A. R. BOLES.

PAPER MOLDING MACHINE.

APPLICATION FILED MAY 12, 1919.

1,367,116.

Patented Feb. 1, 1921.

4 SHEETS—SHEET 1.

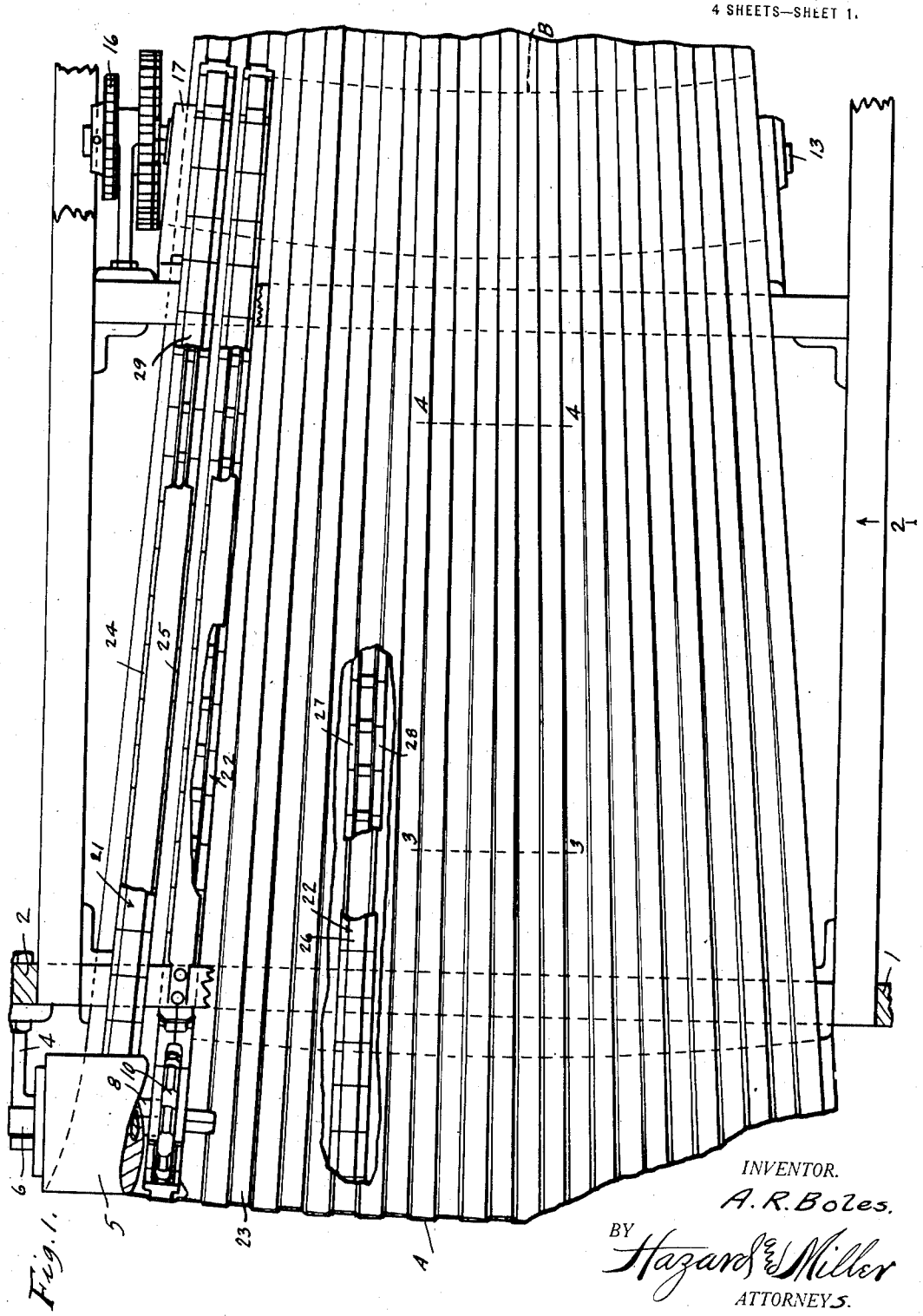


Fig. 1.

INVENTOR.

A. R. Boles.

BY Hazard & Miller

ATTORNEYS.

A. R. BOLES.

PAPER MOLDING MACHINE.

APPLICATION FILED MAY 12, 1919.

1,367,116.

Patented Feb. 1, 1921.

4 SHEETS—SHEET 2.

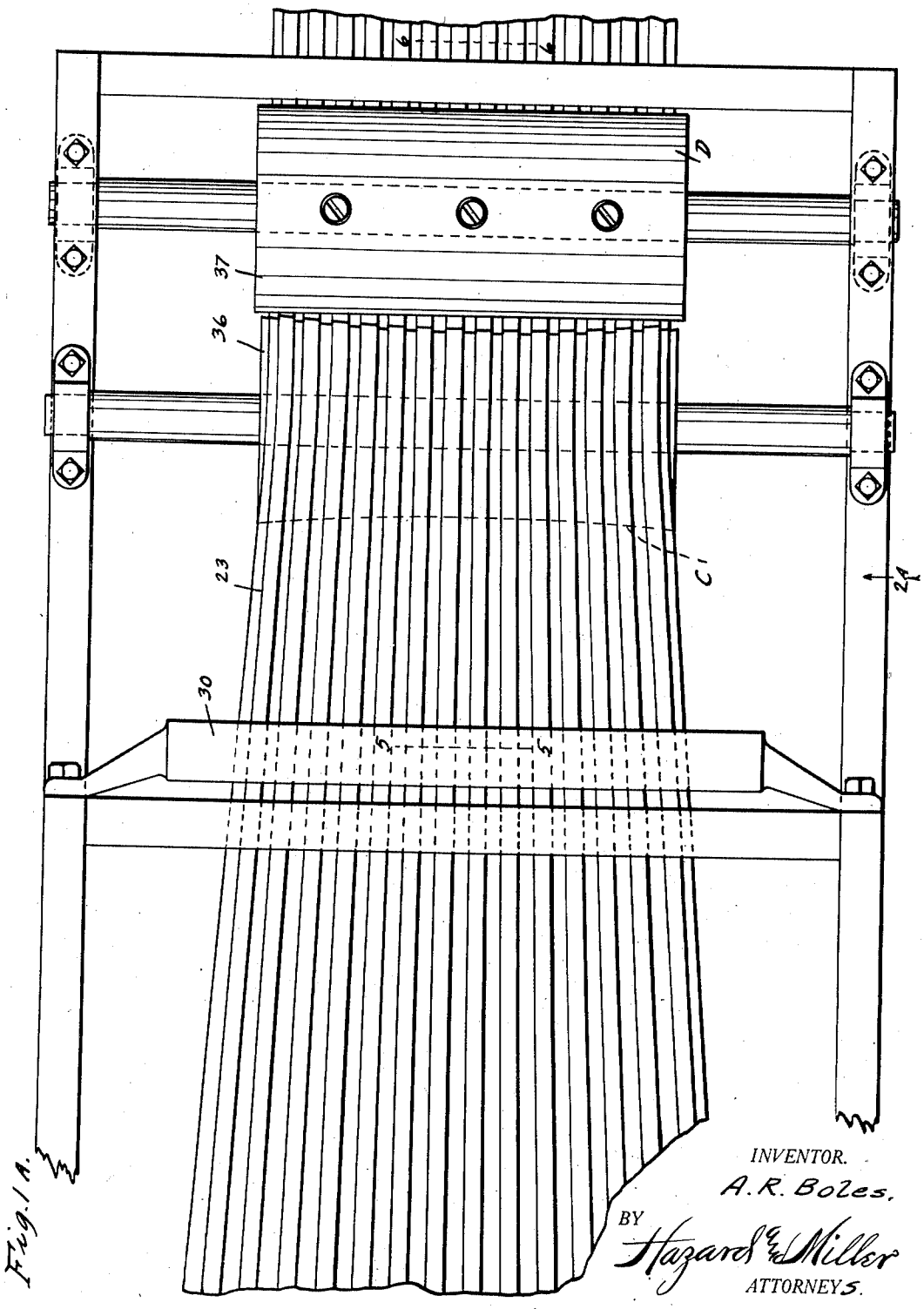


Fig. 1 A.

INVENTOR.
A. R. Boles.
BY Hazard & Miller
ATTORNEYS.

A. R. BOLES.

PAPER MOLDING MACHINE.

APPLICATION FILED MAY 12, 1919.

1,367,116.

Patented Feb. 1, 1921.

4 SHEETS—SHEET 3.

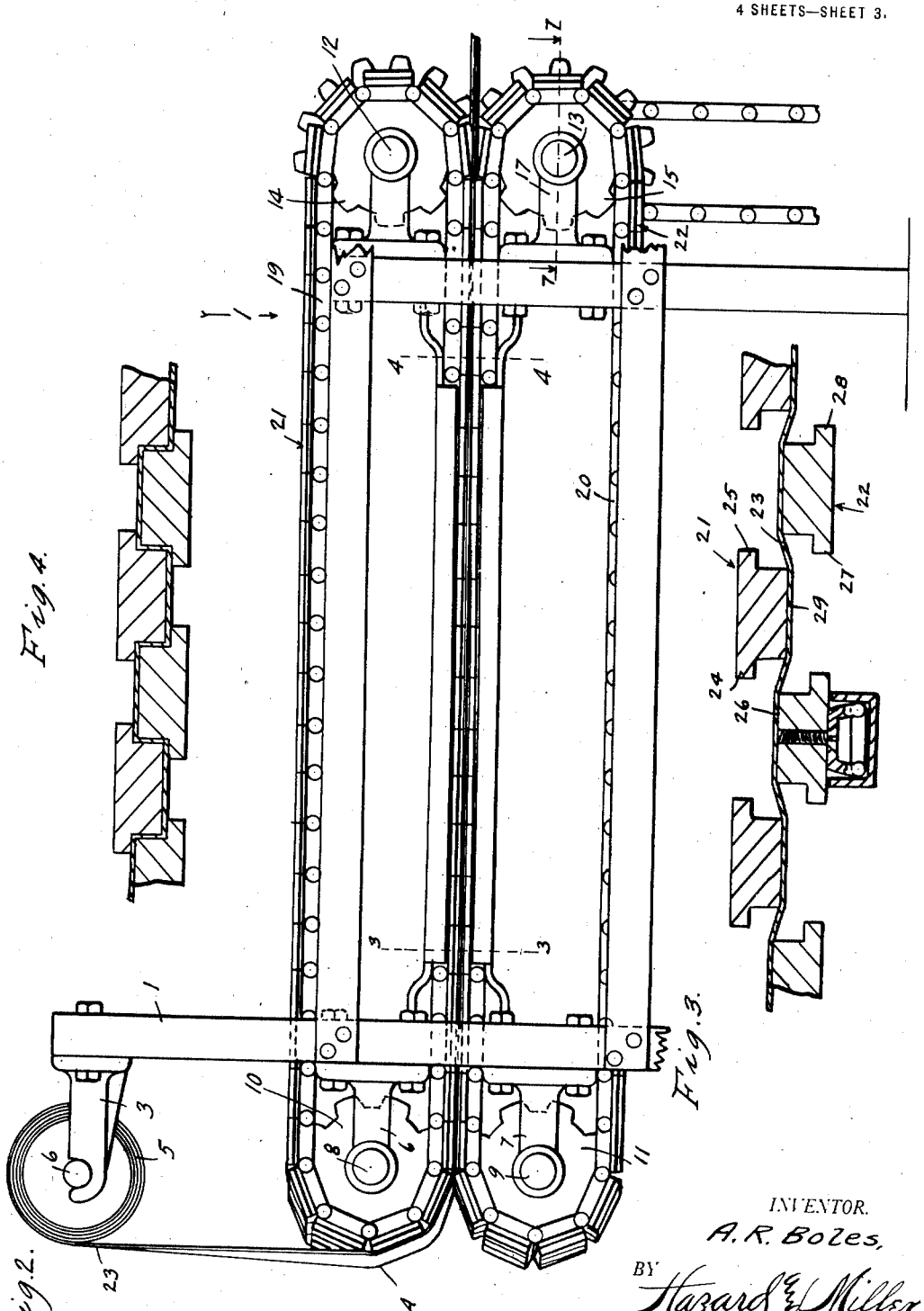


Fig. 4.

Fig. 3.

Fig. 2.

INVENTOR.
A. R. Boles,
BY
Hazard & Miller
ATTORNEYS.

A. R. BOLES.

PAPER MOLDING MACHINE.

APPLICATION FILED MAY 12, 1919.

1,367,116.

Patented Feb. 1, 1921.

4 SHEETS—SHEET 4.

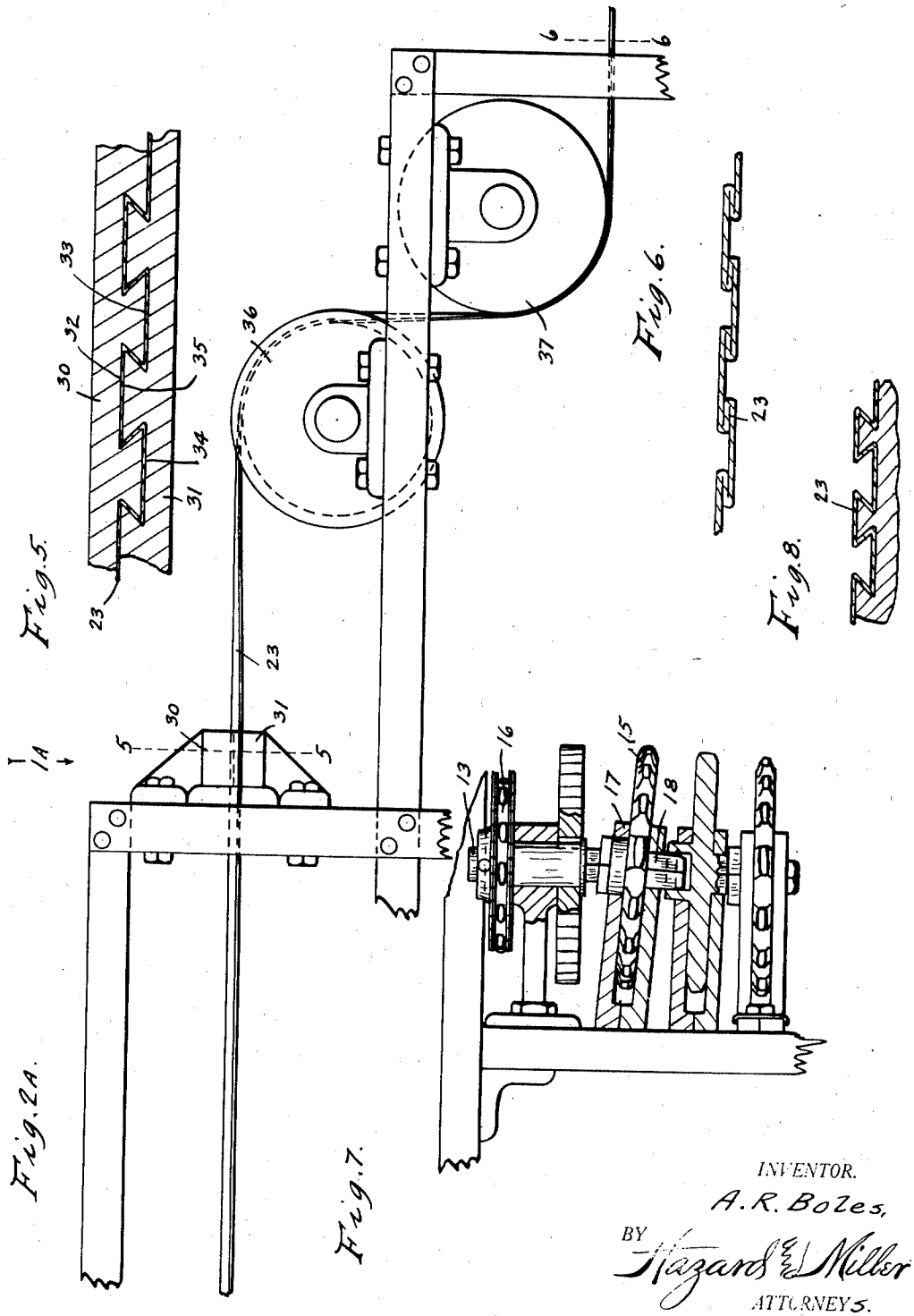


Fig. 5.

Fig. 6.

Fig. 8.

Fig. 2A.

Fig. 7.

INVENTOR.

A. R. Boles,

BY Hazard & Miller

ATTORNEYS.

UNITED STATES PATENT OFFICE.

ALONZO R. BOLES, OF HOLLYWOOD, CALIFORNIA.

PAPER-MOLDING MACHINE.

1,367,116. Specification of Letters Patent. Patented Feb. 1, 1921.

Application filed May 12, 1919. Serial No. 296,715.

To all whom it may concern:

Be it known that I, ALONZO R. BOLES, a citizen of the United States, residing at Hollywood, in the county of Los Angeles and State of California, have invented new and useful Improvements in Paper-Molding Machines, of which the following is a specification.

My object is to make a machine for molding paper to be used in the manufacture of plaster board, and my invention consists of the novel features herein shown, described and claimed.

Figures 1 and 1A together form a top plan view of a paper molding machine embodying the principles of my invention and showing the paper in the machine, parts being broken away and shown in section, the view being taken looking in the direction indicated by the arrows 1 in Fig. 2 and 1A in Fig. 2A.

Figs. 2 and 2A together form a side elevation looking in the direction indicated by the arrows 2 in Fig. 1 and 2A in Fig. 1A, parts being broken away and shown in section.

Fig. 3 is an enlarged fragmentary sectional detail on the line 3—3 of Figs. 1 and 2.

Fig. 4 is an enlarged fragmentary sectional detail on the line 4—4 of Figs. 1 and 2.

Fig. 5 is an enlarged fragmentary vertical cross sectional detail on the line 5—5 of Figs. 1A and 2A.

Fig. 6 is an enlarged fragmentary cross section through the paper and taken on the line 6—6 of Figs. 1A and 2A.

Fig. 7 is an enlarged fragmentary sectional detail on the line 7—7 of Fig. 1 and at the farther side of the machine.

Fig. 8 is a fragmentary cross section of the plaster board of which the molded paper forms a part.

The frame has posts 1 and 2 rigidly mounted at opposite sides of the front end, brackets 3 and 4 extend forwardly from the upper ends of the posts 1 and 2, and the paper roll 5 has an arbor 6 rotatably mounted in the forward ends of the brackets 3 and 4. Bearing brackets 6 and 7 extend forwardly from the post 1, and similar bearing brackets extend forwardly from the post 2. Flexible shafts 8 and 9 are mounted in the bearing brackets 6 and 7, a plurality of sprocket wheels 10 are mounted upon the shaft 8, and a plurality of similar sprocket wheels 11 are mounted upon the shaft 9. A flexible shaft 12 is mounted across the center of the machine in line with the shaft 8, and a second flexible shaft 13 is mounted in vertical alinement with the shaft 12 and in horizontal alinement with the shaft 9. Sprockets 14 are mounted upon the shaft 12 in line with the sprockets 10, and sprockets 15 are mounted upon the shaft 13 in line with the sprockets 11. A driving sprocket 16 is connected to the shaft 13.

Referring to Fig. 7, the shaft 13 intermediate of its ends is mounted in a plurality of bearings 17, and the sprockets 15 have stub shaft sections 18, said sections 18 being rigid with the sprockets and the sections fitting together like a tumbling rod, so that the sprockets 15 are slightly inclined from parallel planes. The shaft 12 and sprockets 14 are made up in the same way as the shaft 13 and sprockets 15. The flexible shafts 8 and 9 and the sprocket wheels 10 and 11 are constructed in the same manner as the shaft 13 and the sprockets 15 and shaft 12 and sprockets 14.

Sprocket chains 19 connect the sprockets 10 and 14, and similar chains 20 connect the sprockets 11 and 15. The chains 19 carry forming pads 21, and the chains 20 carry forming pads 22. The forming pads 21 and 22 are rectangular in plan and T-shaped in cross section, as shown in Figs. 3 and 4. At, or near the sprockets 10 and 11 the chains 19 and 20 are arranged alternately and spaced apart and staggered, so that the pads 21 are in planes between the pads 22, and the paper sheet 23 coming from the roll 5 passes between the pads 21 and the pads 22 in a flat condition. The sprockets 14 and 15 are closer together upon the shafts and the shafts 12 and 13 are closer together than the sprockets 10 and 11 and the shafts 8 and 9, so that as the paper 23 passes from between the sprockets 10 and 11 toward the sprockets 14 and 15 the pads 21 and 22 move toward each other both horizontally and vertically so as to progressively crimp or corrugate the paper 23 from its flat condition to the desired form.

In Fig. 3 the process of bending the paper has progressed slightly; while in Fig. 4 the paper is bent to a zigzag or channel form. The lips 24 and 25 upon the pads 21 are in opposition to the faces 26 of the pads 22, and the lips 27 and 28 of the pads 22 are

in opposition to the faces 29 of the pads 21, so that when the pads come together, as in Fig. 4, the paper is firmly pressed to make right angled bends without any possibility of the pads intermeshing too far and tearing the paper.

Some distance behind the shafts 12 and 13 the forming plates 30 and 31 are mounted. The plate 30 has dovetail slots 32 and dovetails 33 between the slots, and the plate 31 has dovetail slots 32 and dovetails 35 between the slots. The plates are put together endwise of the slots, so that the dovetails 33 fit in the slots 34, and the dovetails 35 fit the slots 32 with sufficient space between the parts for the paper 29 to pass, and the paper is drawn through the plates, thus changing the right angle channel shape shown in Fig. 4 to the reversely dovetail shape shown in Fig. 5. From the forming plates 30 and 31 the paper 29 is drawn over a roller 36 and under a roller 37, thereby pressing the paper from the shape shown in Fig. 5 to the shape shown in Fig. 6. From the roller 37 the paper passes the plaster board machine and plaster is applied to produce the plaster board shown in Fig. 8.

Especial attention is called to the fact that the shafts 8 and 9 are bowed forwardly when seen in plan, as in Fig. 1, to make the crown shape A, as required to make the straight even pull on the entire width of the paper with the lines of the plait converging to the concave lines B of the shafts 12 and 13. The crowning of the shafts 8 and 9 and the concaving of the shafts 12 and 13 is produced by the joints in the shafts and is necessary to avoid tearing the paper. The roller 36 is concaved upon the lines C and as the paper passes over this roller it assumes its narrowest form and passes under the straight roller D, and from the straight roller D the lines of the grooves and plaits in the paper are parallel.

Thus I have produced a machine for molding paper to be used in the manufacture of plaster board which will continuously and progressively mold or fold the paper longitudinally as required to plait the paper and as required to produce plaster board having dovetails projecting from one side.

Various changes may be made without departing from the spirit of my invention as claimed.

I claim:

1. In a paper molding machine, the combination of an upper series of traveling converging sprocket chains, a similar lower series of chains alternately spaced with reference to said first mentioned chains, alternately opposed channel forming pads on said chains, means to actuate said chains to converge and coöperate with each other in their direction of travel, dove-tail forming means adjacent the coöperating ends of said chains, and flattening means adjacent said dove-tail forming means.

2. In a paper molding machine the combination of upper and lower sets of converging chains inclined with reference to each other to alternately converge and coöperate in their direction of travel, alternately opposed channel forming pads on said chains arranged to press the paper into substantially alternate channels and ribs, means to actuate said chains, means adjacent the coöperating ends of said chains to form the channeled product into a shape substantially dove-tail in cross section, means adjacent said last mentioned means to substantially flatten the dove-tailed production.

3. In a paper molding machine, the combination of upper and lower sets of traveling converging chains spaced apart at their receiving ends and alternately arranged and inclined with reference to each other to converge and coöperate at their delivery ends, alternately opposed channel forming pads on said chains arranged to progressively coöperate and press the paper into substantially rectangular corrugations, means to actuate said chains, means forward of the delivery ends of said chains to form the corrugated product into a substantially dove-tail configuration, a concave roller forward of said last mentioned means and a straight roller forward of said concave roller to substantially flatten the dove-tailed product.

4. In a paper molding machine, the combination of upper and lower sets of traveling converging chains spaced apart at their receiving ends and alternately arranged and inclined with reference to each other to converge and coöperate at their delivery ends, alternately opposed channel forming means on said chains arranged to progressively coöperate to press the paper into substantially rectangular corrugations, said means comprising rectangular blocks substantially T-shaped in cross section and arranged to alternately approach each other in opposed relation, means to actuate said chains, means forward of the delivery ends of said chains to form the corrugated product into a substantially dove-tail configuration, a concave roller forward of said last mentioned means and a straight roller forward of said concave roller to flatten the dove-tailed product.

5. A machine for molding paper for the manufacture of plaster board comprising an upper series of sprocket chains, a lower series of sprocket chains, forming pads upon the upper series of sprocket chains, second forming pads upon the lower series of sprocket chains, the first and second pads moving in opposition to each other so as

to take a flat sheet of paper and progressively mold the paper to form opposite channels, forming plates through which the channeled paper passes to produce opposite dovetails, and rollers around which the paper passes to flatten the paper to form plaits.

6. In a machine for molding paper for the manufacture of plaster board, an upper series of sprocket chains carrying forming pads, and a lower series of sprocket chains carrying forming pads in opposition to the upper series, the sprocket chains being mounted upon flexible shafts, the chains being wider apart vertically and transversely at their receiving ends than at their delivery ends so as to take a flat sheet of paper and progressively mold the paper into opposite channels.

7. In a machine for molding paper for the manufacture of plaster board, an upper series of sprocket chains carrying forming pads, and a lower series of sprocket chains carrying forming pads in opposition to the upper series, the sprocket chains being mounted upon flexible shafts, the shafts at the receiving ends of the chains being bowed outwardly to produce a crown shape, and the shafts at the outer ends of the sprocket chains being correspondingly bowed to produce a concave shape, the chains being wider apart vertically and transversely at their receiving ends than at their delivery ends, and there being a concave roller beyond the delivery ends of the chains and a straight roller beyond the concave roller so as to take a flat sheet of paper and progressively mold the paper into opposite channels.

In testimony whereof I have signed my name to this specification.

ALONZO R. BOLES.