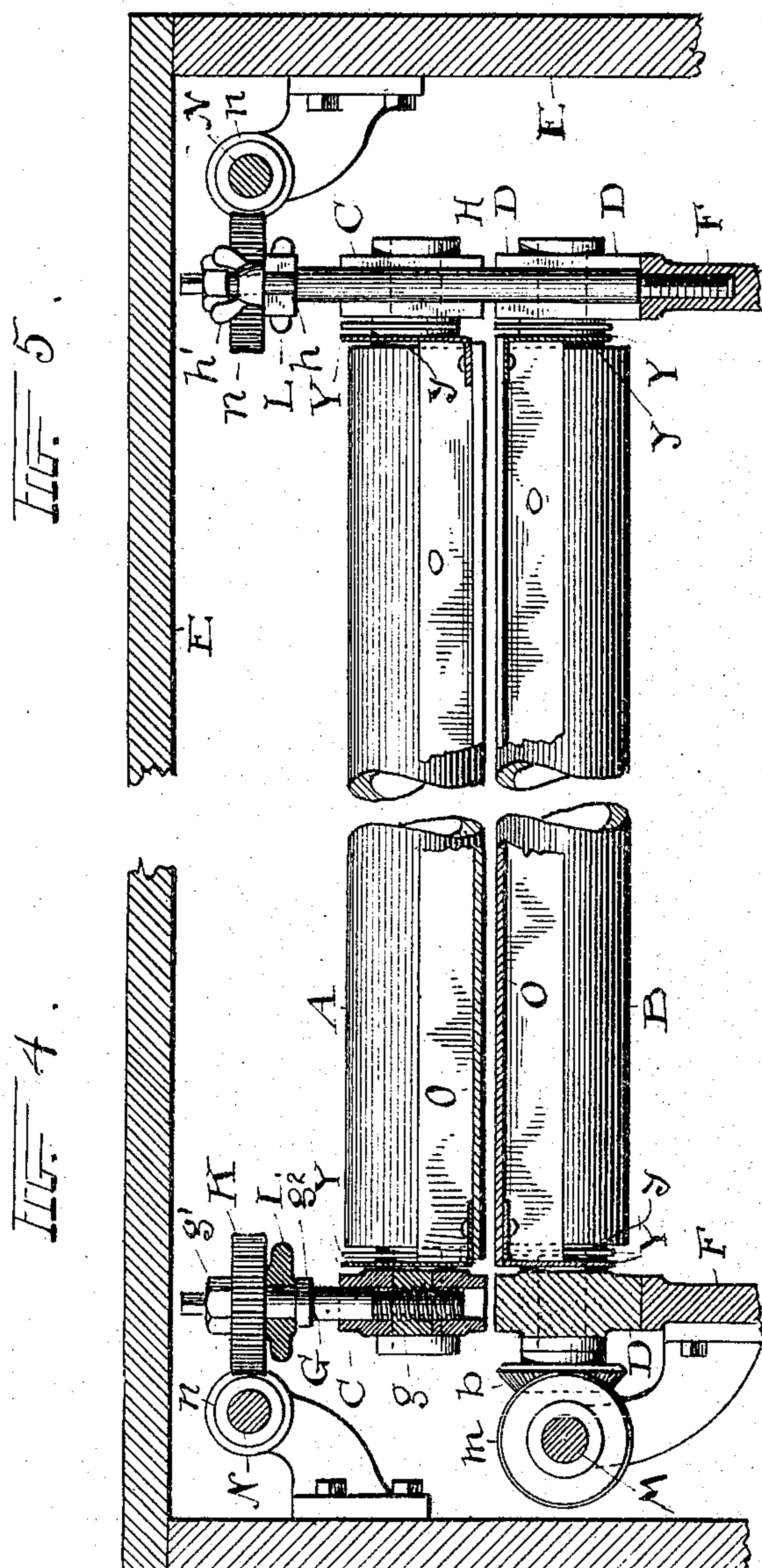
PATENTED FEB. 14, 1905.

J. N. HAHN.

# MACHINE FOR MAKING CORRUGATED PAPER BOARD.

APPLICATION FILED OCT. 28, 1904.

2 SHEETS—SHEET 2.



WITNESSES:

R. B. Moser

W. W. Mason

*INVENTOR.*

BY *John N. Hahn*  
*H J Fisher*  
ATTORNEY.

H J Fisher  
ATTORNEY.

*ATTORNEY.*



# UNITED STATES PATENT OFFICE.

JOHN N. HAHN, OF CLEVELAND, OHIO.

## MACHINE FOR MAKING CORRUGATED PAPER-BOARD.

SPECIFICATION forming part of Letters Patent No. 782,559, dated February 14, 1905.

Application filed October 28, 1904. Serial No. 230,311.

*To all whom it may concern:*

Be it known that I, JOHN N. HAHN, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Machines for Making Corrugated Paper-Board; and I do declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to a machine for making corrugated paper-board; and the invention consists in an improvement upon the machine embodied in my application for Letters Patent, filed June 16, 1904, Serial No. 212,845. In the said machine two series of ironing-rollers, one over the other, is employed; but there is nothing in the space between the rollers adapted to bear upon the paper-board and hold the sides thereof together while the operation of pressing and drying is in progress, and I have found that said sides are more or less liable to spring apart between the said rollers, especially before the paste thickens and becomes thoroughly adhesive, and this renders the work of the machine more or less defective. Obviously this must be so if the advance rollers are defeated in their purpose, because there is nothing between them to economize their service, and by reason of which there is more or less loosening or springing apart of the sheets between the rollers. Under these conditions it follows that the advance rollers did not accomplish as much work as they should have done, and this threw the work mostly on the rollers toward the rear end of the machine, where the space was too limited to do the work effectually. For these and other reasons I have supplemented the rollers with presser or ironing plates or members, filling the space between rollers and effectually holding the paper sheets together in their entire line of travel till the board is finished, all as hereinafter fully set forth.

In the accompanying drawings, Figure 1 is a side elevation, partly broken away, of my improved machine; and Fig. 2 is a plan view of a section or portion of the machine on a line corresponding to  $xx$ , Fig. 1. Fig. 3 is a

longitudinal sectional elevation of a group of four of the numerous upper and lower rolls or rollers and of the intermediate presser-plates or ironing members which cooperate with said rollers. Fig. 4 is a cross-section of the machine on a line corresponding to  $yy$ , Fig. 1; and Fig. 5 is a cross-section on a line corresponding to  $zz$ , Fig. 1, immediately in advance of Fig. 4. Fig. 6 is a cross-section of opposed presser-plates and the means for supporting the same; and Fig. 7 shows a modification of the presser-plate, which is hollow and adapted to be heated internally with steam or otherwise.

The paper-stock which comes to this machine is finished therein as a paper-board, as usual, and consists of an inner transversely-corrugated and pasted sheet and plain outer sheets on opposite sides adhered to the said transverse corrugations or ribs; but the product as such is not regarded as a new article.

The machine as shown comprises two series of rolls or rollers A and B, respectively, in parallel lines transversely of the machine, between which the paper P passes, and the said rolls are supported in a box or chamber E, which is adapted to be heated by steam-pipes or otherwise for drying the paper or paper-board as it passes through the machine, the heating being necessarily done while the rolls are at work. Usually this box or chamber is of a length varying, say, from thirty to fifty feet, a gradual drying of the paste being required along with a moderate and uniform pressing of the sides of the paper together.

Each series of rolls A and B has its own supports, the upper series having bearing-blocks C and the lower series bearing-blocks D. Each block preferably is made to support two rolls, and blocks D rest on ledges or supports F in or from the bottom of chamber E, and blocks C are suspended by screws G, engaging loose nuts  $g$ , housed in blocks C and by which the elevation of the upper rolls A and their relation to rolls B are controlled. Vertical stay-rods H are provided between the bearing-blocks successively, said blocks having semicircular grooves in their edges half-way overlapping said rods on opposite sides, and the said rods are screwed



down into the base-supports F, thus forming standards between each two upper and lower blocks successively, between which said blocks are held, but are removable above, and the upper block is adjustable, as above described. The upper blocks likewise are supported on or from these standards by means of yokes or bars L, which, like said blocks, have semi-circular grooves vertically in their ends resting on shoulders *h* on standard-rods H, the upper ends of said rods being reduced and threaded to receive nuts *h'* over and upon bars L. The entire weight of the upper rolls and their bearings is thus caused to rest on rods H through screws G, which have collars *g*<sup>2</sup> beneath said yokes at their middle, while the adjusting-pinions K are engaged on the upper ends of screws G outside of yoke L and are secured by nuts *g'* over said pinions on the threaded extremities of screws G. A lengthwise shaft N carries worms *n*, which engage pinions K, and thus all the upper rolls are adjusted or raised and lowered alike and at the same time to fix their working relation to the lower rolls. The lower rolls are driven positively and at the same rate of speed by shaft M and bevel-gears *m* thereon, while the upper rolls run or turn by contact with the paper which is carried along by the lower rolls.

Now coming to the more important feature of the invention as embodied in the presser or ironing plates or members O, it will be seen that said plates have flat smooth bearing-surfaces exposed to the paper P and of such width as to substantially span or bridge the space between the rolls at their bearings upon the paper. Obviously the space covered by said rolls in contact with the paper is comparatively small, while the intervening space is large, and hence the great importance of providing this space with means which will supplement the work of the rollers and hold together the sides of the paper in its transit from roll to roll until the entire board is uniformly pressed and completed. To these ends the said plates are provided with ribs or flanges *o* centrally on their backs, which give them rigidity, and are each fixed to yokes Y at their ends, adapted to hook or rest upon the hubs or bosses *y* of the respective bearing-blocks C and D. The lower yokes rest downward upon said bosses, and the upper yokes hang or hook upon the upper bosses and are raised and lowered with the rollers A. Successive plates engage on the same bosses one behind the other, and thus each plate is given its own independent support and their alinement is with the rolls with which they work.

The form of presser or ironing plate or member shown in Figs. 3 and 6 is solid and proportionately light; but the modification shown in Fig. 7 is hollow, and said plate or member O' may be filled with steam or heat-

ed air or the like to apply the heat directly to the paper-board.

What I claim is—

1. In a paper-board-making machine, a series of presser-rollers and a series of presser-plates between the rollers. 70

2. In a paper-board-making machine, two parallel series of rollers between which the board passes and independent presser-plates between said rollers. 75

3. The drying-chamber and the rollers therein and oppositely-arranged presser-plates between said rollers having separate end supports.

4. The drying-chamber and the two series of rollers therein, presser-plates between said rollers and means for raising and lowering the upper rollers and presser-plates together, 80

5. The machine substantially as described having two parallel series of rollers horizontally, presser-plates between the rollers of each series, vertically-adjustable bearings for the upper series of rollers and supports for the upper series of presser-plates engaged upon said bearings. 85 90

6. In a paper-board-making machine, a lower series of rollers and power connections to rotate the same, an upper series of rollers and means to raise and lower the entire series simultaneously, and presser-plates between said rollers. 95

7. In a paper-board-making machine, two parallel series of rollers and two series of independent presser-plates between said rollers, bearings for said rollers one over the other and vertical stays for said bearings, the said presser-plates supported by said bearings. 100

8. In a paper-board-making machine, upper and lower series of rollers and a series of bearings at each end for said rollers, vertical stays on which said bearings are engaged edgewise and means to suspend the upper series of bearings from said stays. 105

9. In a paper-board-making machine, upper and lower presser-rollers and bearings therefor one over the other, a series of vertical stays confining said bearings, cross-bars on the top of said stays and means suspending the upper series of said bearings centrally from said cross-bars. 110 115

10. In a paper-board-making machine, a lower series of rolls and an upper series of rolls, bearings for the upper rolls and vertical stays on which said bearings are slidably engaged, cross-pieces at the tops of said stays and screws supported therein and engaging said bearings and adapted to adjust the bearings. 120

11. In a paper-board-making machine, a series of lower rollers and mechanism to drive said rollers uniformly and simultaneously, in combination with a series of upper rollers and means to raise and lower the same uniformly and simultaneously. 125

12. In a paper-board-making machine, a 130

series of lower power-driven rollers, in combination with a series of suspended upper rollers, and means to simultaneously raise and lower said upper rollers.

5 13. In a paper-board-making machine, a series of lower power-driven rollers and a series of upper rollers and presser-plates between the same, means suspending said upper rollers

and presser-plates and means to raise and lower the same together. 10

In testimony whereof I sign this specification in the presence of two witnesses.

JOHN N. HAHN.

Witnesses:

C. A. SELL,

R. B. MOSER.