

J. FERLA.

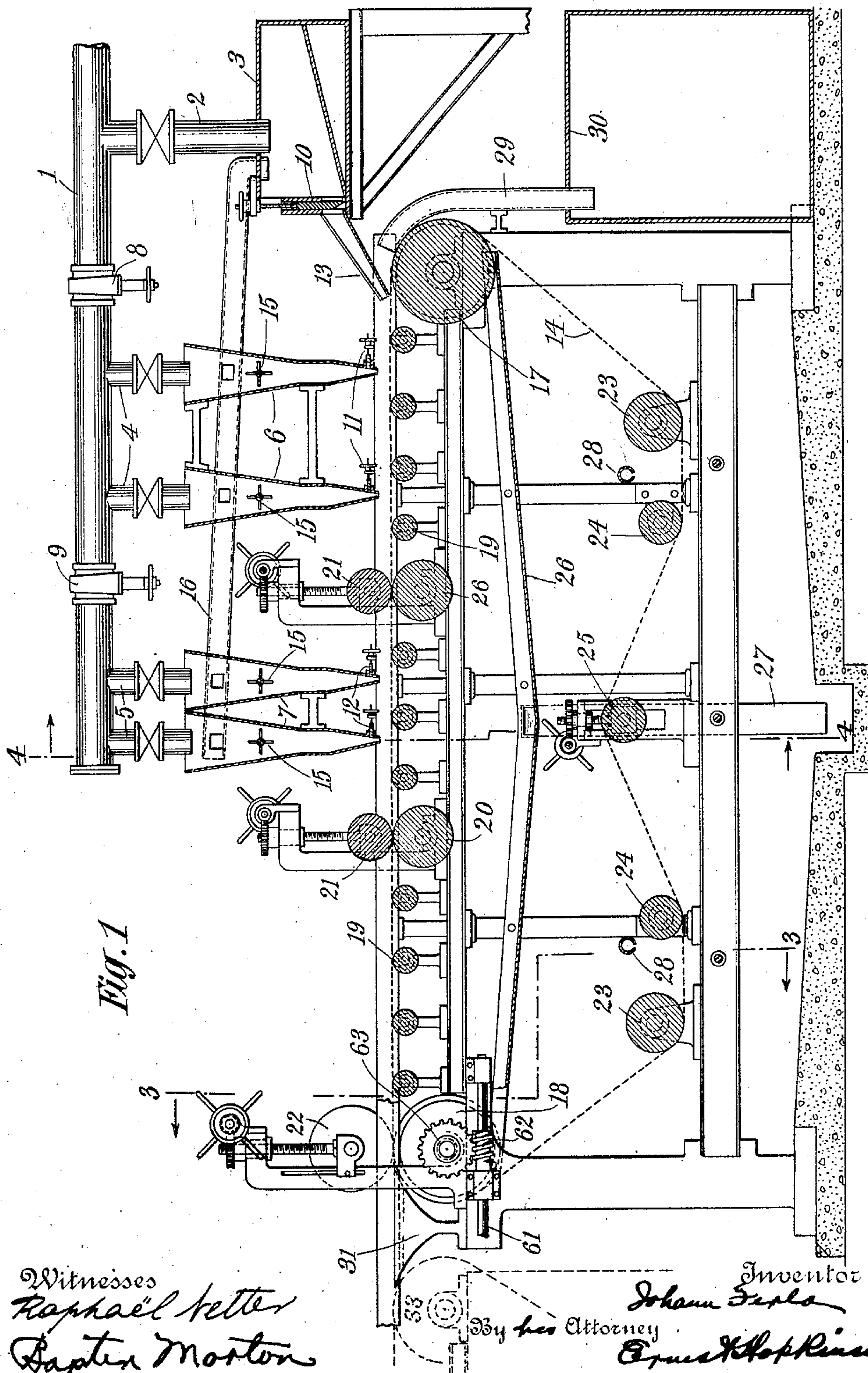
APPARATUS FOR MANUFACTURE OF COMPOSITION BOARD.

APPLICATION FILED MAY 29, 1907.

Patented Nov. 16, 1909.

3 SHEETS—SHEET 1.

940,449.



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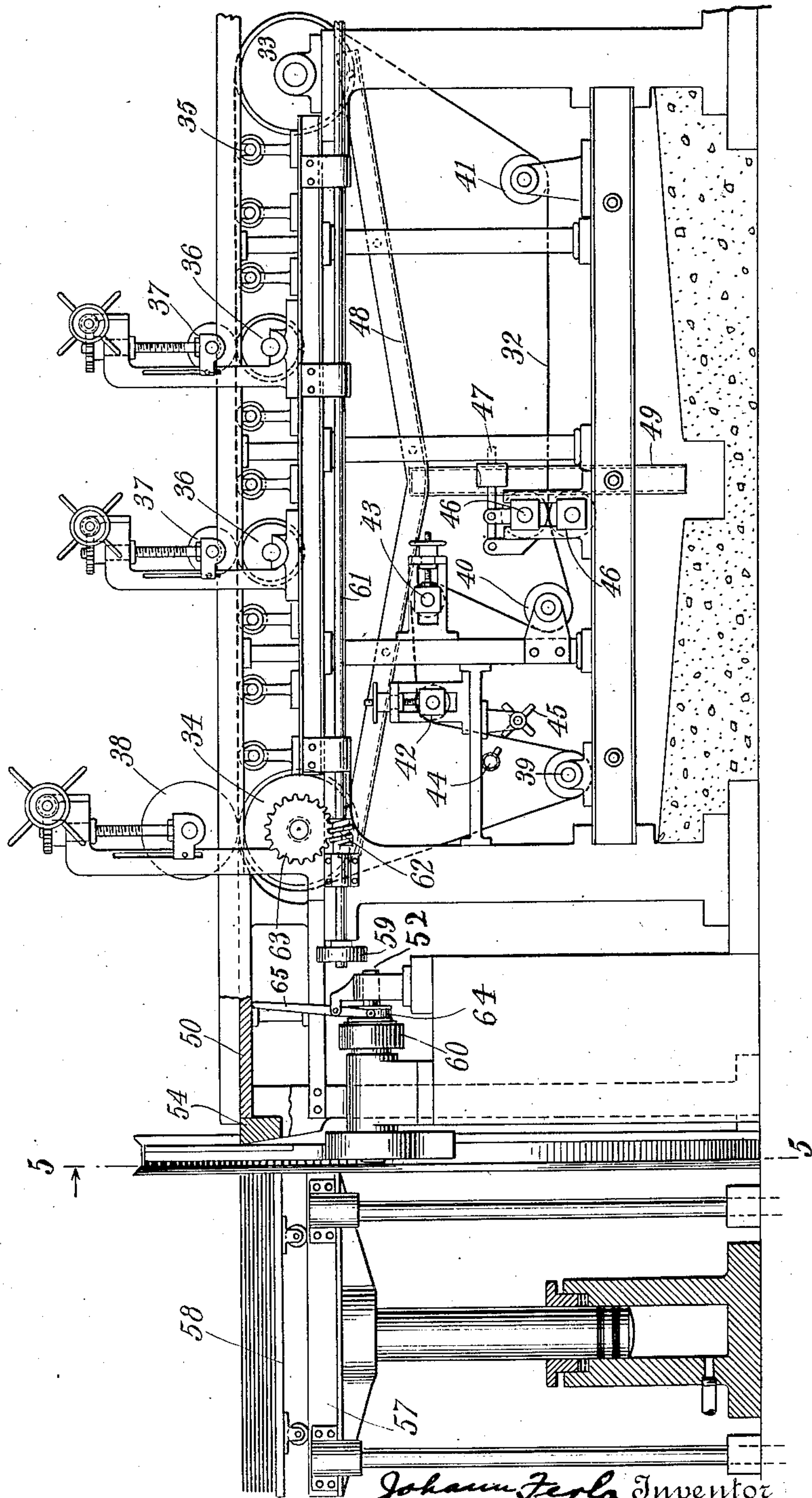
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Fig. 2



Witnesses:
Raphaël Ketter
Baxter Morton

Johann Ferla Inventor

By his Attorney Ernest Hoffmann

J. FERLA.

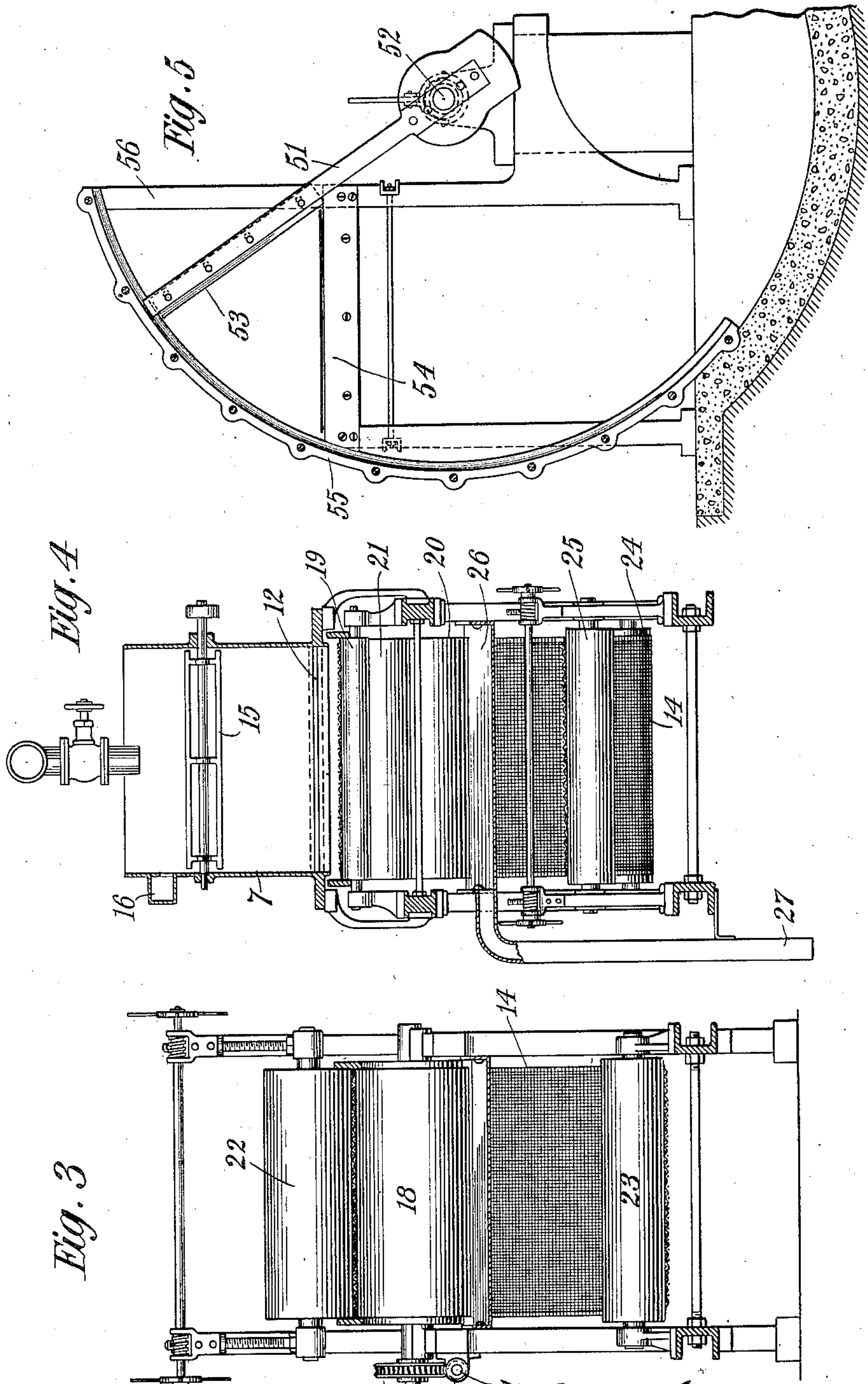
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3 SHEETS—SHEET 3.



Witnesses:
Raphaël Ketter
Baptist Morton

Johann Ferla Inventor
By his Attorney Ernest Hopkinson

UNITED STATES PATENT OFFICE.

JOHANN FERLA, OF NEW YORK, N. Y.

APPARATUS FOR MANUFACTURE OF COMPOSITION BOARD.

940,449.

Specification of Letters Patent.

Patented Nov. 16, 1909.

Application filed May 29, 1907. Serial No. 376,438.

To all whom it may concern:

Be it known that I, JOHANN FERLA, a citizen of the Republic of Switzerland, residing in New York city, New York, have invented
5 a new and useful Improvement in Apparatus for Manufacture of Composition Board, of which the following is a specification.

This invention relates to apparatus for the manufacture of composition board and it
10 has for its primary object the provision of apparatus whereby composition boards of different thicknesses but of uniform quality and density may be expeditiously and economically produced.

15 In the accompanying drawings I have illustrated a preferred embodiment of my invention, but it is to be understood that the details of construction and the precise mode of arrangement of the elements may be varied
20 without departing from the spirit of the invention or sacrificing the advantages thereof.

The scope of the invention is pointed out in the appended claims.

In the drawings: Figure 1 is a view principally in longitudinal section through the forward division of the apparatus; Fig. 2 is a view principally in side elevation but partly in section of the rear division of the apparatus; Fig. 3 is a sectional view on the
30 plane shown by the line 3—3 in Fig. 1; Fig. 4 is a sectional view taken in the plane indicated by the line 4—4 of Fig. 1; Fig. 5 is a sectional view in the plane shown by the line 5—5 in Fig. 2, and showing the cut-off
35 mechanism.

As in the manufacture of paper, cardboard, paste-board, and the like, the material out of which the composition board is formed is supplied to the apparatus in the
40 form of a thin pulp which will flow freely and which contains a large excess of water.

In the operation of the apparatus the excess of water is extracted from the pulp and the particles of the pulp are compressed to
45 form a sheet of substantially uniform thickness and density. The sheet of material formed in this way is cut off by suitable cutting mechanism and delivered to a receiving carriage which is preferably supported upon
50 a vertically adjustable table at the delivery end of the board-forming apparatus.

The pieces of board successively cut off the sheet formed by the apparatus are stacked upon the carriage or other suitable

receiver and are subsequently subjected to 55 pressure in a powerful hydraulic press to increase the density and compactness of the board.

Referring to the drawings by the reference characters, which designate corresponding parts in the several views, 1 is a supply pipe through which the pulp is fed to the board-forming apparatus. This supply pipe has a main branch 2 which delivers directly to a main reservoir 3 with a closed
60 top. Supplementary branch pipes 4 and 5 deliver two pairs of supplementary reservoirs 6 and 7. Check valves 8 and 9 control the supply of pulp to the supplementary reservoirs 6 and 7 respectively. From the reservoirs the flow of pulp is controlled by suitable gate valves; the main reservoir 3 being provided with a screw-controlled gate valve 10, and the supplementary reservoirs 6 and 7
65 being controlled by smaller gate valves 11 and 12 of similar construction. From the main reservoir 3 an inclined delivery chute 13 permits the pulp which passes through the gate valve 10 to flow on to a traveling web 14 of wire gauze, which facilitates the
80 drainage of the greater portion of the excess of water from the pulp. The supplementary reservoirs 6 and 7 are disposed vertically and are arranged directly above the web 14, so as to discharge directly thereon or on top
85 of the sheet formed by the pulp delivered from the main reservoir 3. To prevent choking of the supplementary reservoirs 6 and 7, rotary agitators 15 are arranged therein and suitable means for operating them (not
90 shown) may be provided. The accumulation of an excess of material in the supplementary reservoirs is prevented by the provision of an inclined overflow conduit 16 communicating with all of the supplementary reservoirs and discharging into the
95 main reservoir 3.

The web 14 of wire gauze is supported upon two end rolls 17 and 18 and a plurality of intermediate supporting rolls 19 of
100 much smaller diameter. Intermediate rolls 20 of larger size than the rolls 19 cooperate with adjustable rolls 21 to gage the thickness of the sheet formed upon the web 14 from the material delivered from the reservoirs. Over the end roll 18, which is the driving roll for the web 14, is provided an
105 adjustable roll 22 which also serves as a

gage roll. The gage rolls 21 and 22 effect a certain degree of compression of the material, but the material cannot be subjected at this stage of manufacture to any great degree of compression.

To maintain a suitable degree of tension upon the web 14, fixed rolls 23 and 24 are provided in the lower part of the general supporting frame of the apparatus, together with an adjustable roll 25, and the web 14 is carried under the rolls 23 and 24 and over the adjustable roll 25, as shown in Fig. 1. By adjusting the roll 25 up or down the tension upon the web 14 can be regulated exactly. The excess of water which drains through the web 14 as the pulp travels forward upon it is received in a pan 26 arranged under the upper lead of the web and sloping from its ends toward the middle, where a discharge pipe 27 is provided.

Owing to the character of the materials used in the formation of the composition board, a considerable quantity of material adheres to the surface of the web 14 and is carried downward by the web as it passes around the rear or drive roll 18. If this material were allowed to accumulate upon the web 14 the meshes would soon become clogged and effective drainage of water from the pulp would be prevented. To prevent this clogging, spray pipes 28 are arranged above the lower lead of the web and discharge water in fine streams against the web with sufficient force to cleanse the web of the adherent material. To remove the water discharged from the spray pipes 28 as well as that delivered from the pipe 27, the foundation upon which the apparatus rests is preferably formed into a sort of basin with a gutter along the middle to take off the water. Excess of material delivered upon the web 14 through the inclined chute 13 leading from the main reservoir is not allowed to waste, but flows downward through a chute 29 into a receiver 30, from which it may be removed in any suitable manner.

The material delivered upon the web 14 may all be discharged from the main reservoir 3 or may be delivered in part from the main reservoir 3 and in part from the supplementary reservoirs. The use of one or more reservoirs for the delivery of pulp to the web 14 will be determined primarily by the thickness of the board to be manufactured, a greater number of reservoirs being ordinarily brought into use for the production of thick and heavy board than for the production of thin board. It will, however, be obvious that all of the reservoirs may be employed in the construction of thin board, if a board of laminated structure is desired.

By the time the sheet of material formed from the pulp passes between the rear end roll 18 and the cooperating gage roll 22 the bulk of the excess water will have been

drained off and the sheet will have a considerable degree of solidity, so that it will pass across the bridge plate 31 between the forward section of the apparatus and the rear section. After passing across the bridge plate the still moist board comes upon an endless web 32 of felt or other absorbent material which is supported in much the same way as the web 14 of wire gauze. This web of felt is carried upon a forward end roll 33 and a rear end roll 34, the latter being the driving roll. Between the end rolls 33 and 34 a plurality of small supporting rolls 35 are mounted in suitable bearings and spaced at suitable intervals are gage rolls which act upon the board as it travels forward on the felt to compress it slightly as it passes to the delivery end of the apparatus. These gage rolls comprise lower supporting rolls 36 turning about fixed axes and upper adjustable rolls 37. The rear end roll 34 also serves as a gage roll, cooperating with an adjustable roll 38 arranged above it. The gage rolls in this rear section of the machine have the additional function of increasing the absorbent action of the felt of the endless web 32. The compressing action of the gage rolls upon the partially formed board of course has a tendency to express the moisture remaining therein, and the moisture is thereby forced to the surface, and on the under surface at least of the board the moisture so expressed is at once absorbed by the felt.

The tension of the endless web is maintained by being carried around fixed rolls 39, 40 and 41 mounted in the lower part of the supporting frame of the apparatus and over adjustable rolls 42. To cleanse the web of adherent particles of the material entering into the composition board, a spray pipe 44 is provided above the roll 39 and a revolving beater 45 operates upon the carrying surface of the web adjacent to the spray pipe. After passing over the adjustable rolls 42 and 43 the web passes between squeeze rolls 46, the upper one of which is forced downward by weighted levers 47 arranged adjacent to the bearings. A drainage pan 48 is provided to receive the moisture which passes through the carrying lead of the felt and from the pan 48 an escape pipe 49 leads downward to a basin beneath the rear section of the apparatus similar to that under the forward section. After passing off the endless felt web the composition board has acquired such consistency that it may be handled gently without injury and passes readily across a table 50 lying to the rear of the web 32. At the rear margin of this table 50 is the cutting mechanism by which the composition board is cut up into pieces of suitable length. This cutting mechanism preferably comprises a revolving cutter bar 51 mounted on a shaft 52 extend-

ing parallel to the direction of travel of the material through the apparatus. The cutter bar carries a knife or blade 53 which co-operates with a fixed cutter block 54 at the end of the table 50, and the movement of the cutter bar is guided by an arcuate guide 55 supported at its upper end by a standard 56 rising above the table 50 at one side and supported at its lower end by the foundation of concrete or the like upon which the apparatus stands. Just beyond the cutting mechanism is preferably arranged an adjustable receiving table 57, which is mounted on a piston like the platen of an hydraulic press. This table supports a receiving carriage 58 upon which the pieces of board severed from the sheet as it comes from the delivery table 50 are received. After each operation of the cutting mechanism, the table is allowed to descend slightly and a piece of sheet metal is laid on top of the last piece of board severed from the sheet. The descent of the table after each operation of the cutting mechanism is just sufficient to permit the end of the sheet of board to advance over the pile of alternately arranged pieces of board and sheet metal, so that at the next cutting operation the severed piece will lie on the top of the pile.

The power for operating the apparatus can be supplied from any suitable source and it is preferably applied to pulleys 59 and 60 at the rear of the apparatus. The pulley 59 is mounted on a shaft 61 extending longitudinally of the apparatus and having a pair of worms 62 meshing with worm gears 63 rigidly connected with the driving rolls 18 and 34 from which motion is imparted to the two endless webs 14 and 32. The pulley 60 is mounted on the shaft 52 which carries the cutter bar, and the power transmitted to the pulley 60 serves simply to operate the cutting mechanism. As the cutting mechanism is designed to operate only at intervals, the pulley 60 is loose on the shaft 52 and a double clutch 64 is provided on the shaft to bring the pulley and shaft into operative connection when desired and to hold the shaft against rotation when the cutter bar is to be held stationary. A lever 65 is provided to shift the clutch when it is desired to operate the cutting mechanism.

The operation of the apparatus will probably be clear from the foregoing description and the accompanying drawings; but special attention is invited to certain features of the operation. It will be noted that the carrying leads of both of the endless webs 14 and 32 lie in the same horizontal plane and in the formation of the composition board from the highly fluid pulp the movement of the material is in a straight line from the beginning of the operation until the pieces of formed board are severed from the sheet

at the delivery end of the apparatus. Attention is also invited to the fact that the arrangement of the gate valves in the pulp reservoirs permits the feeding of the pulp to the web 14 of wire gauze in a sheet of any desired thickness. This sheet is subjected to such a degree of pressure while advancing on the gauze as it will withstand satisfactorily, and by the time the material passes from the web of wire gauze across the bridge plate and on to the web of felt it has had by far the greater portion of the moisture extracted from it and has attained a considerable degree of density.

As the movement of the material is always in a straight line, sheets of composition board of any desired thickness can be formed without danger of breaking in the process of formation and, as the boards produced by this apparatus are not built up out of a plurality of thin superposed laminae but are preferably formed of a single layer of any desired thickness, the production of composition boards is much more rapid than in apparatus in which thin layers are successively superposed to build up a board of any desired thickness.

Of course, it is to be understood that the pieces of board severed from the sheet by the cutting mechanism at the delivery end of the apparatus are ordinarily subjected to additional pressure, if a high degree of density and hardness in the board is desired. The carriage upon which the pile of pieces of board lies can be transferred bodily from the receiving table to a suitable press (not shown).

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

1. In apparatus of the character described, the combination with board-forming apparatus of pulp feeding devices for said board-forming apparatus, said pulp-feeding devices comprising a main reservoir and a supplementary reservoir, valves to control the escape of pulp from said reservoirs, and an overflow conduit extending from said supplementary reservoir to said main reservoir.

2. In apparatus of the character described, the combination with suitable supporting and driving devices, of a pulp carrying web through which moisture can drain readily, the carrying lead of said web being arranged to travel in a straight path, a second traveling web having its carrying lead arranged for movement in the same plane with the first-mentioned web and adapted to receive material from said first-mentioned web, the latter web being formed of absorbent material, a blank-receiving table, and means to obtain the blank-receiving surface of said table in the same horizontal plane as the carrying surfaces of the traveling webs.

3. In apparatus of the character described,

the combination with an endless web of wire gauze having its carrying lead arranged in a horizontal plane, of pulp-feeding devices arranged near the forward end of said web, and an overflow pipe supported adjacent said feed devices and flush with the pulp-receiving surface of said web.

In testimony whereof, I have signed my name in the presence of two witnesses.

JOHANN FERLA.

Witnesses:

WM. BRADFORD,

H. RICHARD WOBSE.