

No. 680,214.

Patented Aug. 13, 1901.

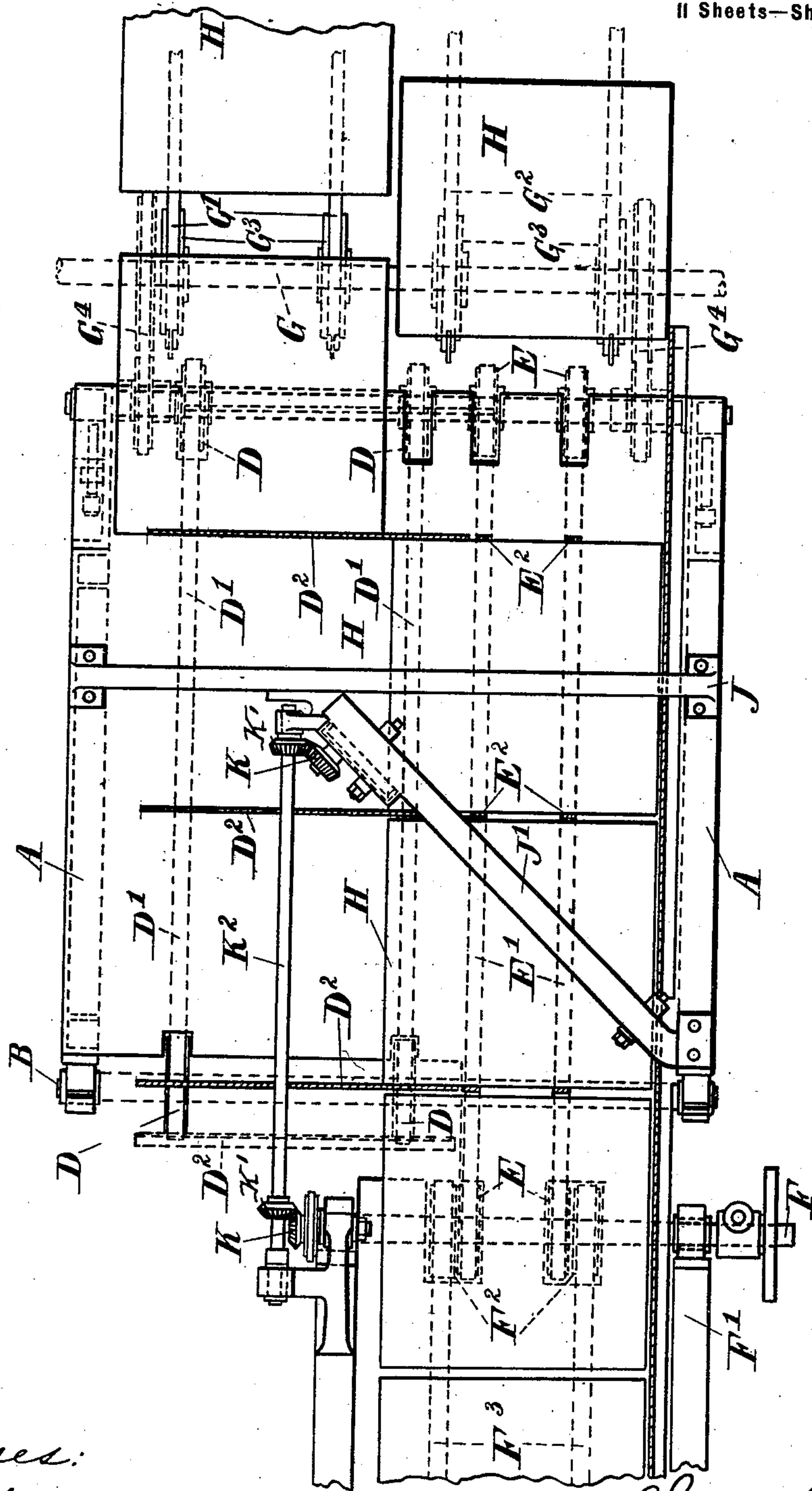
G. S. BAKER.
CONVEYER APPARATUS.

(Application filed Feb. 4, 1901.)

(No Model.)

11 Sheets—Sheet 1.

Fig. 1.



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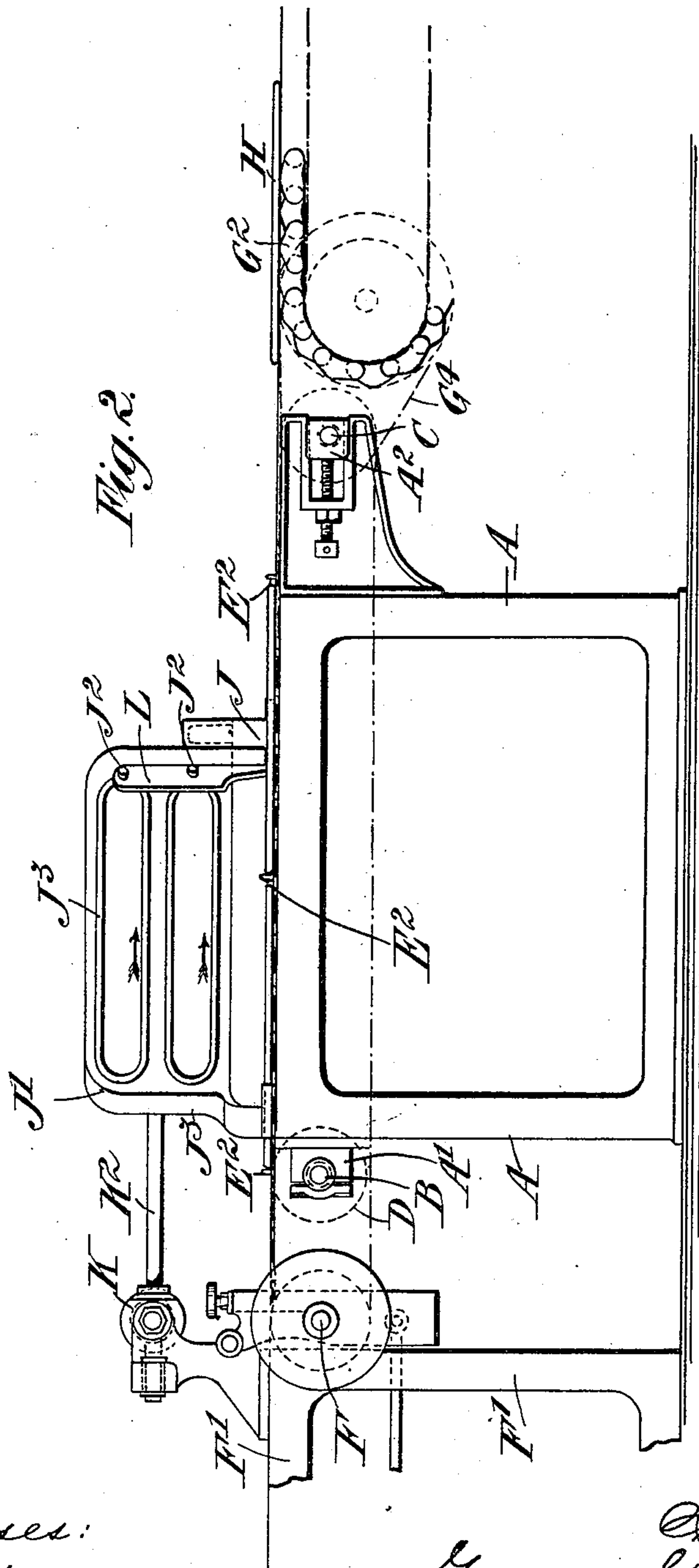
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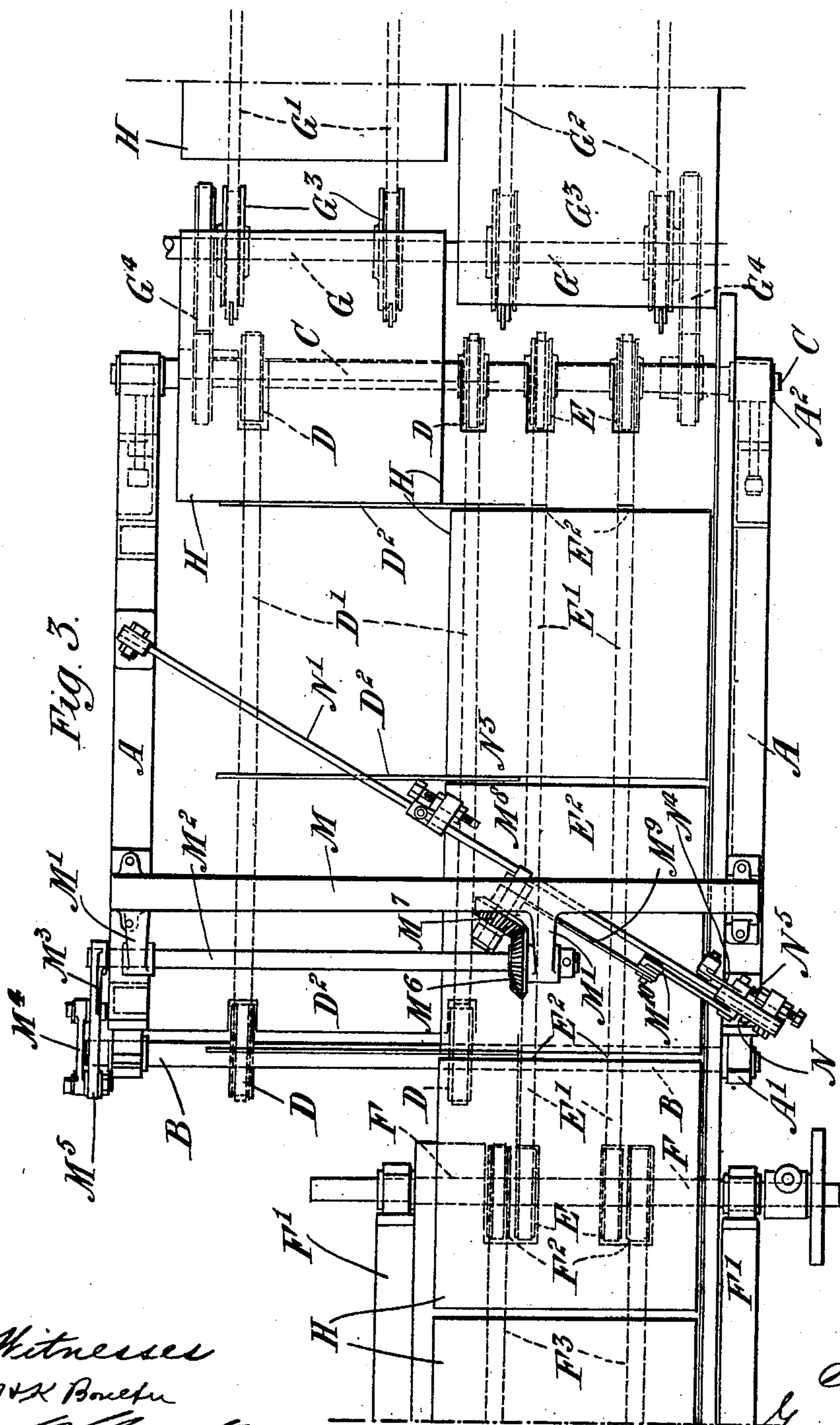


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(No Model.)

11 Sheets—Sheet 3.



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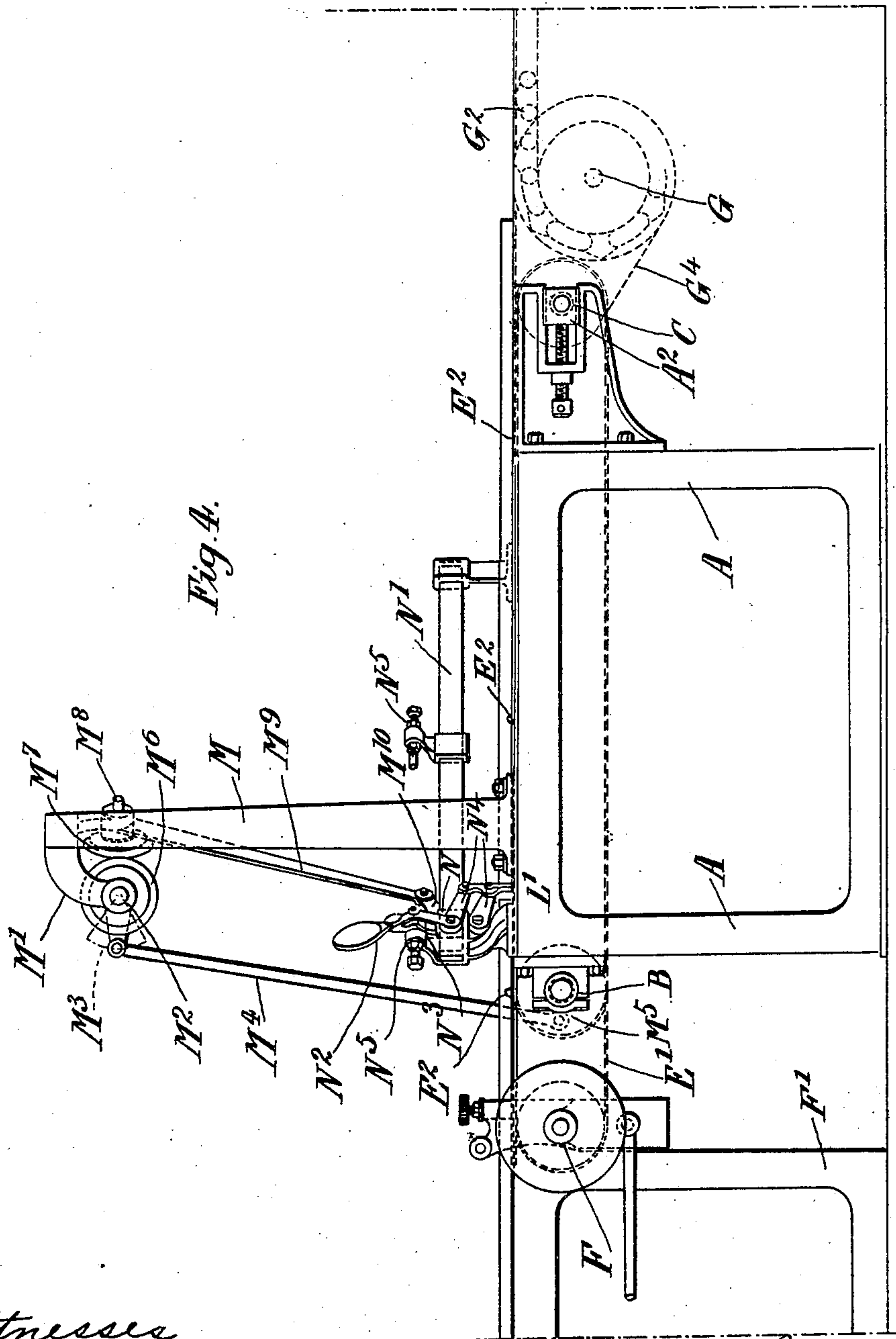
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11 Sheets—Sheet 4.



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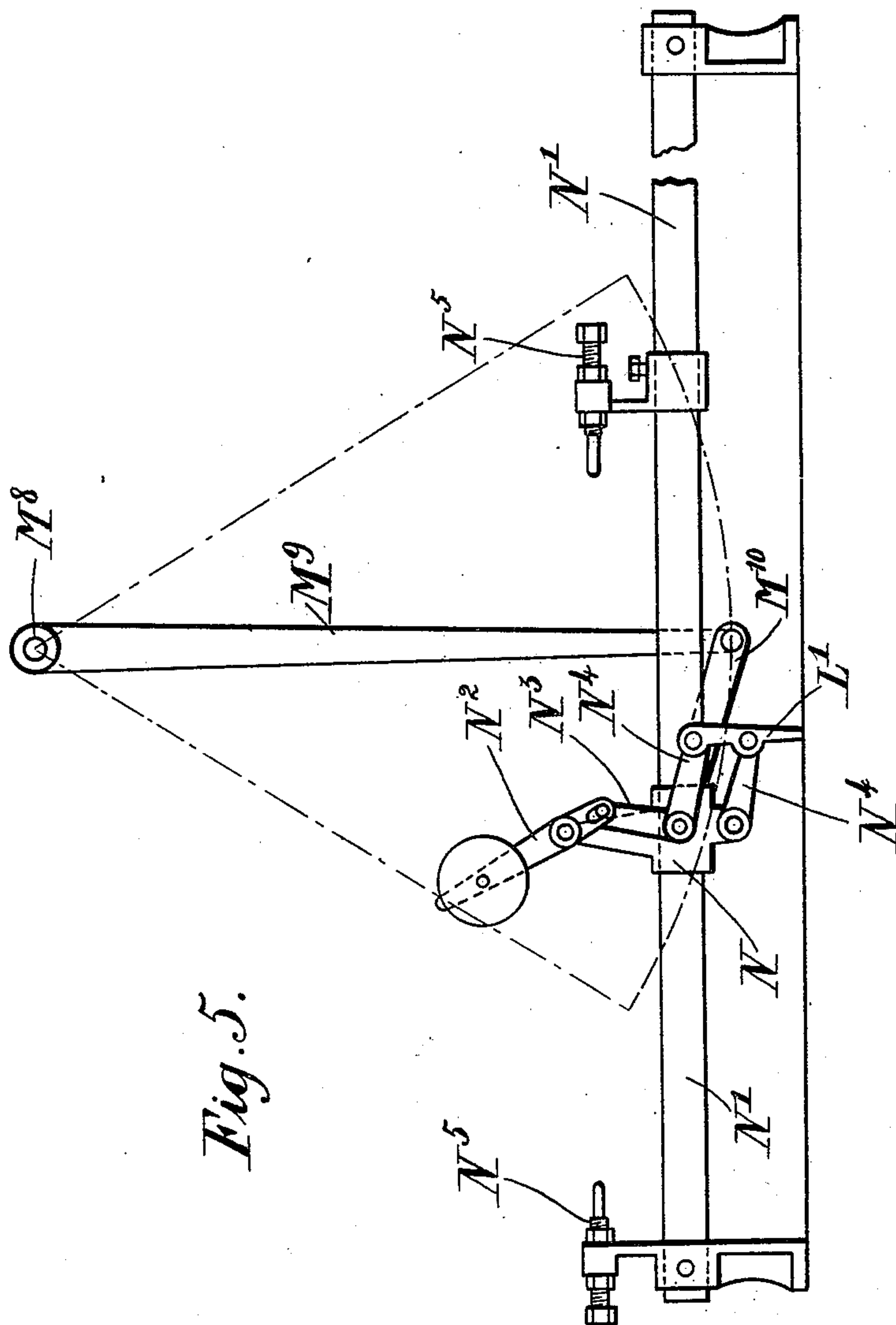
Patented Aug. 13, 1901.

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(No Model.)

11 Sheets—Sheet 5.



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G. S. BAKER.
CONVEYER APPARATUS.

(Application filed Feb. 4, 1901.)

(No Model.)

11 Sheets—Sheet 6.

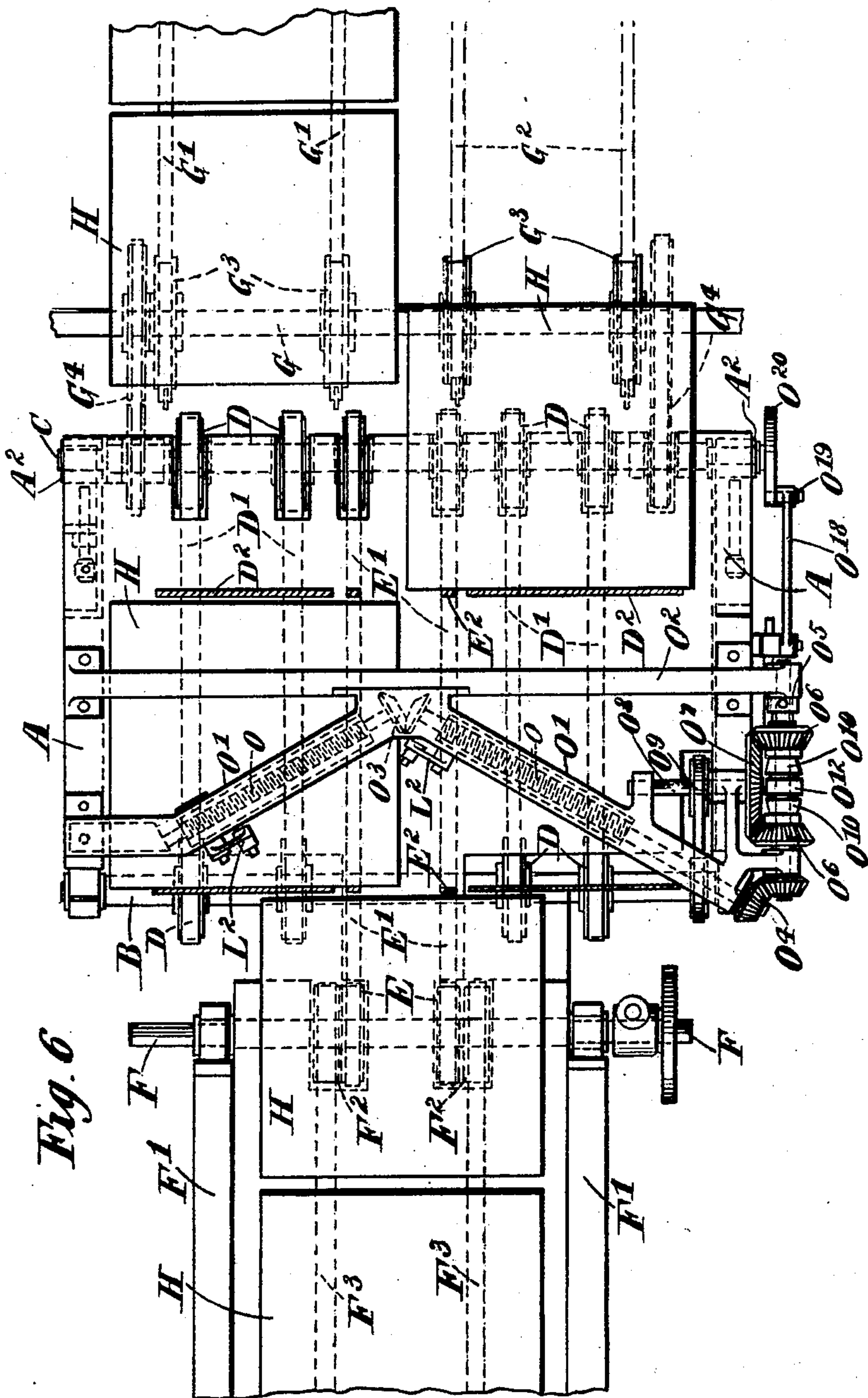


Fig. 6

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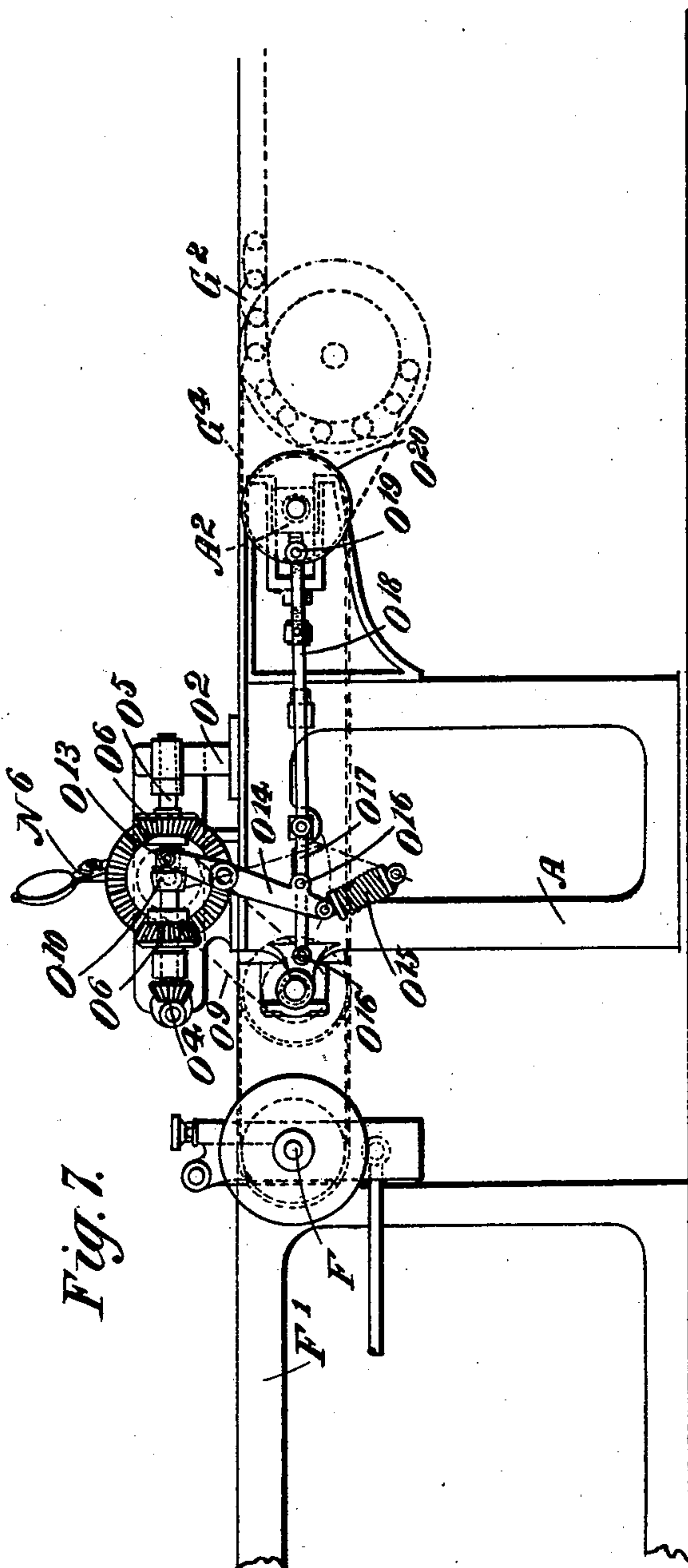
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(No Model.)

11 Sheets—Sheet 7.



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G. S. BAKER.
CONVEYER APPARATUS.

(Application filed Feb. 4, 1901.)

(No Model.)

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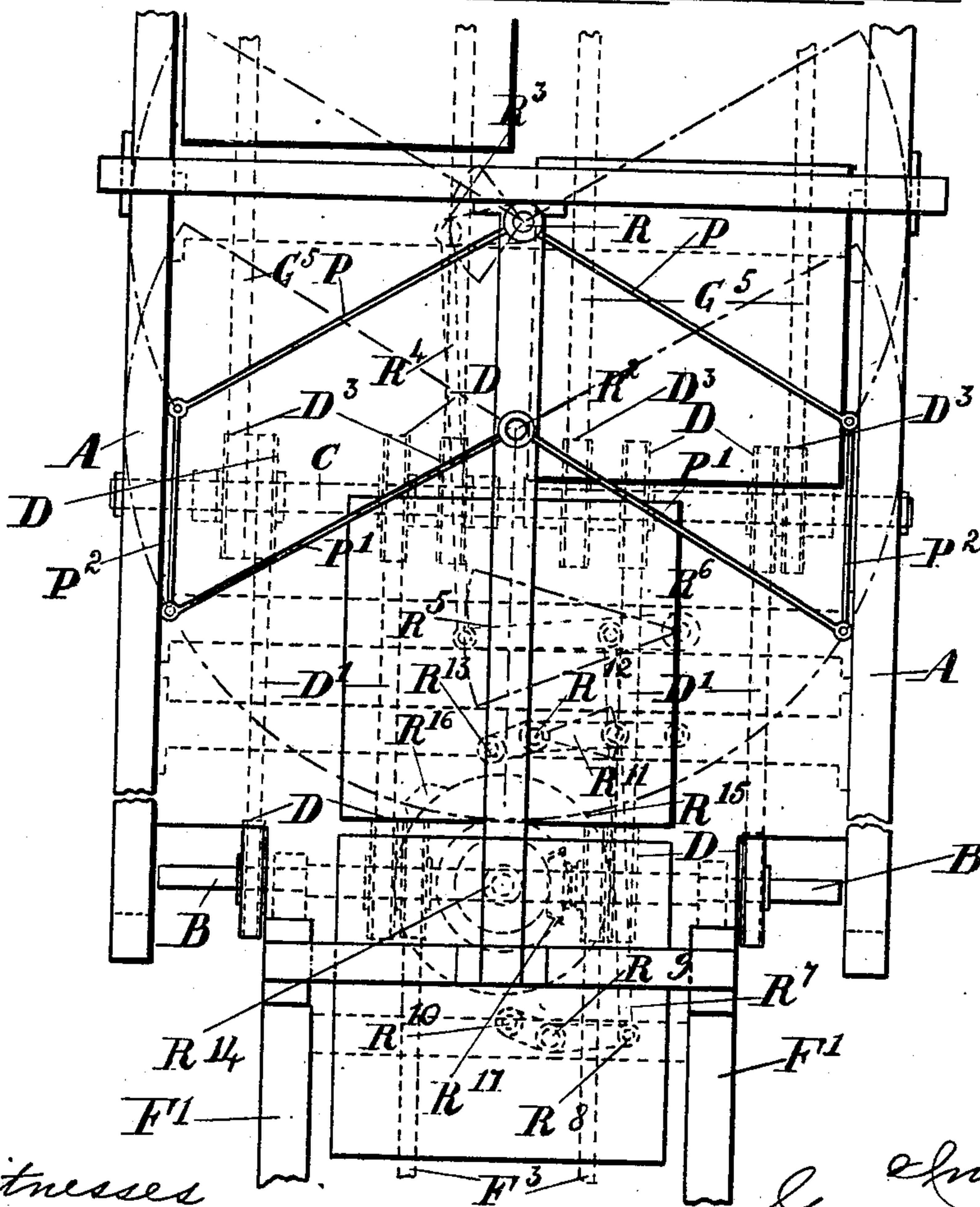
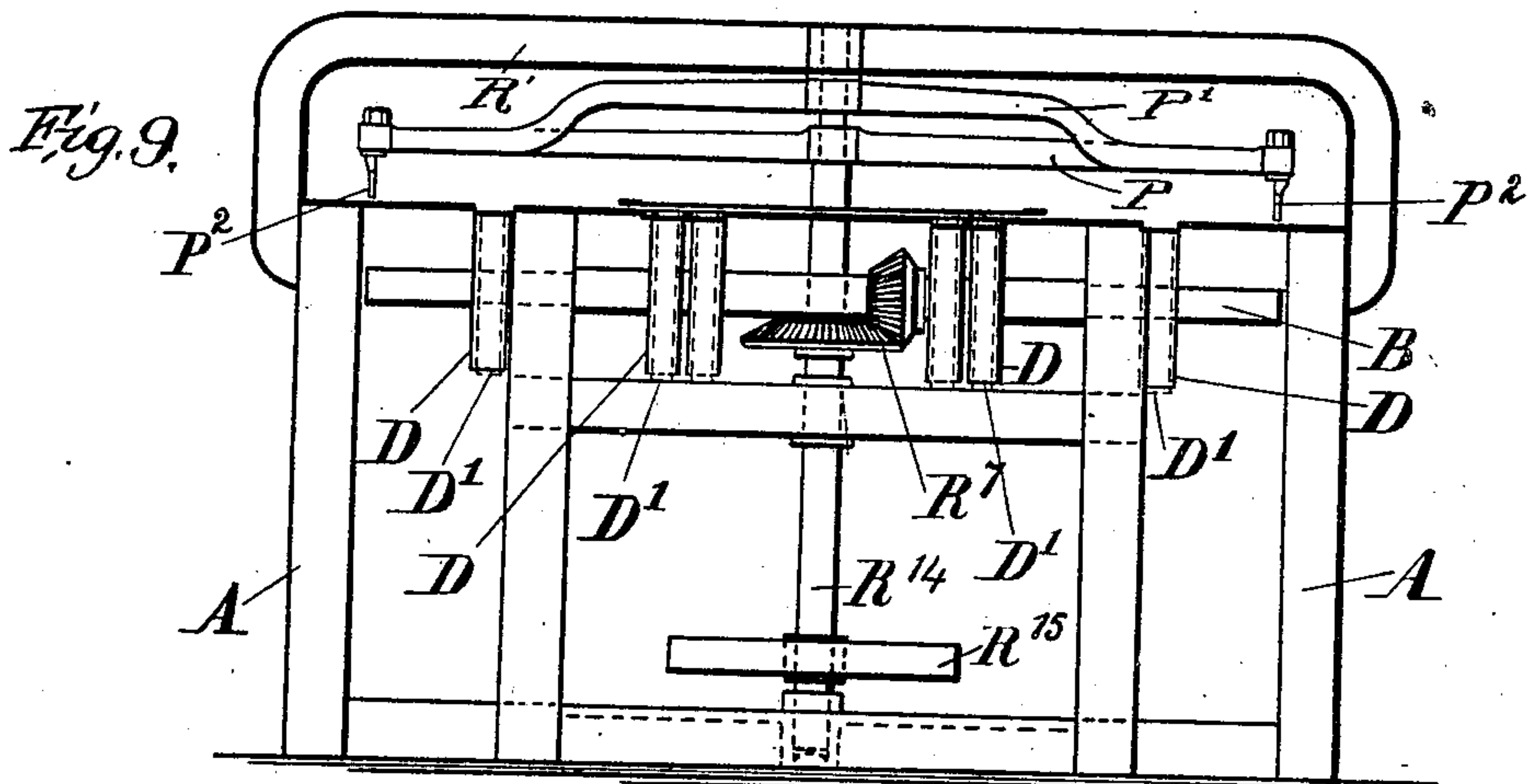


Fig. 8.

Witnesses
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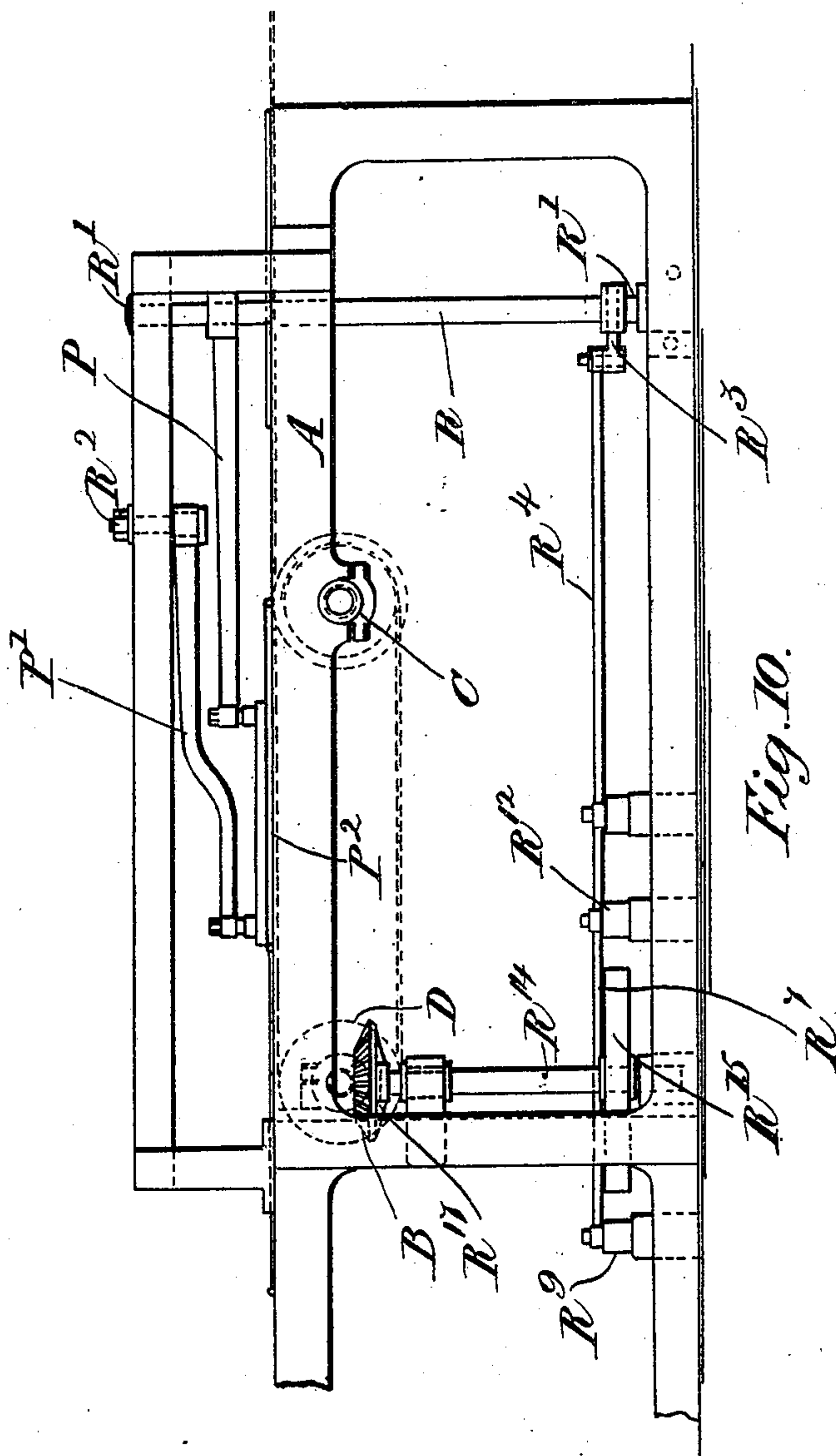
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G. S. BAKER.
CONVEYER APPARATUS.
(Application filed Feb. 4, 1901.)

(No Model.)

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Witnesses
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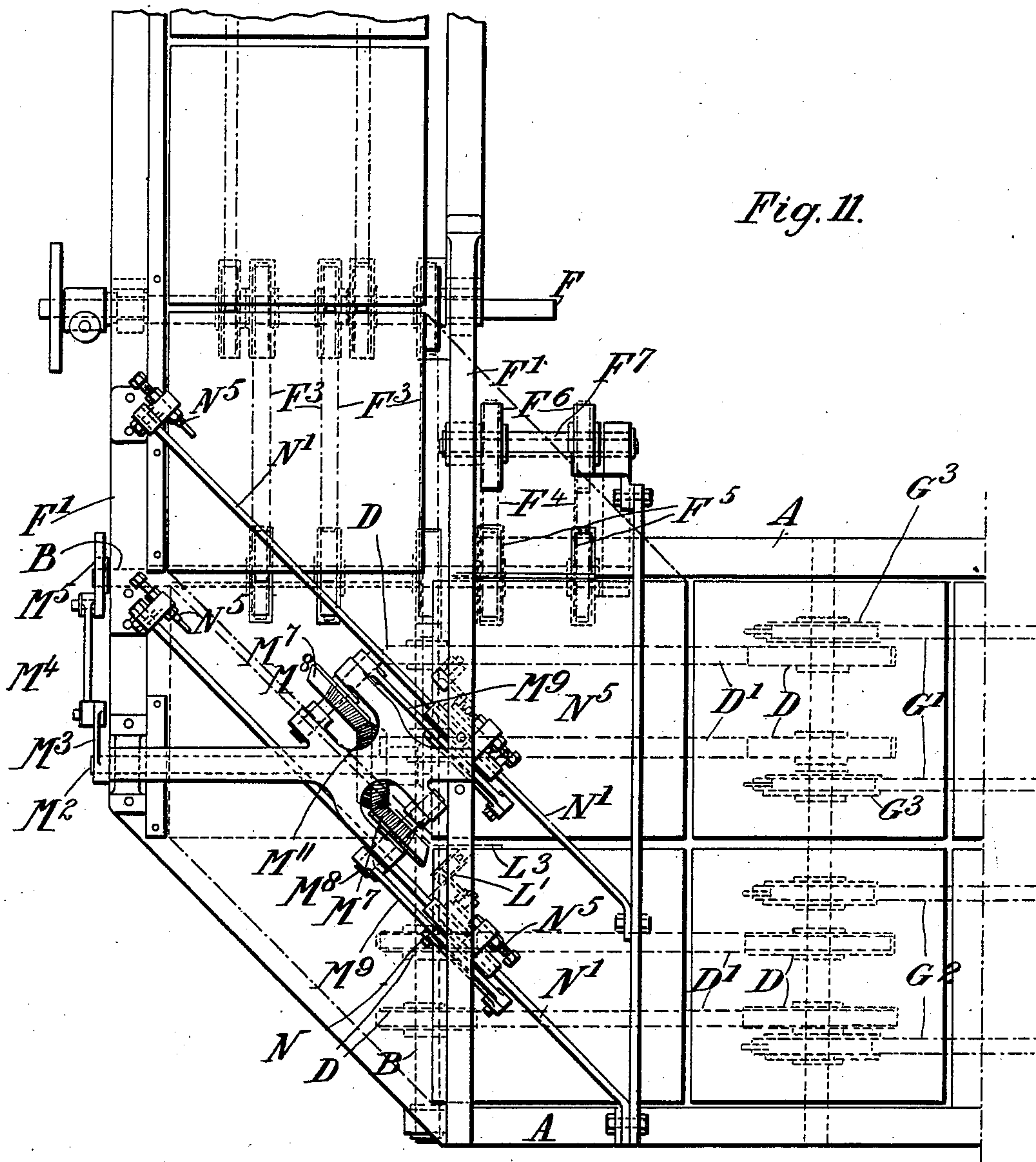
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CONVEYER APPARATUS.

(Application filed Feb. 4, 1901.)

(No Model.)

11 Sheets—Sheet 10.



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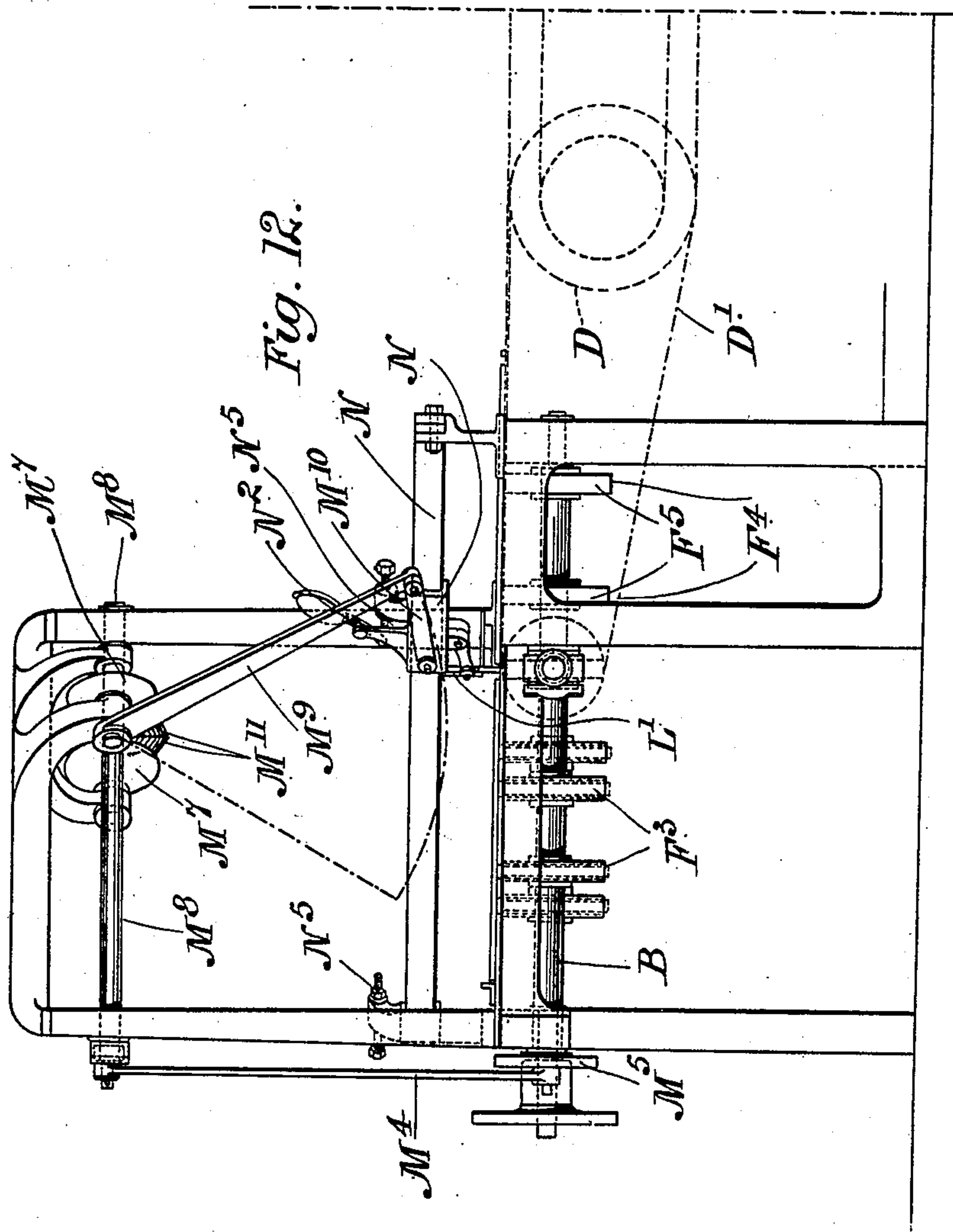
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CONVEYER APPARATUS.

(Application filed Feb. 4, 1901.)

(No Model.)

11 Sheets—Sheet 11.



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UNITED STATES PATENT OFFICE.

GEORGE SAMUEL BAKER, OF LONDON, ENGLAND.

CONVEYER APPARATUS.

SPECIFICATION forming part of Letters Patent No. 680,214, dated August 13, 1901.

Application filed February 4, 1901. Serial No. 45,953. (No model.)

To all whom it may concern:

Be it known that I, GEORGE SAMUEL BAKER, a subject of the Queen of England, residing at London, England, have invented
5 certain new and useful Improvements in or Relating to Conveyer Apparatus, (for which application has been made in Great Britain, under No. 12,964, dated July 18, 1900,) of which the following is a specification.

10 This invention relates to chain or other conveyer apparatus, and has for its object the provision, in combination with apparatus from which pans, plates, buckets, trays, or the like are delivered in a single row and
15 other apparatus through which they are to travel in two or more rows, of novel means which automatically divert the trays from the single row in the desired order and at proper intervals and cause them to form into the two
20 or more rows into which they are to subsequently travel.

This invention is applicable with advantage to, for example, biscuit-cutting machines delivering to traveling-chain baking-ovens
25 for taking pans charged with biscuits from the cutting-machine and delivering them automatically in two or more rows into the chain baking-oven, and thereby dispensing with the manual labor and loss of time hitherto involved where the transfer of the pans
30 from the one apparatus to the other has been made, as heretofore, by hand-labor. A similar automatic transfer is, moreover, applicable with advantage to other apparatus than that
35 just previously mentioned by way of example.

This invention is applicable not only in cases where the movement of the pans or the like into the receiving apparatus is in line or parallel with the direction in which they issue
40 from the delivering apparatus, but also in cases where these movements occur in directions at an angle with each other.

In the description which follows, this invention is referred to, for convenience, in its application to a biscuit-cutter delivering flat
45 pans to a chain baking-oven into which the pans pass in two rows, although it must be understood that the pans can be made to travel in more than two rows and that the invention can be used in manufactures other
50 than that of biscuits.

In one construction according to this invention endless-chain conveyers extend from the delivery end of the cutting-machine to the point of entry of each row of pans into the
55 mouth of the baking-oven and are operated by any convenient means—say from the gear which drives the cutting-machine or the oven-chains—so that they preferably run at the same speed as that at which the charged pans
60 are delivered from the cutting-machine. Certain of these chains have projections on them by which certain of the pans are taken straight forward into the baking-oven. Other
65 of the chains running in the same plane parallel with the former are provided with elongated projections which extend in between successive pans issuing from the cutting-machine and not only serve to propel the pans
70 in the desired direction, but also constitute guides between alternate pans which are moved forward, as described, and also shifted laterally, so as to finally enter the oven in a path parallel with that of their companion
75 pans. To effect the lateral movement of the pans in the desired order and to the desired extent while they travel onward, various devices according to this invention may be adopted, these devices being geared to the
80 cutting-machine or driven independently, as may be desired.

One shifting device according to this invention comprises a pair of endless chains disposed in the same vertical plane which lies
85 aslant the path of issue of the charged pans from the cutting-machine. These two chains have attached to them a vertical finger, which extends down from them sufficiently far to come into contact with the sides of the
90 pans. The two chains run at the same speed, and during a complete cycle of their movement they cause the finger to act upon the side of one of the pans and to push it laterally out of its place into the next row while
95 being moved forward and then lift it clear of the pans and return it across them, so that it misses the succeeding pan and arrives at the point whence it started in time to operate upon the next pan but one, pushing that into
100 the second row in similar fashion. The speed of the finger in its path aslant that of the issuing pans is such that its component in

the line of forward travel of the pans represents the speed of the pans in the direction of the component.

In another construction according to this invention the finger is carried by parallel arms pivoted on a cross-head which is moved backward and forward by an oscillating lever along a guide disposed aslant the path of the issuing pans. Mounted on the cross-head and geared to the parallel arms by a toggle is a weighted lever which will hold the finger in either of its extreme positions—that is to say, down to bear against the sides of the pans or up clear of them. From one of these two positions to the other the finger is caused to move at the ends of its travel by stops, with which the finger-operating apparatus—say the toggle—comes into contact to cause the weighted lever to shift from one extreme position to the other. Conveniently these stops are movable and may be screw-stops, by which the point at which the tilting of the weighted lever takes place may be adjusted to a nicety.

In a further construction according to this invention the cross-head carrying the finger and its operating-gear is caused to reciprocate aslant the path of the charged pans by a screw turned alternately in opposite directions by gearing which is under the control of a reversing-clutch thrown over mechanically at the desired intervals. Conveniently the arm of the operating-clutch may form a toggle conjointly with a spring which is pivoted in line with a fulcrum of the arm, so that the expansion of the spring tends to keep the lever over in either of its two extreme positions. A convenient construction embodying this screw-gear is one in which the pans issue from the cutting and forming machine in a single row in line with the center of two rows in which they enter the baking-oven, two operating-screws disposed in a horizontal plane being geared together at the obtuse angle at which they meet and which is presented toward the oven. By this construction the pans issuing from the cutting-machine are diverted alternately to right or left from a central chain with projections and into the spaces between coincident but longer projections on chains disposed in line with the two series of chains in the baking-oven.

An additional construction according to this invention comprises pairs of parallel arms pivoted to stationary pivots between the rows of pans entering the baking-oven and oscillating in a horizontal plane to divert the pans by means of a coupling rod or bar laterally as they issue from the cutting-machine. Conveniently these arms can be caused to reciprocate at desired intervals by rods operated by tappet or other cams, which may be driven from the cutting-machine. Where a single row of pans from the cutting-machine has to be diverted into two rows in the oven, the arms may extend from pivots between the

two series over both the rows and be operated so that the pairs of arms move inward alternately, moving the first pan to the right and the next to the left, &c., as they issue from the cutting-machine.

Where the rows of pans in the baking-oven are to lie at an angle to the row issuing from the cutting-machine, the one, two, or more pans at the end of the single row are simultaneously shifted sidewise or in the direction of their diagonals, where the oven and cutter are at right angles, so as to arrive simultaneously and side by side at the ends of the rows in the oven. This simultaneous shifting may be effected by shifting devices of the kinds herein described arranged parallel to each other in pairs aslant the line of issue of the pans from the biscuit-cutting machine, reinforced, if desired, by conveyer-chains arranged in the angle between the two machines and feeding the pan that traverses that angle toward that row which it is intended to occupy in the oven. Conveniently these auxiliary chains run at right angles to that row. The angles of the pans may be engaged by an angular pusher in this construction. This pusher preferably would be applied to the pan which is farthest from the angle between the cutting-machine and the oven, as it could not be assisted by the auxiliary conveyer provided in that angle.

This invention also comprises the employment of diagonal transferring-chains above or below the plane in which the main conveyer-chains of the cutting-machine and oven travel. These chains effect the lateral movement of the pans out of the one row from the cutting-machine into the two or more rows for the oven. The main chains for conveying the pans may be above them, and the others, or the mechanism previously described for shifting them laterally, may be below, or vice versa.

In the accompanying drawings, which illustrate various forms of conveyer apparatus all according to this invention, Figures 1 and 2 are respectively a plan and a side elevation of one construction of conveyer. Figs. 3 and 4 are similar views of another construction. Fig. 5 is a diagram showing in elevation a portion of the apparatus illustrated in Figs. 3 and 4. Figs. 6 and 7 are respectively a plan and a side elevation of another construction. Fig. 8 is a plan showing a portion of another construction. Fig. 9 is an end elevation of the same. Fig. 10 is a side elevation of the same, and Figs. 11 and 12 are respectively a plan and an elevation of yet another construction of conveyer.

Like letters indicate like parts throughout the drawings.

With reference first to Figs. 1 and 2, A indicates standards forming the frame of the apparatus and carrying at one end in bearings A' a shaft B and at the other end in adjustable bearings A² another shaft C. Upon the shaft B are chain-wheels D, in line with similar

wheels upon the shaft C, each pair of wheels being connected by an endless chain. The shaft C also carries two other chain-wheels E, which, in conjunction with similar wheels upon a shaft F, carry chains E', parallel with and running in the same plane as the chains D'. The shaft F forms part of a cutting-machine, the details of which form no part of the present invention. The ends of its standards F', however, are shown in Figs. 1 and 2, and the shaft F carries other chain-wheels F², which help to support chains F³, upon which the pans travel in single row from the cutting-machine to the conveyer. These chain-wheels F² may themselves be the wheels of the cutting-machine. Adjacent to the other end of the conveyer is a baking-oven, a portion only of which is shown in the figures. It is provided with two sets of chains G' G², carried by chain-wheels G³, which are mounted upon a shaft G. This shaft G forms part of a conveyer or chain-oven, and the auxiliary chains G⁴ are driven therefrom, the corresponding wheels on the shaft C running loosely. The three machines—namely, the cutting-machine, the conveyer, and the baking-oven—may be driven from the shaft F of the cutting-machine, which may be driven through the chains F³ or from any available source of power. It is, however, preferable for the conveyer to be driven from the cutting-machine and the oven driven independently. The chains E' are provided with projections E², which serve to engage trays or pans H, which are brought onto the chains E' by the chains F³ of the cutting-machine. The other conveyer-chains D' have elongated projections D², which are spaced to correspond with the projections E² and serve not only to convey any pans which are placed between them toward the baking-oven, but also act as guides while these pans are shifted laterally from the chains E' to the chains D'.

The mechanism for transferring alternate pans from the chains E' to the chains D' will now be described. Upon the standards A is secured a cross-frame J, which supports one end of a diagonal frame J', the other end of which is supported upon one of the standards A. Within this frame J' are two chains (not shown in the drawings) which travel in the same vertical plane and have studs J², which project through slots J³ in the frame J'. These chains are caused to travel by bevel-gearing K K', the gear K being driven from the shaft F and connected to the gear K' by a shaft K². Although details of the chains are not shown, it will be readily appreciated that by suitably mounting them they can be caused to travel so that the studs J² travel around and around each in its respective slot J³. The studs J² are connected by a finger L, and when the studs J² are traveling in the direction of the arrows in Fig. 2 along the lower portions of the slots J³ the finger L makes contact with the edge of one of the pans H and causes that pan to travel from the chains E' gradually

across between the guides D² onto the chains D'. The pan is completely transferred by the time the finger has reached the end of its travel in the direction above indicated, and the studs J² then move up onto the upper portion of the slots J³ and return the finger L, the latter being then at such a height that it clears the next pan H, which consequently moves forward, continuing on the chains E'. The edge of the third pan is engaged by the finger when it descends, and that pan is then transferred, as described with reference to the first pan, to the chains D'. The chains D' deliver the pans which they carry to the chains G' in the baking-oven and the chains E' deliver their pans to the chains G², and thus it will be seen that the pans which issue in a single row from the cutting-machine are caused by the conveyer apparatus to enter the baking-oven in two rows.

The general construction of the apparatus illustrated in Figs. 3 and 4—such as the framing, the relative arrangement of the cutting-machine, conveyer, and baking-oven, with their traveling chains—is substantially similar to that described with reference to Figs. 1 and 2; but a modified construction of shifting-gear is employed for transferring alternate pans from the chains E' to the chains D', and this mechanism will now be described. Upon the standards A is a cross-frame M, supporting in brackets M' a shaft M². To one end of this shaft is fixed a crank M³, connected by a rod M⁴ to a crank-disk M⁵, mounted upon the shaft B. Near the other end of the shaft M² is mounted a bevel-wheel M⁶, which gears with another bevel-wheel M⁷, carried upon a shaft M⁸ in bearings upon the frame M. One end of an oscillating lever M⁹ is secured to the shaft M⁸, the other end of the lever being connected by a link M¹⁰ to a cross-head N, which can slide backward and forward upon a guide N', mounted upon the standards A aslant of the path of travel of the chains D' and E'. Pivoted upon the cross-head N is a weighted lever N², connected through a toggle N³ with parallel arms N⁴, also pivoted to the cross-head N. The other ends of these parallel arms N⁴ are joined to a vertical finger L', which corresponds in its function to the finger L, mentioned with reference to Figs. 1 and 2. When the arms N⁴ are in their lower position, as shown in Figs. 2 and 3, the finger L' engages with the edge of one of the pans H, and when they are raised the finger L' is clear of them. The position of the arms N⁴, and consequently of the finger L', is determined by the weighted lever N², which falls into one or other of two extreme positions. (Indicated in dotted lines in Fig. 5.) The lever N² is thrown over into one or other of these positions at the end of each oscillation of the lever M⁹, for the movement of that lever carries the cross-head N along the guide N' until the toggle N³ comes into contact with a stop N⁵, of which there are two secured upon the guide N'. The relative po-

sition of the various parts of the shifting mechanism is clearly shown in Fig. 5. The stops N^5 are adjustable to allow for exact regulation of the point at which the finger shall alter its position. The operation of this conveyor is similar to that described with reference to the construction illustrated in Figs. 1 and 2, except that in place of the continuously-traveling diagonal chains carrying the finger L there is the oscillating lever M^9 with its appurtenances.

In the form of conveyor illustrated in Figs. 6 and 7 the chains F^3 of the cutting-machine deliver the pans H, as before, to chains E' of the conveyor, having short projections E^2 ; but there are two pairs of chains D' , with long guide projections D^2 , one pair traveling on one side of the chains E' and the other pair on the other side. In this construction the pans are not delivered directly from the chains E' to the chains of the baking-oven, but are diverted alternately to right and left first to one pair of chains D' and then to the other, one pair of chains D' delivering to the chains G' of the baking-oven and the other pair to the chains G^2 of that device. The transference of the pans from the chains E' to the chains D' is brought about by means of a finger which operates in substantially the same way as the finger L' , described with reference to Figs. 3, 4, and 5. The finger is indicated at L^2 in Fig. 6, but the toggle, weighted lever, and stops are omitted for the sake of clearness, one of the weighted levers being, however, indicated at N^6 in Fig. 7. In the present construction there are two fingers, one to divert the pans to one pair of chains D' and the other to move the pans to the other pair of chains D' . The fingers are operated by screws O, carried in guide-frames O' , attached to a cross-bar O^2 and to the standards A. These screws are connected by bevel-gear O^3 and are driven by bevel-gear O^4 . This gear is operated from a shaft O^5 , which carries two bevel-wheels O^6 normally free to revolve about it. These bevel-wheels O^6 engage with a common bevel-wheel O^7 , which is mounted upon a shaft O^8 and driven by gear O^9 . Free to slide upon the shaft O^5 , but turning with it, are two friction-cones O^{10} , each of which can engage with a friction seating in the adjacent bevel-wheel O^6 . It will be seen that the direction of rotation of the screws O is determined by which of the friction-cones O^{10} is in connection with its bevel-wheel O^6 , and this is controlled by mechanism which will now be described. The friction-cones O^{10} are mounted or formed upon a sleeve, which is encircled by a collar O^{12} . This collar is provided with trunnions O^{13} , Fig. 7, which engage with one end of a reversing-lever O^{14} , pivoted to the frame of the machine. The other end of this lever O^{14} is attached to and forms a toggle with a spring O^{15} , and this spring by its expansion tends to keep the lever O^{14} in one or other of two positions indicated in Fig. 7. In one position

one friction-cone O^{10} is engaged with its corresponding wheel O^6 , and in the other position the other friction-cone O^{10} is engaged with its wheel. The shifting of the reversing-lever O^{14} from one position to the other is brought about by means of stops O^{16} , carried upon a sliding rod O^{17} , which is reciprocated, through a connecting-rod O^{18} , by a crank-pin O^{19} , which is mounted upon a disk O^{20} at the end of the shaft C. The operation of this conveyor will be readily understood from the description already given of the working of the other forms of conveyers. The fingers L^2 operate alternately to divert the pans H first to one side and then to the other, the motion of the screws O, driving the fingers, being reversed by the lever O^{14} and the friction-clutch which it carries.

In the conveyor, of which portions are illustrated in Figs. 8, 9, and 10, the chains F^3 of the cutting-machine deliver the pans centrally in a single row to two sets of chains D' in the conveyor. These chains D' are carried, as in the constructions previously described, upon chain-wheels D on shafts B and C, and other chain-wheels D^3 , loose upon the shaft C, support chains G^5 , which are driven from other chain-wheels, forming part of the baking-oven and not shown in Figs. 8, 9, and 10. The shifting mechanism comprises two sets of parallel arms P and P' . The arms P are mounted upon a shaft R, placed centrally with regard to the two rows into which the pans are to be diverted. This shaft R is supported in bearings R' of the frame of the conveyor. The other arms P' are pivoted to a point R^2 also on the center line of the apparatus. The extremities of the arms P and P' are coupled by bars P^2 , and these bars P^2 engage with the sides of the pans H and divert them first to one pair of chains D' and then to the other pair. The motion of the parallel arms P P' is brought about in the following way: To the shaft R is attached a crank R^3 , joined by a connecting-rod R^4 to a lever R^5 , which is pivoted, as at R^6 , to the frame of the machine. Pivoted to the lever R^5 between its pivot R^6 and the end at which it is attached to the connecting-rod R^4 is a connecting-rod R^7 , the end of which is connected to one arm of a lever R^8 , pivoted at R^9 and carrying a friction-roller R^{10} at the end of its other arm. A lever R^{11} , similar to the lever R^8 , is pivoted at R^{12} and has one arm attached to the connecting-rod R^7 at a point somewhat near the lever R^5 . The other arm of this lever R^{11} carries a friction-roller R^{13} . Midway between the levers R^9 and R^{11} is a vertical shaft R^{14} , carrying a disk R^{15} , upon the periphery of which is a projection or cam R^{16} . The shaft R^{14} is rotated by bevel-gear R^{17} from the shaft B, and when the cam R^{16} comes in contact with the friction-roller R^{13} the shaft R will, through the action of the various levers and connecting-rods, be rotated in one direction, carrying the parallel arms P P' with it and shift-

ing a pan to one set of chains D'. When the cam R¹⁶ has been carried around by the next half-revolution of the shaft R¹⁴ into contact with the friction-roller R¹⁰, the shaft R is rotated for a similar amount in the opposite direction and the other set of arms move inward, shifting the next pan onto the other set of chains D', the first-mentioned pair of parallel arms returning to their original position. In Fig. 8 the limits of motion of the various parts are indicated in chain-lines.

Figs. 11 and 12 show a form of conveyer which is useful when it is required to cause the pans coming in single row from the cutting-machine to travel, say, in double rows at an angle to the single row to the baking-oven. In this construction the pans H are delivered by the chains F⁸ of the cutting-machine and the two end pans are shifted diagonally simultaneously, so that they arrive side by side on the chains D', which convey them to the chains G' and G² of the baking-oven. The shifting mechanism is substantially similar to that described with reference to Figs. 3, 4, and 5, cross-heads N, carrying the fingers L', being caused to travel along guide-bars N' by the action of oscillating levers. In the present construction there are two sets of shifting-gear, as it is required to move two pans simultaneously. Each of the oscillating levers M⁹, Fig. 11, is mounted upon a shaft M⁸, which carries a bevel-wheel M⁷, and each of the wheels M⁷ gears with a wheel M¹¹, common to them both. This wheel M¹¹ is mounted upon a shaft M², having a crank M³ attached to it. This crank is operated through a connecting-rod M⁴ from a crank-disk M⁵, mounted upon the shaft B. In order to assist the progress of the pans which traverse the angle between the cutting and forming machine and the conveyer and baking-oven, auxiliary chains F⁴ are provided driven from chain-wheels F⁵ on the shaft B and supported upon similar wheels F⁶ upon a counter-shaft F⁷. The pans moved by the lower set of shifting mechanism are engaged by an angle-piece L³, which forms part of the finger L' and fits the corner of the pan, thus assisting to keep it in its right path.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In conveyer apparatus the combination of a conveyer to carry articles in a single row, a plurality of conveyers traveling synchronously side by side one of which receives the

articles delivered by the first conveyer, registering projections upon the conveyers which serve as guides for the articles and means to divert alternate articles from one conveyer to another substantially as set forth.

2. In conveyer apparatus the combination of a conveyer to carry articles in a single row, a plurality of conveyers traveling synchronously side by side, one of which receives the articles delivered by the first conveyer, registering projections upon the conveyers which serve as guides for the articles, a downwardly-extending projection, and means to move the projections in a path oblique to the direction of travel of the articles substantially as set forth.

3. In conveyer apparatus the combination of a conveyer to carry articles in a single row, a plurality of conveyers traveling synchronously side by side, one of which receives the articles delivered by the first conveyer, registering projections upon the conveyers which serve as guides for the articles, a downwardly-extending projection, means to move the projection in a path oblique to the direction of travel of the articles and means to raise and lower the projection out of or into engagement with the articles substantially as set forth.

4. In conveyer apparatus the combination of a conveyer to carry articles in a single row, a plurality of conveyers traveling synchronously side by side, one of which receives the articles delivered by the first conveyer, registering projections upon the conveyers which serve as guides for the articles, a guide disposed obliquely to the direction of travel of the articles, a cross-head sliding upon the guide, a lever linked to the cross-head, means for oscillating the lever, parallel arms pivoted to the cross-head, a downwardly-extending projection carried by the parallel arms, a weighted lever pivoted to the cross-head and connected to the parallel arms by a toggle-joint and adjustable stops upon the guide in the path of the toggle-joint operating to cause the weighted lever to raise and lower the downwardly-extending projection substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GEORGE SAMUEL BAKER.

Witnesses:

WALTER J. SKERTEN,
WILMER M. HARRIS.