

No. 621,893.

Patented Mar. 28, 1899.

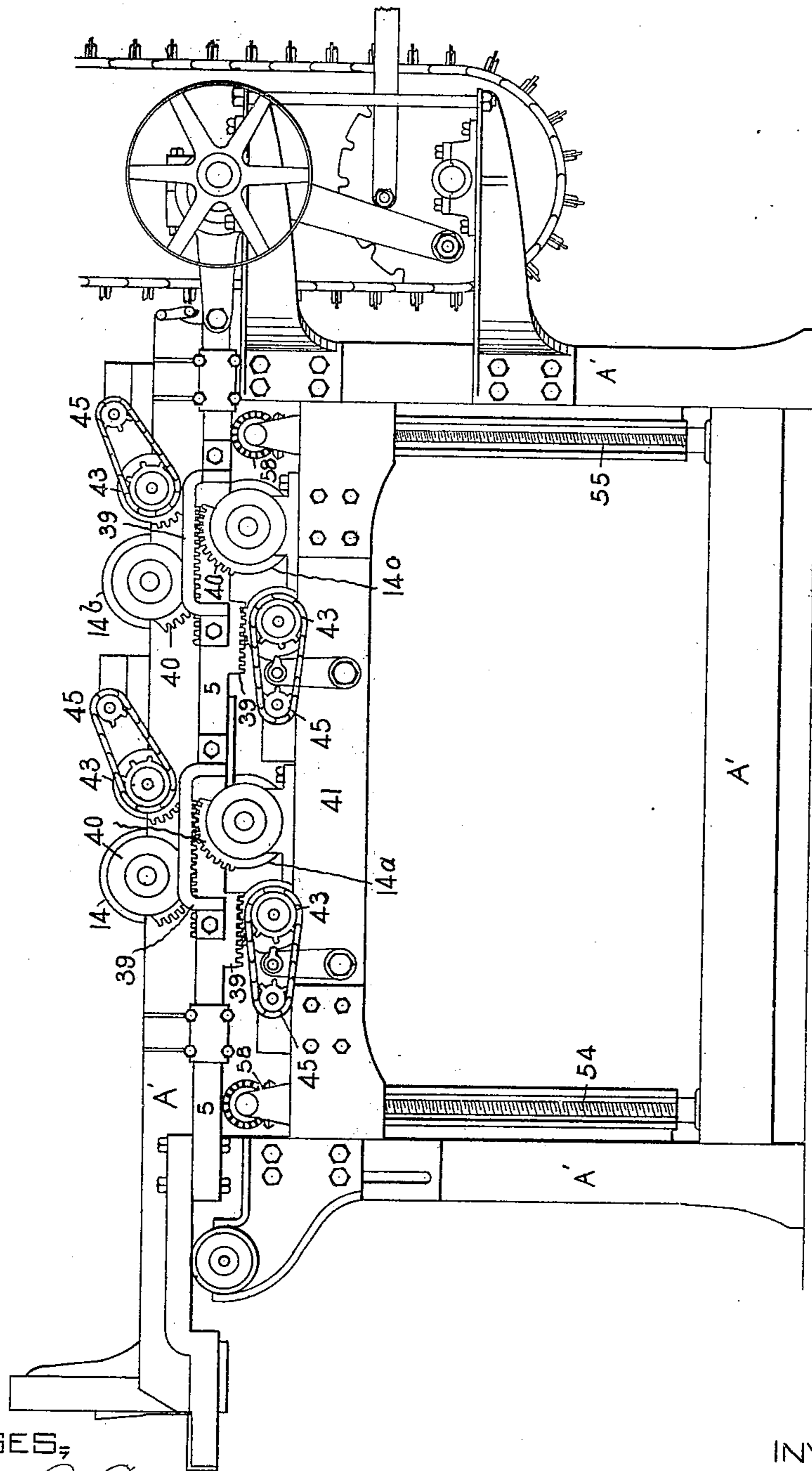
J. BOULARD.
MATCH PRINTING MACHINE.

(Application filed Feb. 23, 1898.)

(No Model.)

8 Sheets—Sheet 1.

Fig. 1-



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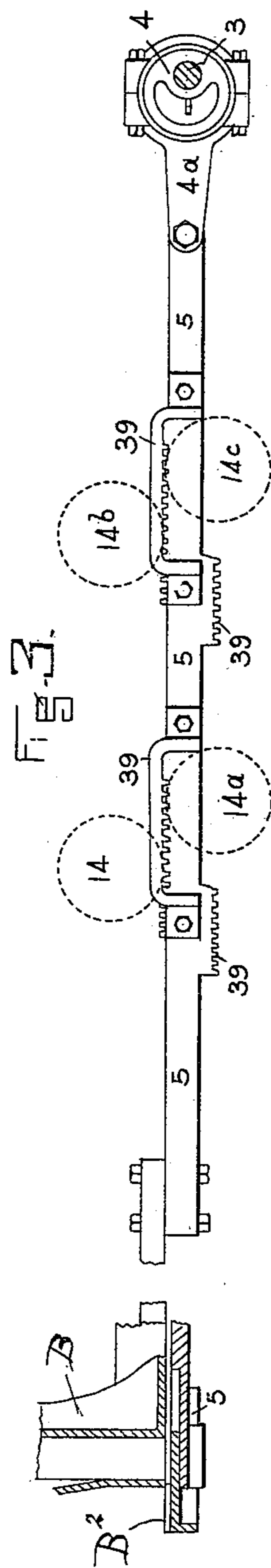
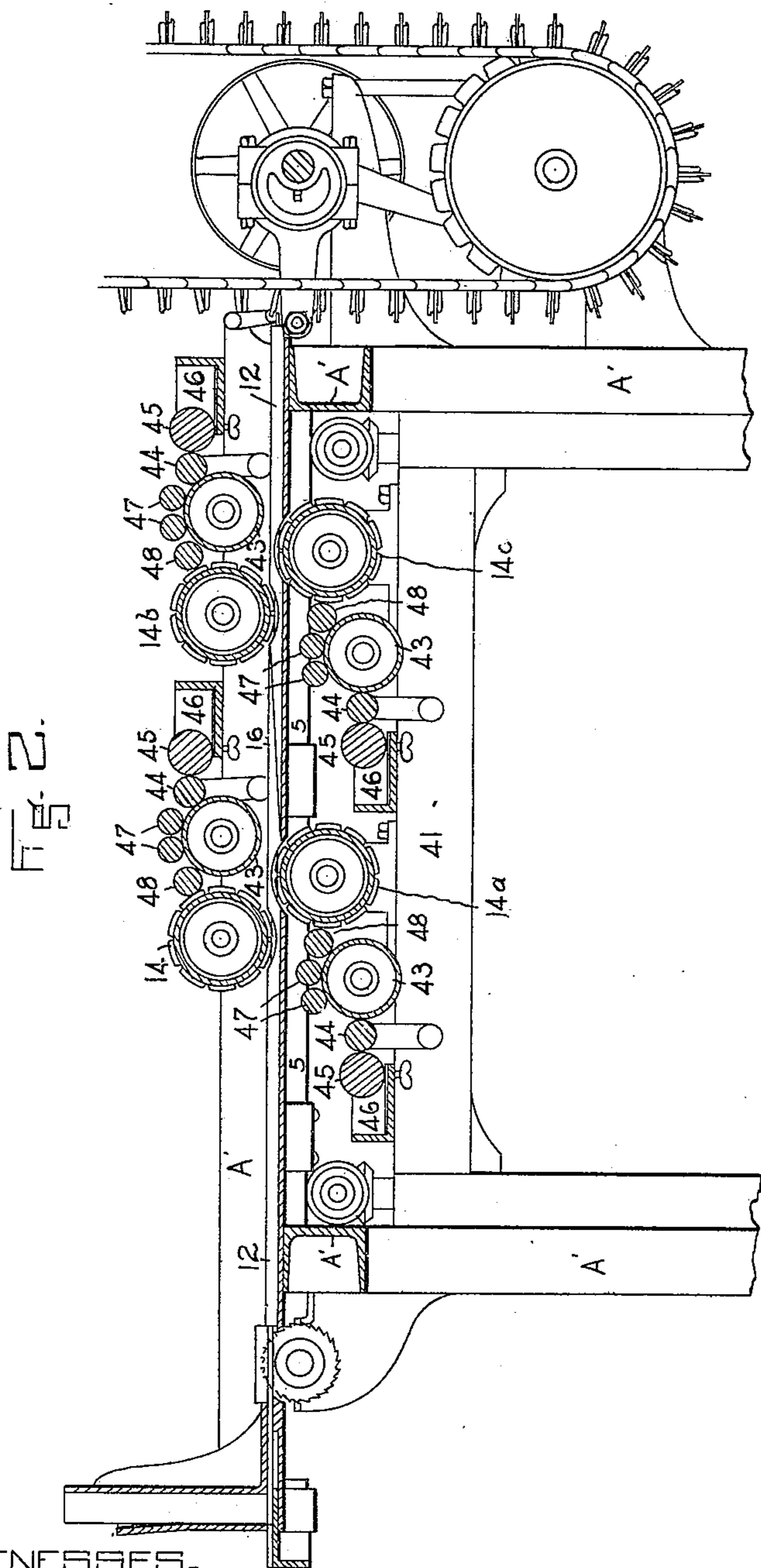
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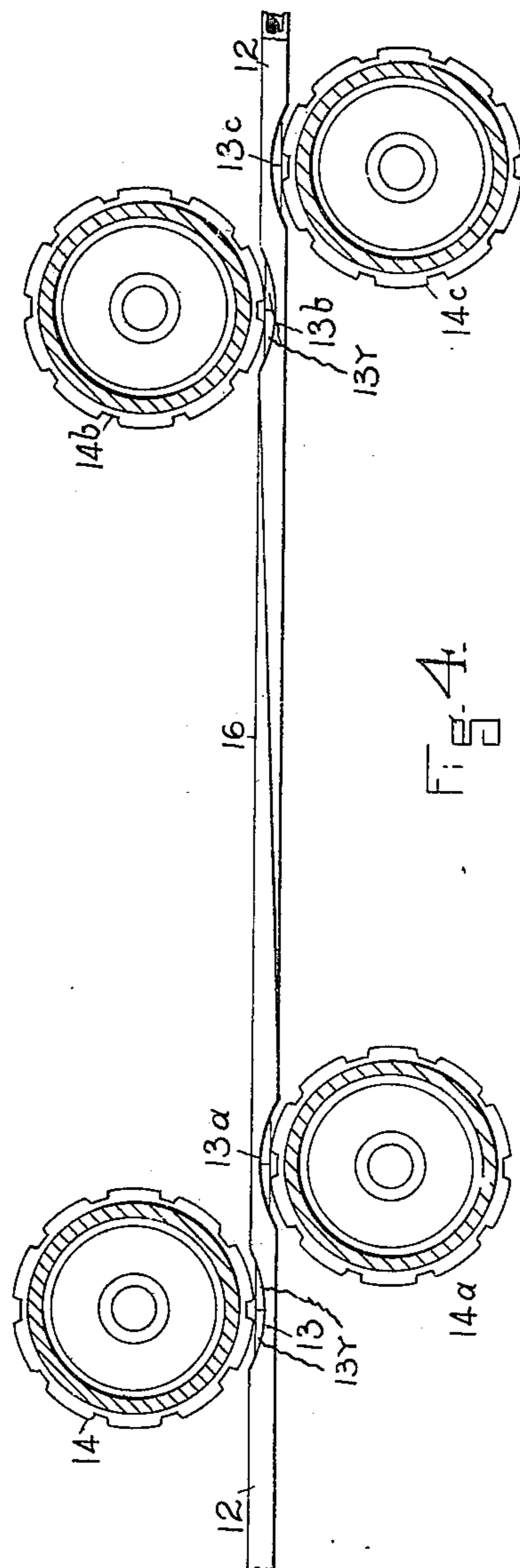
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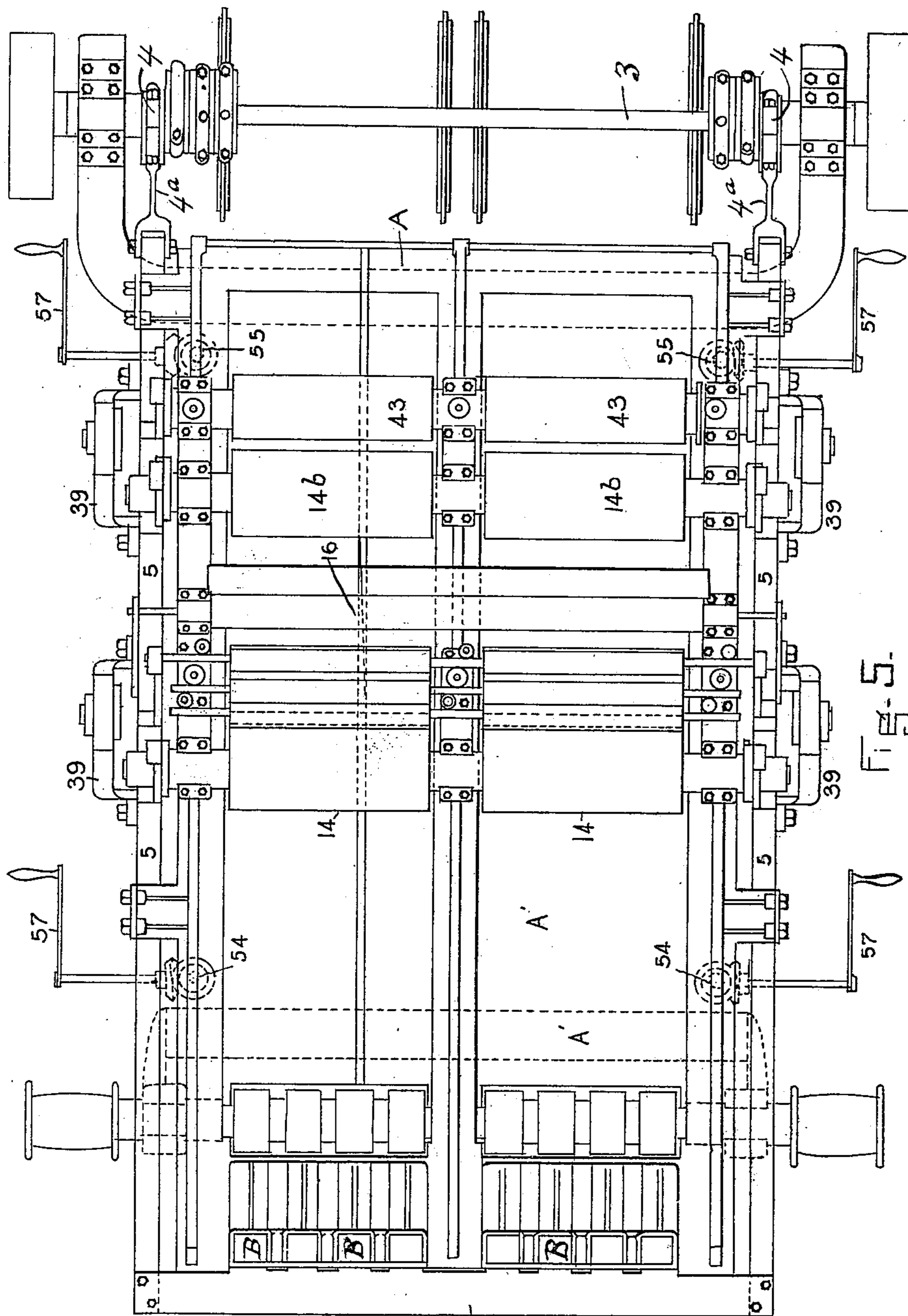


Fig. 5.

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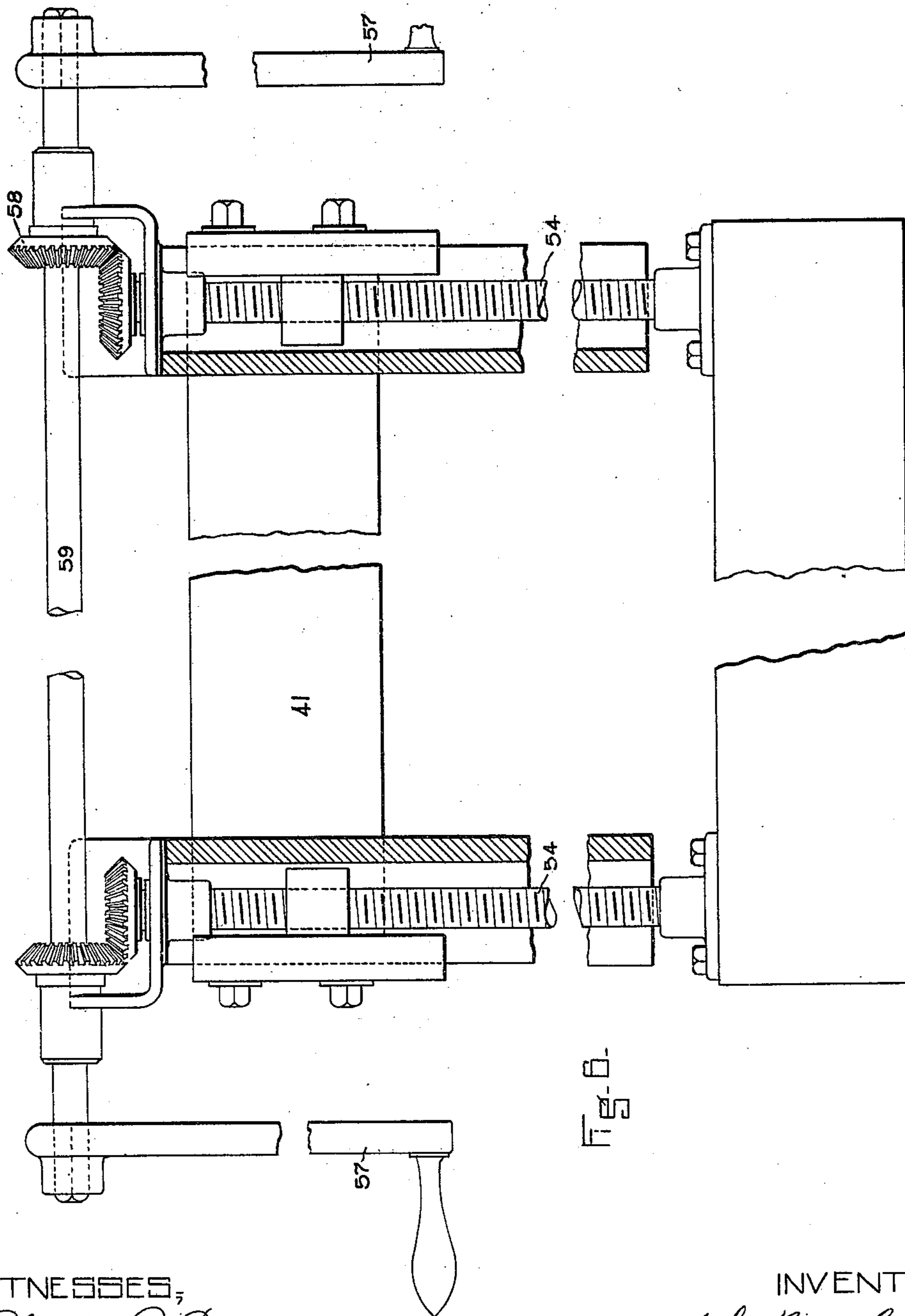
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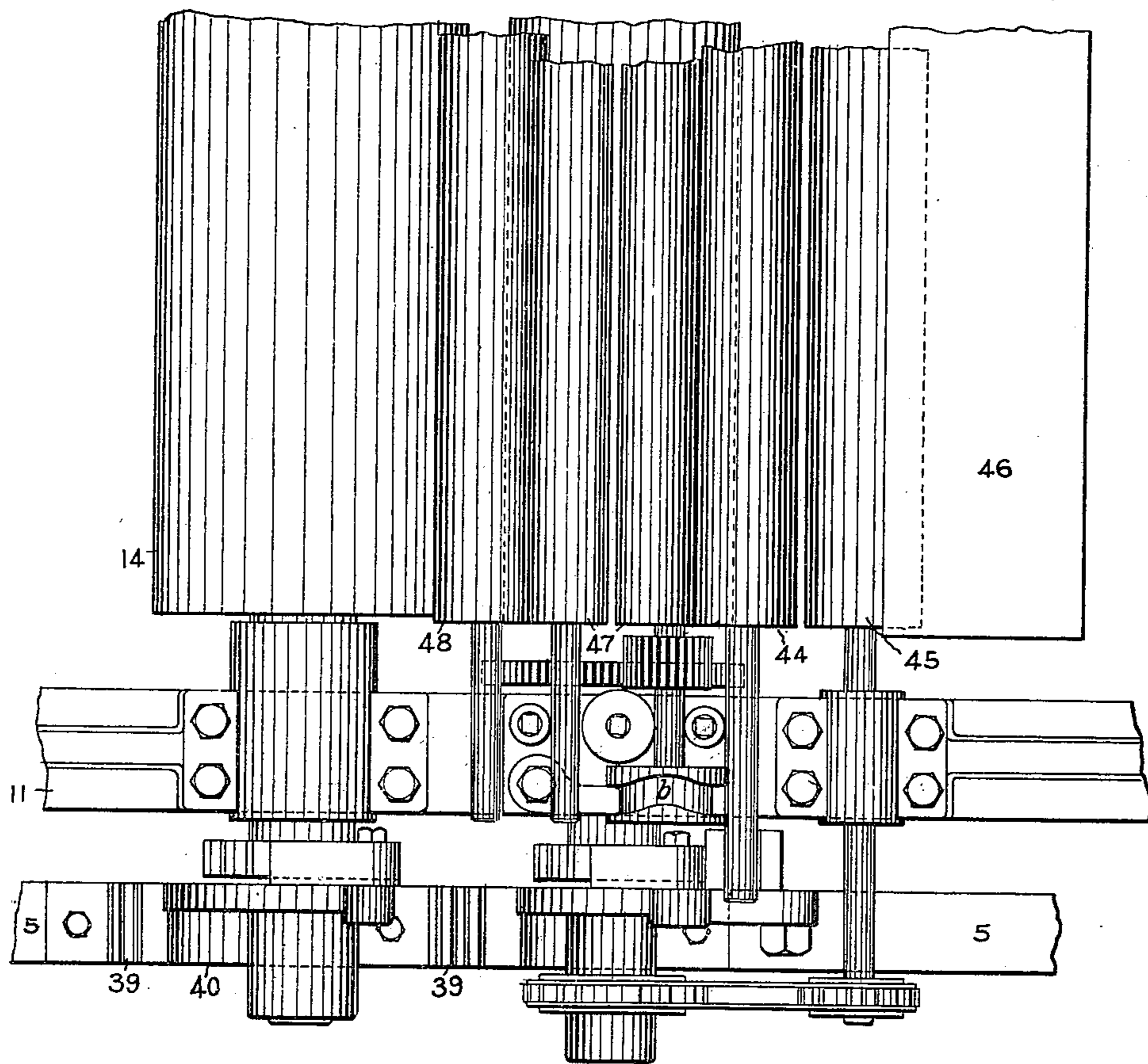


Fig. 6.

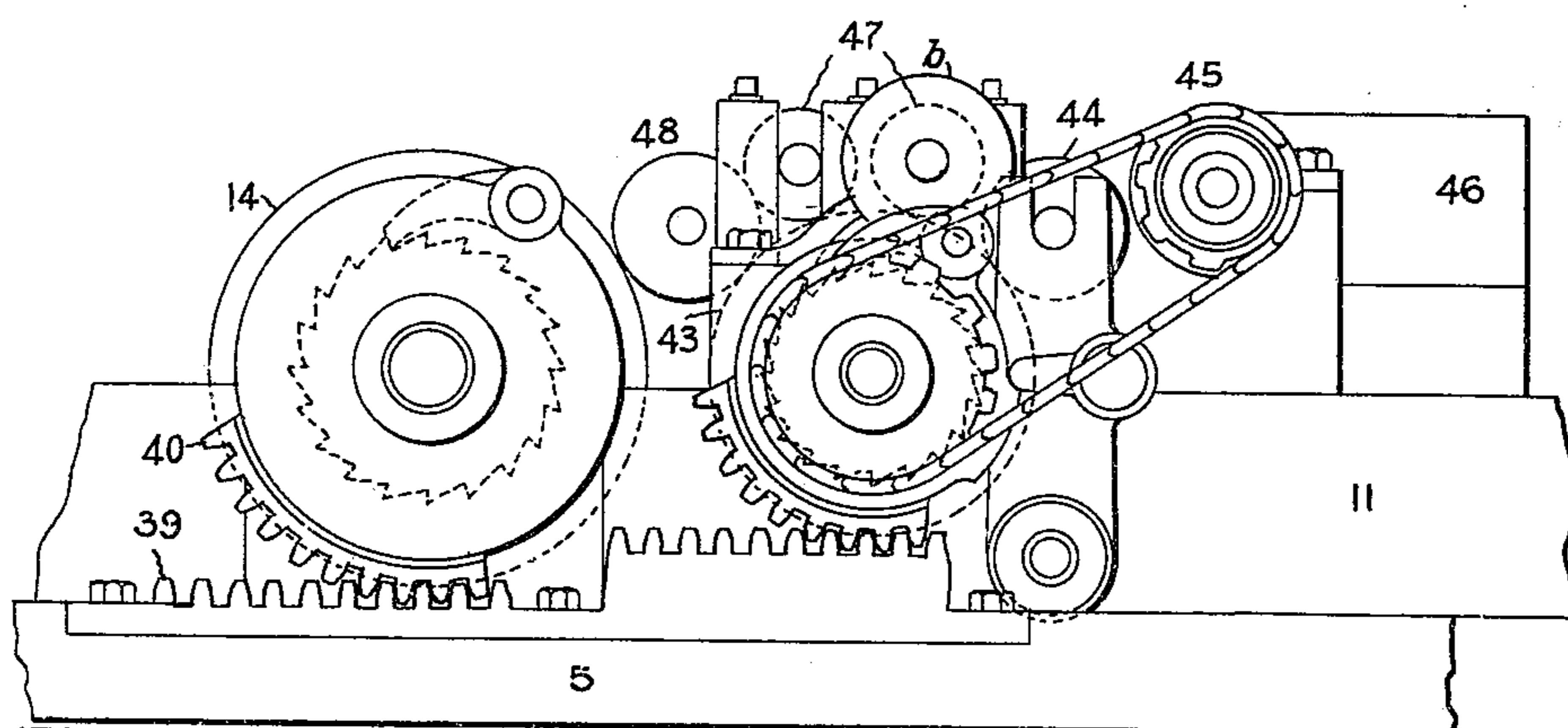


Fig. 7.

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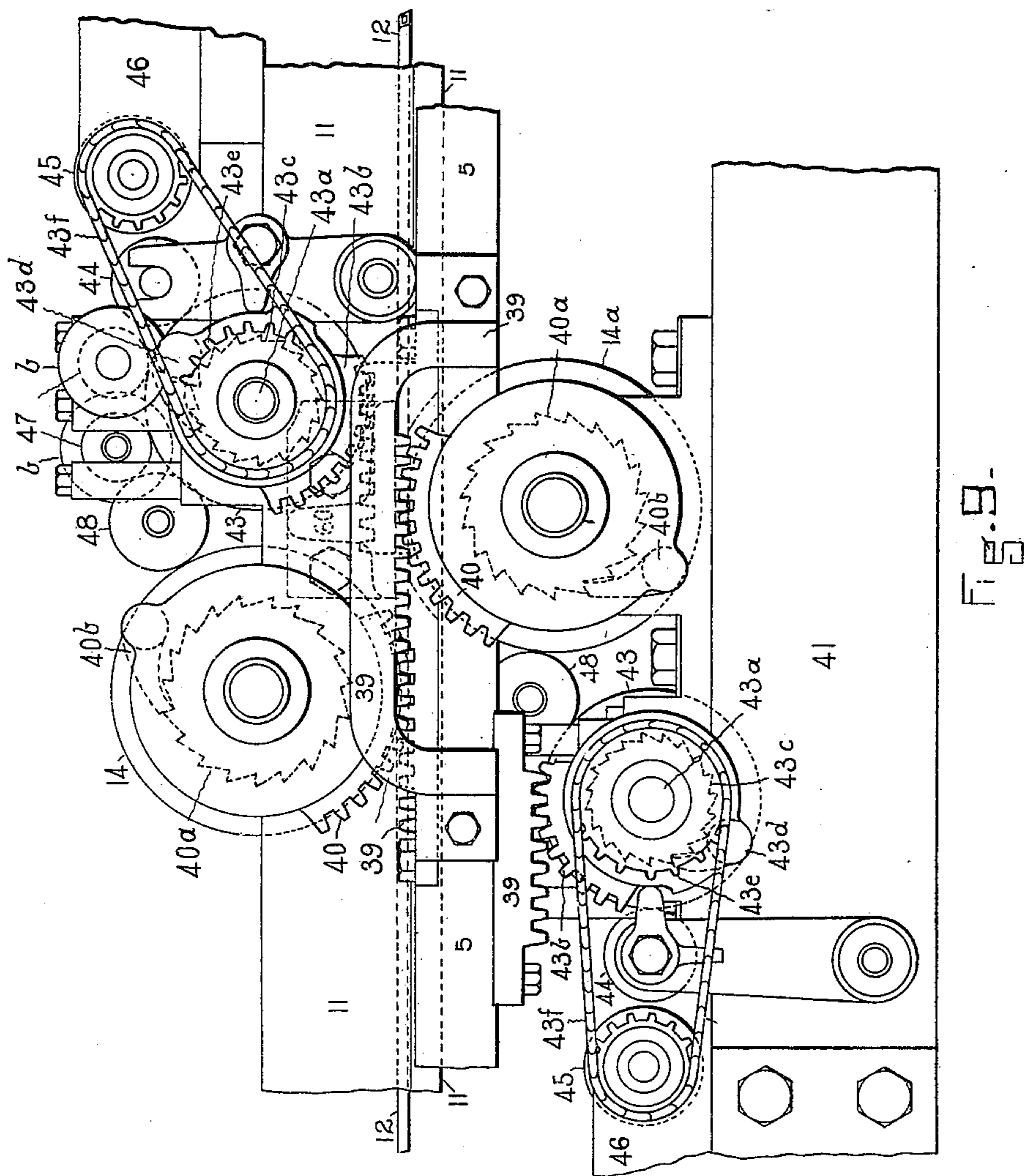
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(No Model.)

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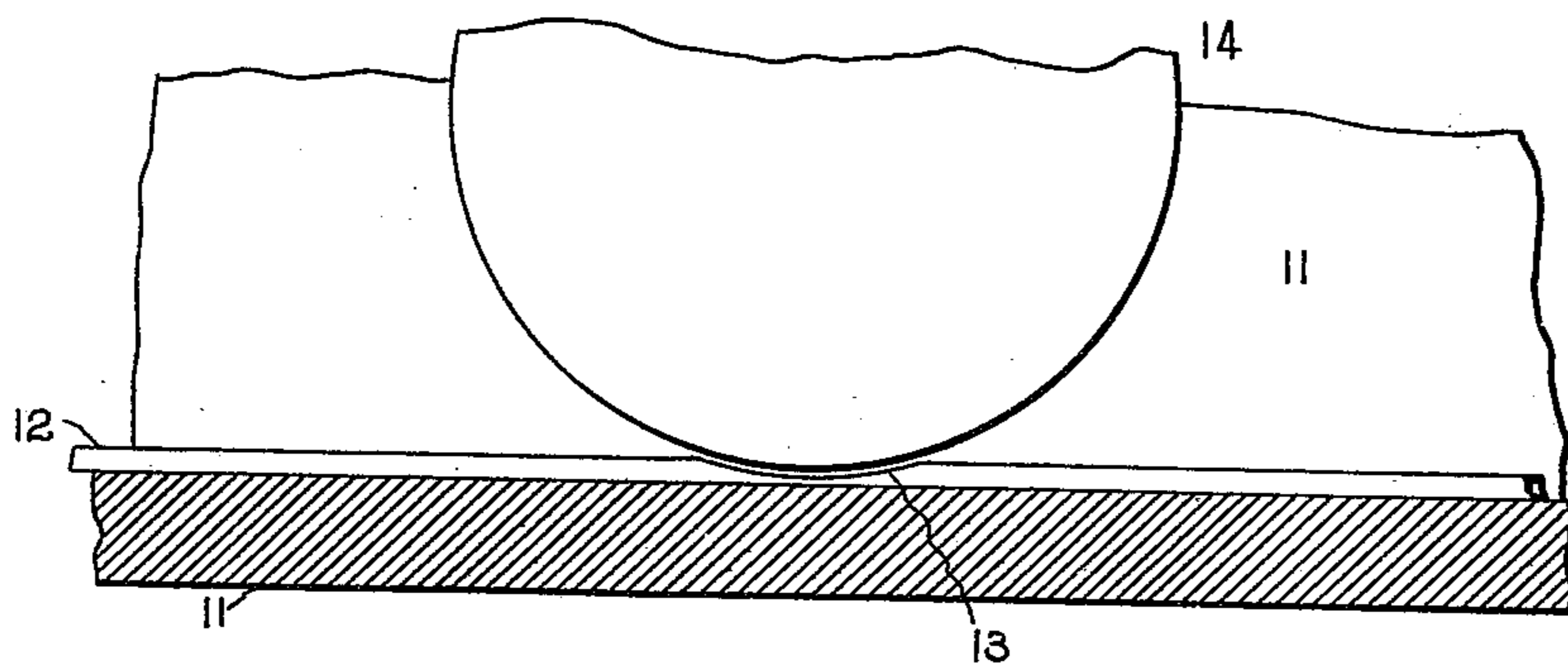


Fig. 10.

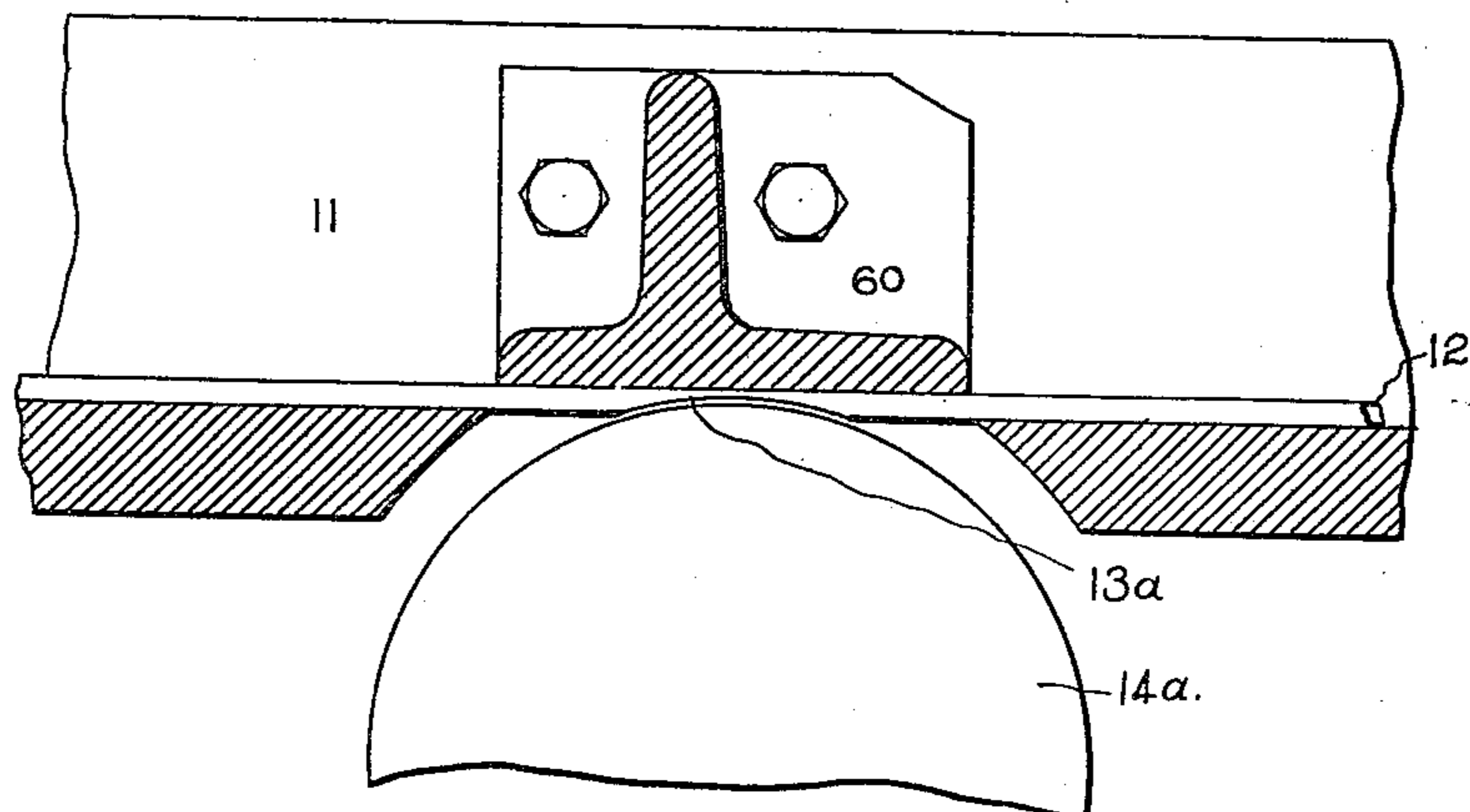


Fig. 11.

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UNITED STATES PATENT OFFICE.

JOSEPH BOULARD, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO FRANK W. MEAD, OF HINGHAM, MASSACHUSETTS.

MATCH-PRINTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 621,893, dated March 28, 1899.

Original application filed May 14, 1896, Serial No. 591,739. Divided and this application filed February 23, 1898. Serial No. 671,364. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH BOULARD, a citizen of the United States, residing in the city of Boston, county of Suffolk, and State of Massachusetts, have invented certain Improvements in Machines for Making and Printing Matches at a Single Operation, of which the following is a specification.

The present application is a division of my prior application, Serial No. 591,739, filed May 14, 1896, for a match making and printing machine.

The following is a full and exact description of this match-printing division of my invention, reference being had to the drawings furnished herewith and to the letters and figures of reference marked thereon.

The object of this my present invention is to produce a printing mechanism adapted to the above-noted combination of match-making and match-printing mechanism for the purpose of producing complete manufactured matches having any desired letters or other devices printed thereon.

The nature of my invention relates, primarily, to improvements upon the invention shown in my former patent, No. 481,522, dated August 25, 1892, and embraces particular improvements relating to the subject in the construction, arrangement, and combination of parts, substantially as hereinafter more fully set forth.

Figure 1 is a side elevation of a machine, illustrating my improvements in printing mechanism as applied to a match-making machine. Fig. 2 is a similar sectional elevation. Fig. 3 is a similar elevation illustrating the common impelling or side bar 5 and its attached mechanism for connecting the printing mechanism to the machine for making matches. Fig. 4 is a sectional elevation, somewhat enlarged, illustrating the application of printing-rolls which act through the scallops in the guides that conduct the match-splints from the dividers to the main conveyer. Fig. 5 is a general plan illustrating the application of the printing apparatus to a match-making machine. Fig. 6 is a front sectional elevation of the adjustable table 41 for carrying the lower roll printing device, showing its elevating-

screws, shafts, and cranks, to be observed in its relative relations in Figs. 1, 2, and 9. Fig. 7 is an end view of a type-roll, inking-rolls, and fountain. Fig. 8 is a plan view of a type-roll; inking-rolls, and fountain. Fig. 9 is an enlarged sectional elevation illustrating the relations of the main match-machine frame, the adjustable lower roll printing device and rolls, the upper printing-rolls and the impelling side bars 5, racks 39, match-splint-guiding tubes 12, &c. Fig. 10 is an enlarged detail of parts shown in Fig. 9, including the guide-tubes 12, their supporting-table 11, a scallop in the tubes at 13, and a section of the upper printing-roll 14. Fig. 11 is a similar detail of parts shown in Fig. 9, including the guide-tubes 12, their reinforcing-plate 60, a scallop in the tubes at 13^a, and a section of the lower printing-roll 14^a.

Like letters and figures of reference refer to the same or corresponding parts in all the drawings.

In the splint-forming section of the machine, Fig. 1, is shown on the left one of a row of stationary hoppers B, in which are piled rectangular-shaped cards of wood or other suitable material which is to be sawed or otherwise cut into match-splints. This hopper B has a movable bottom or platen B², which is driven backward and forward under the hopper by means of the side bars 5, connected thereto, and which side bars are operated by the eccentrics 4 on the main shaft 3 through the connecting-rods 4^a. (See also Figs. 2, 3, and 5.) The backward movement of the hopper-platen B²—i. e., away from the saws—causes the bottommost card in each hopper to drop between guideways on top of the supporting-table underneath the hoppers. Then the forward movement of the platen B² pushes the cards (termed herein "match-blanks") through the guideways and onto the saws, beyond which they emerge in the form of match-splints. Thus the repeated vibratory movement of the platen B, actuated by the side bar 5, causes a continuous train of match-blanks to be driven onto the saws, each blank pushing the blank or splints in front of it until the splints are forced through the guide-tubes 12 and between the

printing-rolls 14^a 14^b and 14^c 14^d, from which they receive an impression on each of their four sides. This four-sided impression is effected by a peculiar twist in the guide-tubes, hereinafter more fully described.

Referring to Figs. 1, 2, and 6, the main frame of a match-machine is marked A'. Within frame A' and fitted to be moved freely up and down therein by screws 54 and 55 is the lower-roll-printing-device frame, (marked 41.) This frame 41 supports in suitable bearings the journals of the lower printing-rolls 14^a and 14^c, while upon the main frame A' are in like manner supported the upper printing-rolls 14 and 14^b. These printing-rolls derive an intermittent movement from side bars 5, which are the common moving agency for several parts in the match-making machinery. Their longitudinally-reciprocating movement, which is required in the match-making machinery, affords, through racks 39 thereon, as illustrated in Fig. 3, the means for communicating the simultaneous intermittent rotary movement to the printing-rolls. For this purpose the racks 39 referred to mesh into free-playing gears 40 upon the shafts of the printing-rolls. These free-playing gears 40 carry pawls 40^b, which engage the ratchet-wheels 40^a, (shown dotted in Figs. 7 and 9,) fixed upon said printing-roll shafts, and as the side bars 5 move forward and backward with a correctly-limited reciprocating movement this same movement presents periodically and successively the single match-splints (which by this reciprocating movement are brought forward from the dividers or splint-formers) to the printing-rolls at the open scallops in the tubular guides 12, already mentioned.

The usual inking and distributing devices for properly applying the printing-ink to the printing-rolls are used as indicated in Fig. 9 and other figures and need not be minutely described. Observe in Fig. 9 a shaft 43^a, on which is mounted the inking-roll 43. This shaft is provided with pawl-carrying gears 43^b, (similar to gears 40,) loose thereon, and ratchet-wheels 43^c, fixed upon said shafts, into which these pawls 43^d play, whereby motion is communicated from racks 39 on the side bars 5 through said gears 43^b, pawls 43^d, and ratchet-wheels 43^c to said inking-roll 43 similarly to that of printing-rolls and from which (roll 43) motion is communicated to ink-fountain roll 45 by means of sprocket-wheels 43^e and chain 43^f. Roll 44 carries the ink from roll 45 to inking-roll 43, over which are arranged two distributing-rolls 47, while roll 48 by contact carries the ink to the type-faces on the printing-rolls 14 and 14^a. The distributing-rolls 47 are given a suitable endwise reciprocating motion through the action of the cams *b*, located upon the same shafts. One of these cams is shown on Figs. 7 and 8. (See also Fig. 9.)

The inking apparatus just described applies to the upper system above the match-

splint guides 12. The system is repeated, substantially as shown, below the match-splint guides 12, as will be readily understood by reference to the drawings.

The lower roll printing device already alluded to, consisting of frame 41 within and fitted to and to move up and down in frame A' and to be adjusted by elevating-screws 54 and 55, constitutes a printing-roll system substantially like the upper described system and is driven in like manner by racks 39, attached to the reciprocating side bars 5 of the match-making machine, all of which is shown in the drawings. The elevating-screws 54 and 55, of which there is one at each of the four corners of the frame 41, are provided with bevel-gears 58, and these are driven by like intermeshing gears on shafts supported on frame 41, said shafts being provided with hand operating-cranks 57. Thus by turning these cranks the lower printing-rolls may be elevated or depressed at pleasure. These rolls and their gears may thus be made to engage or disengage with the propelling side bars through their racks 39 or be depressed and elevated for other purposes, such as accessibility, for cleaning, changing type, etc., and for adjusting the pressure of the printing-rolls upon surfaces to be printed on. The upper printing-rolls are accessible and adjustable in the ordinary manner.

The tubular match-splint guides 12 have open scallops 13, 13^a, 13^b, and 13^c (see Fig. 4) to receive the printing-rolls and have twisted intermediate portions at 16 and are an essential feature of the printing mechanism and are also employed in the match-making machine to conduct the separate match-splints from the point of their being separated by the dividers from the match-splint blank to and past the printing-rolls and onward to other processes, as indicated in the drawings. The ends of match-splints 13^v are shown at the scallops exposed to the action of the printing-rolls. These tubes rest on the table 11 for a firm foundation to resist the upper printing-rolls' downward pressure and may be reinforced against the lower printing-rolls' upward pressure by any suitable bearer, as 60, Fig. 9. The twisted portion 16 of these single-tube guides 12 gives the match-splints a quarter-turn after they have been printed by the first pair of upper and lower rolls, so as to present the remaining two sides of the match-splints to be printed by the second pair of rolls. These separate scalloped and twisted single tubes or guides 12 are a great improvement over any heretofore known guides used for this purpose, and their peculiar adaptation to the purpose of this machine and to that of the combined match-making and match-printing machinery is such that their importance cannot well be overstated.

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

1. The combination of the match-blank-

propelling hopper-bottom, the attached reciprocating side bars of a match-making machine, the upper and lower printing-rolls of a printing mechanism, the connecting and
 5 cooperative mechanism and the open-scalloped and twisted single-tube guides interpolated and coacting, substantially as shown and described.

2. The combination of the match-blank-
 10 hopper bottom 6, and attached reciprocating side bar 5, its connecting-rod 4^a and driving-shaft 3, the cooperating mechanism actuating the printing-rolls, viz., racks 39, gears 40, ratchets 40^a, and pawls 40^b, the upper and
 15 lower printing-rolls, the open-scalloped, twisted single-tube guides, substantially as shown and described.

3. In a printing mechanism applied to and cooperating with a match-making mechanism, the combination of the match-blank-receiving hopper B, the platen B² with its operating mechanism comprising the driving-shaft 3, the eccentric 4, connecting-rods 4^a and side bars 5; the four-sided single-tube,
 25 match-splint guides, scalloped to admit the printing-rolls; and said rolls, they being journaled and adjusted to operate through said scallops upon match-splints within; substantially as shown and described.

4. In a printing mechanism applied to and cooperating with a match-making mechanism, the combination of the hopper B, the platen B² with its operating mechanism as described; and the four-sided, single-tube
 35 match-splint guides having upper and lower scallops to admit two or more pairs of upper and lower printing-rolls, said single-tube guides also having twisted sections located between the pairs of upper and lower scallops
 40 substantially as and for the purpose described.

5. The combination of the intermittently-rotating printing rolls or cylinders, the single-tube guides scalloped for the interaction of
 45 said rolls upon match-splints and twisted between the scallops, and the splint supplying and propelling mechanism, substantially as described and shown.

6. In a match-printing mechanism the combination of, a match-making frame A', bearing upper sets of printing-rolls to print upper surfaces, a vertically-movable and adjustable subframe 41 bearing lower printing-rolls to print under surfaces, and a group of
 55 interposed match-splints single-tube guides, open-scalloped for the interaction of said rolls and twisted between the scallops, substantially as and for the purpose set forth.

7. The independent, open-scalloped and
 60 twisted single-tube match-splint guides, reinforced or buttressed by table 11 and bear-

ing 60, in combination with the interacting printing-rolls, substantially as shown and described.

8. The combination of a supporting-frame 65 A', carrying printing-rolls, a match-blank-propelling mechanism and an adjustable, vertically upwardly and downwardly moving frame 41 within the supporting-frame A' also carrying printing-rolls to print under sur- 70 faces, the intermediate match-blank-carrying single tubes and cooperative intermittent and simultaneously moving match-splint-propelling mechanism connectable and detachable as respects upper and lower printing-rolls by 75 means of the subframe 41, substantially as shown and described.

9. In combination with a match-printing mechanism, the reciprocating side bars 5, having the toothed racks 39, and the other parts 80 named below; the secondary subframe 41 fitted to move up and down within the main frame A' and bearing the lower printing-rolls 14^a and 14^c, which have segmental gears 40 toothed upwardly to mesh into said racks 39, 85 elevating-screws 54 and 55, gears 58 and cranks 57, whereby said racks and lower gears 40 are made to engage and to disengage by the reverse movement of the cranks 57, and whereby the upper and lower printing-rolls 90 are brought into simultaneous operation at pleasure, substantially as shown and described.

10. In a match forming and printing machine the adjustable printing device located 95 within the main frame A', comprising in combination a platform 41 having four elevating-screws 54 and 55 at the four corners geared to hand operating-cranks 57, printing-rolls 14^a and 14^c provided with shafts and bearings, 100 free segmental gears 40 on said shafts carrying pawls 40^b which play into ratchet-wheels 40^a attached to said printing-rolls, reciprocating racks 39 above, into which, when the table is elevated to the required point to pro- 105 duce printing contact of said rolls with surfaces to be printed, said gears engage and by the reverse movement disengage, substantially as shown and described.

11. In combination with the main frame 110 and a pair or several pairs of printing-rolls, each pair printing upwardly and downwardly, the lower adjustable carrying-table 41, its printing-rolls 14^a and 14^c, and automatically-engaging segmental gears 40, pawls 40^b, ratch- 115 ets 40^a and a reciprocating rack 39, substantially as shown and described.

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Witnesses:

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