No. 813,049. PATENTED FEB. 20, 1906.

B. J. LINDGREN.

PERFORATING MACHINE.

APPLICATION FILED JUNE 17, 1904

5 SHEETS—SHEET 1.

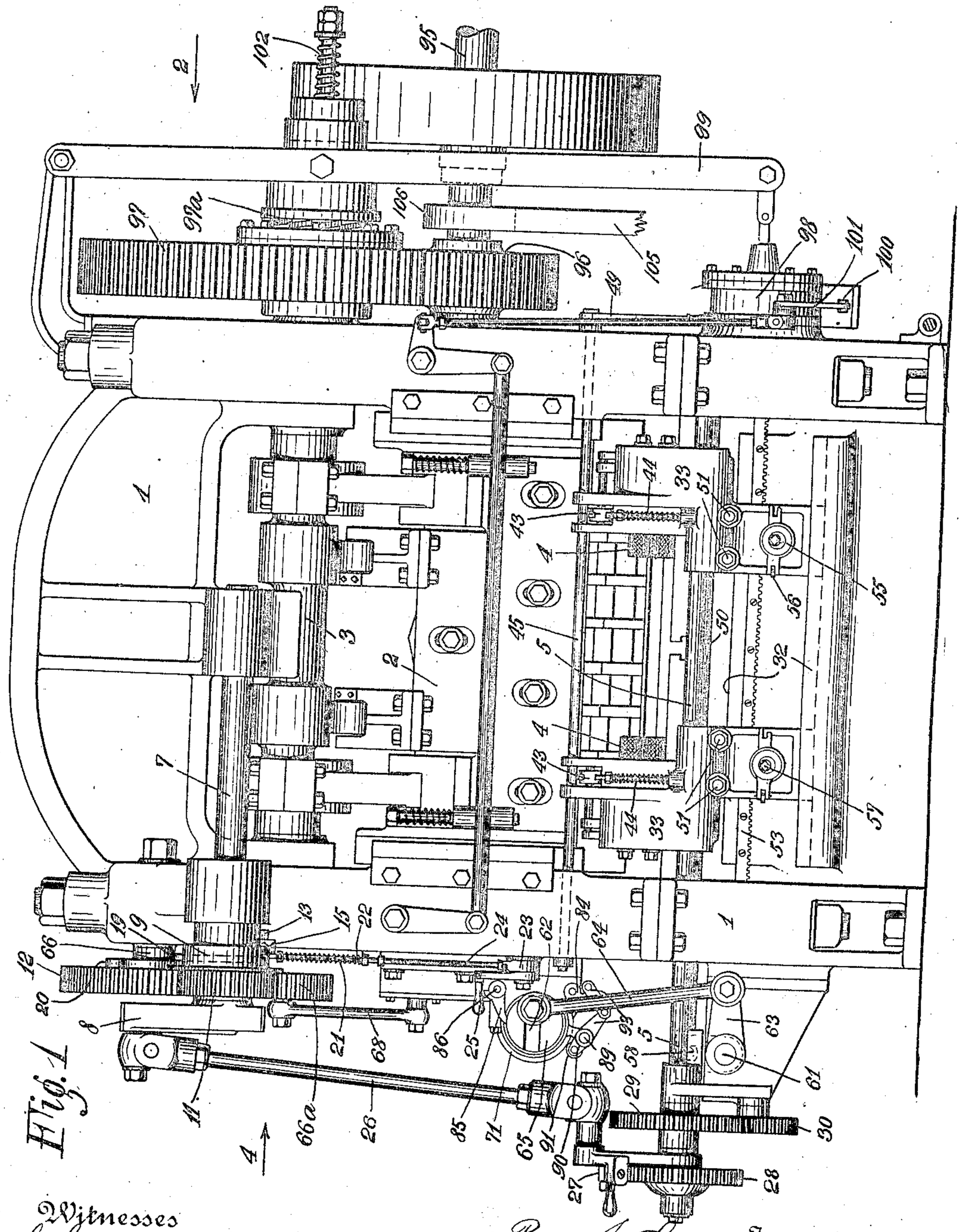

Fig. 1.

Witnesses
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Ivan Konigsberg

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Deeken & Spaulding

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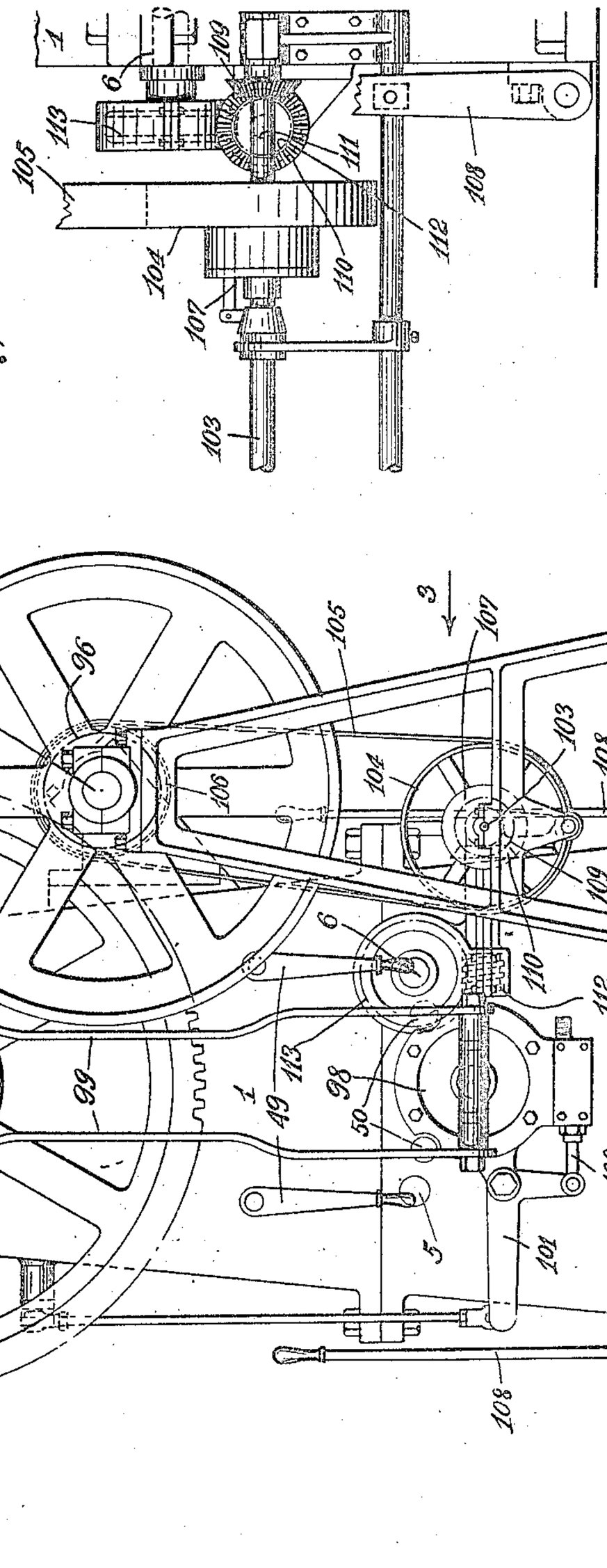

Fig. 3

Fig. 2

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5 SHEETS—SHEET 3.

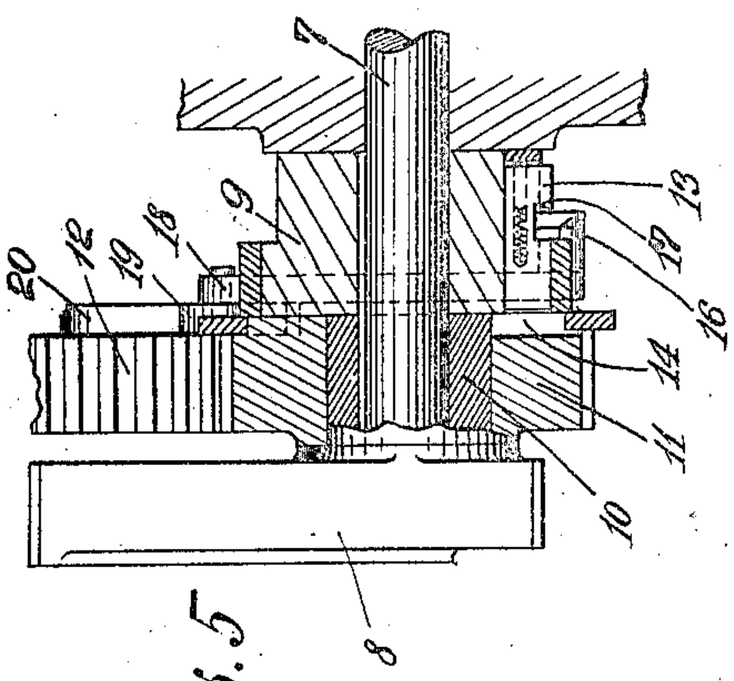

Fig. 5

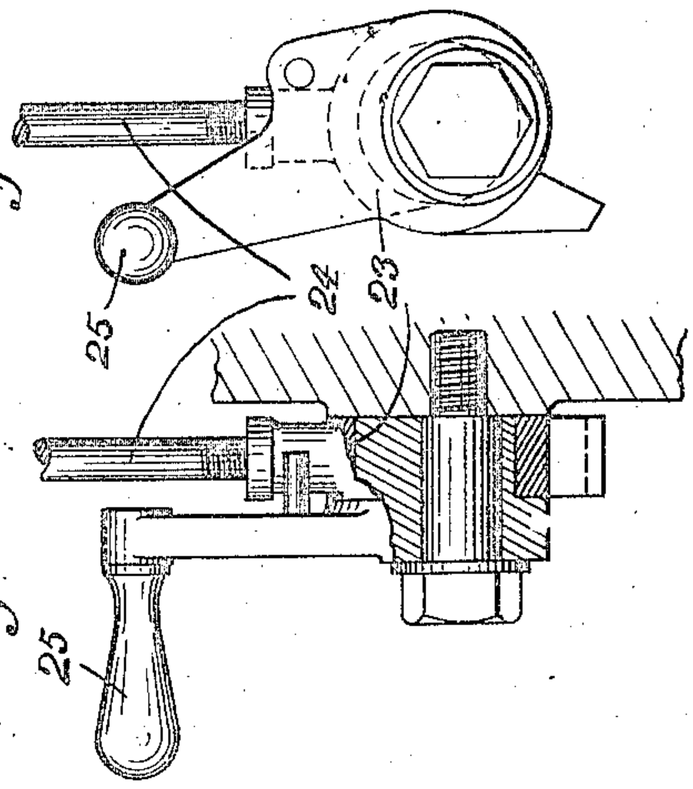

Fig. 7

Fig. 6

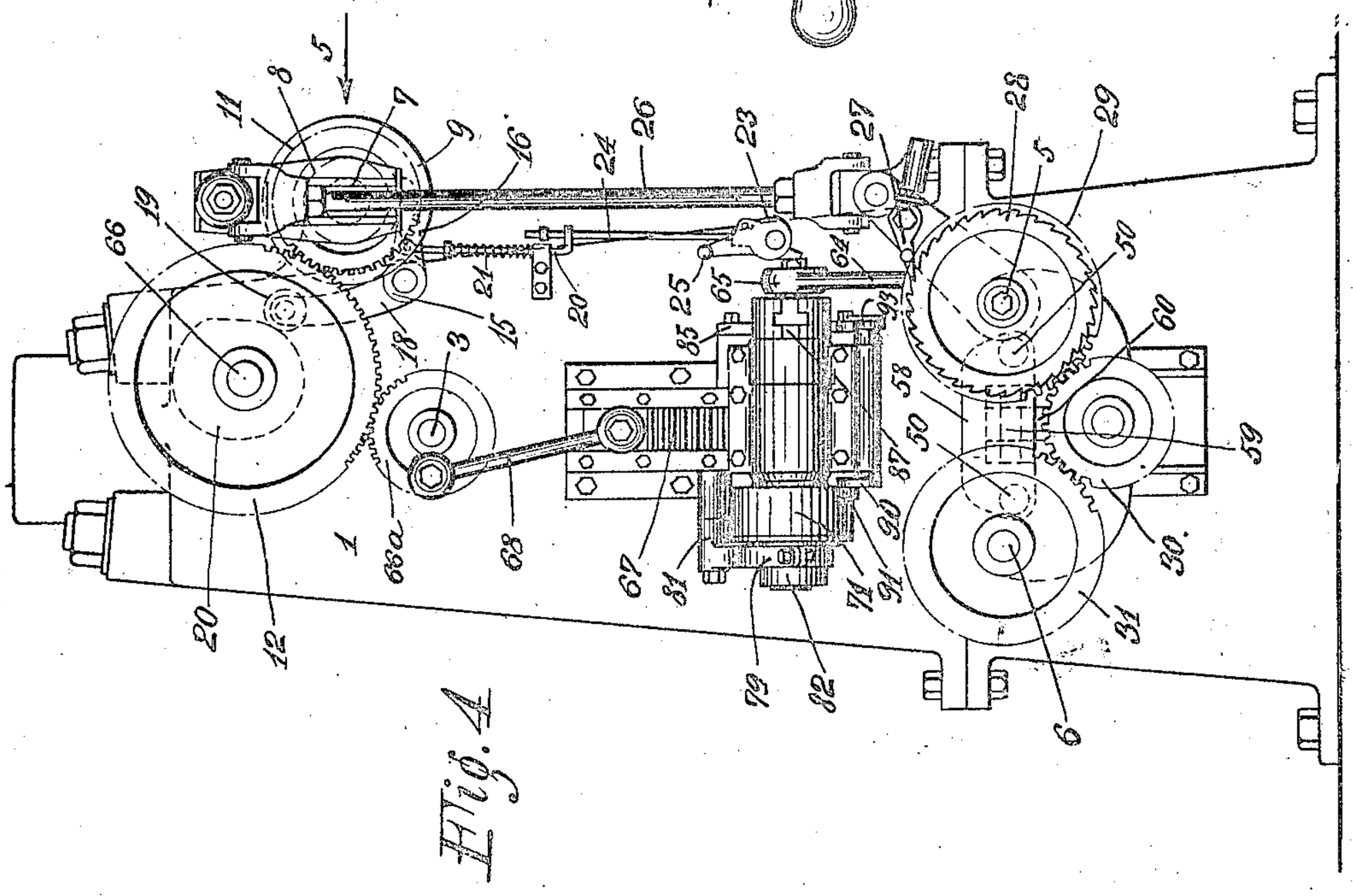

Fig. 4

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5 SHEETS—SHEET 4.

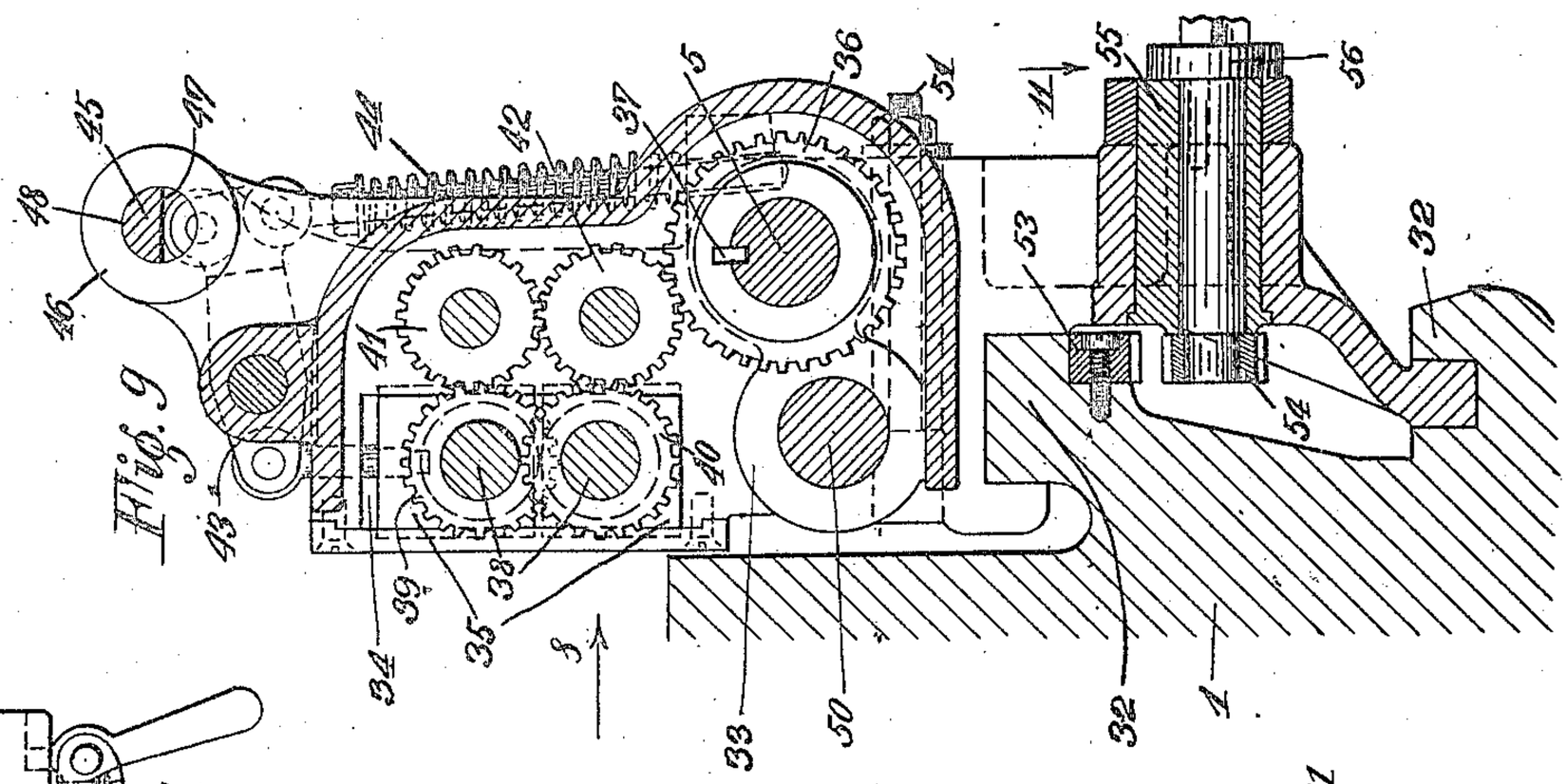

Fig. 9.

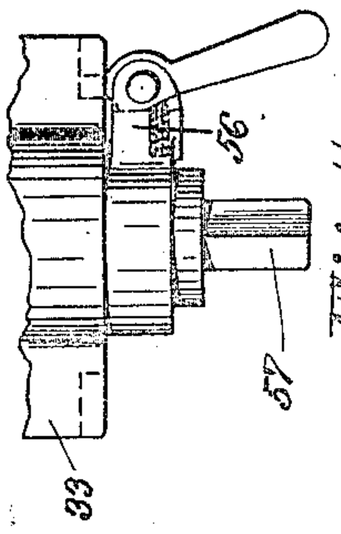

Fig. 11.

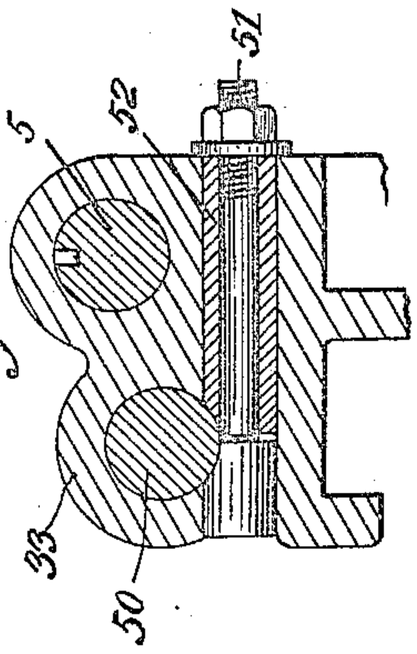

Fig. 10.

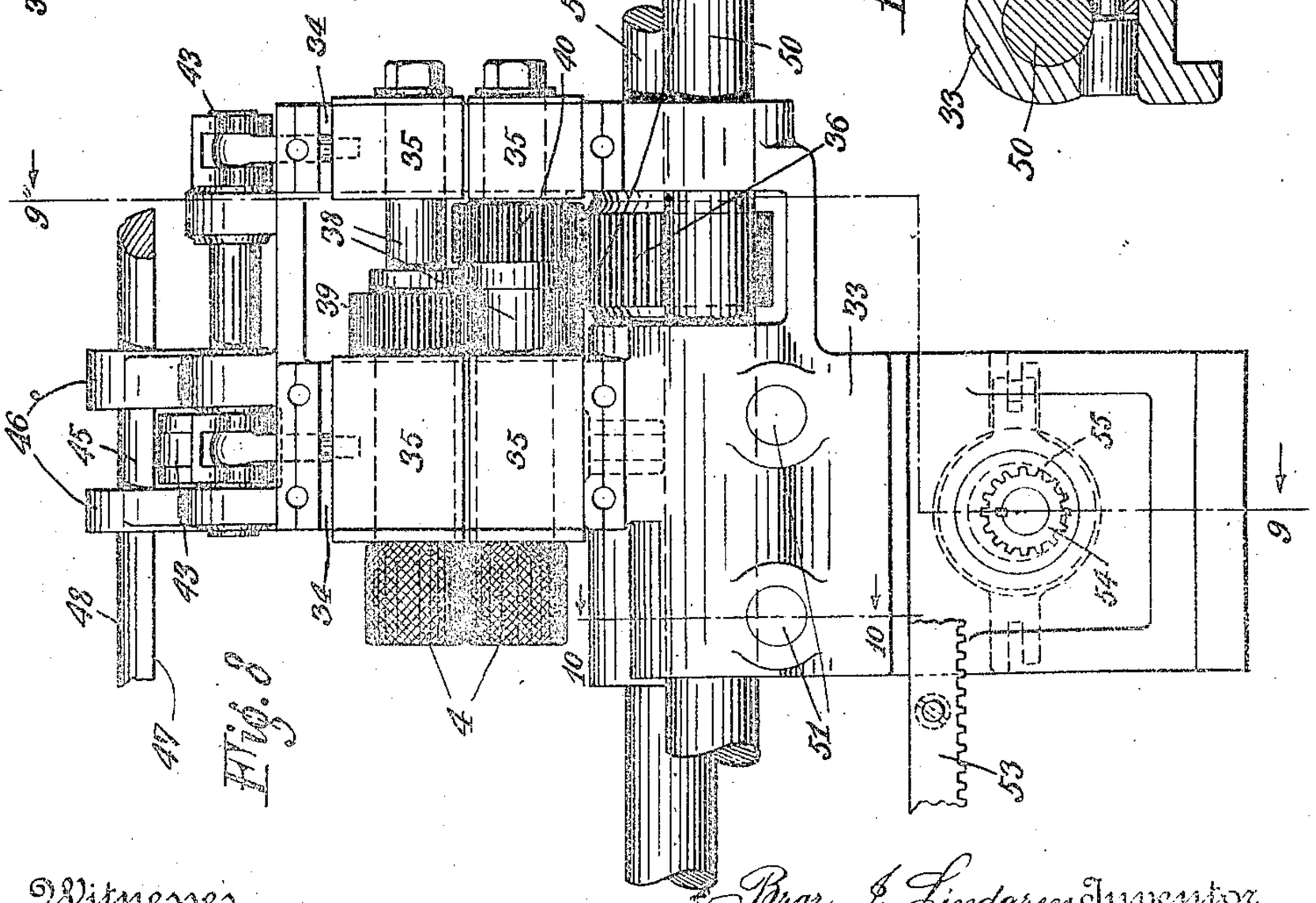

Fig. 8.

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5 SHEETS—SHEET 5.

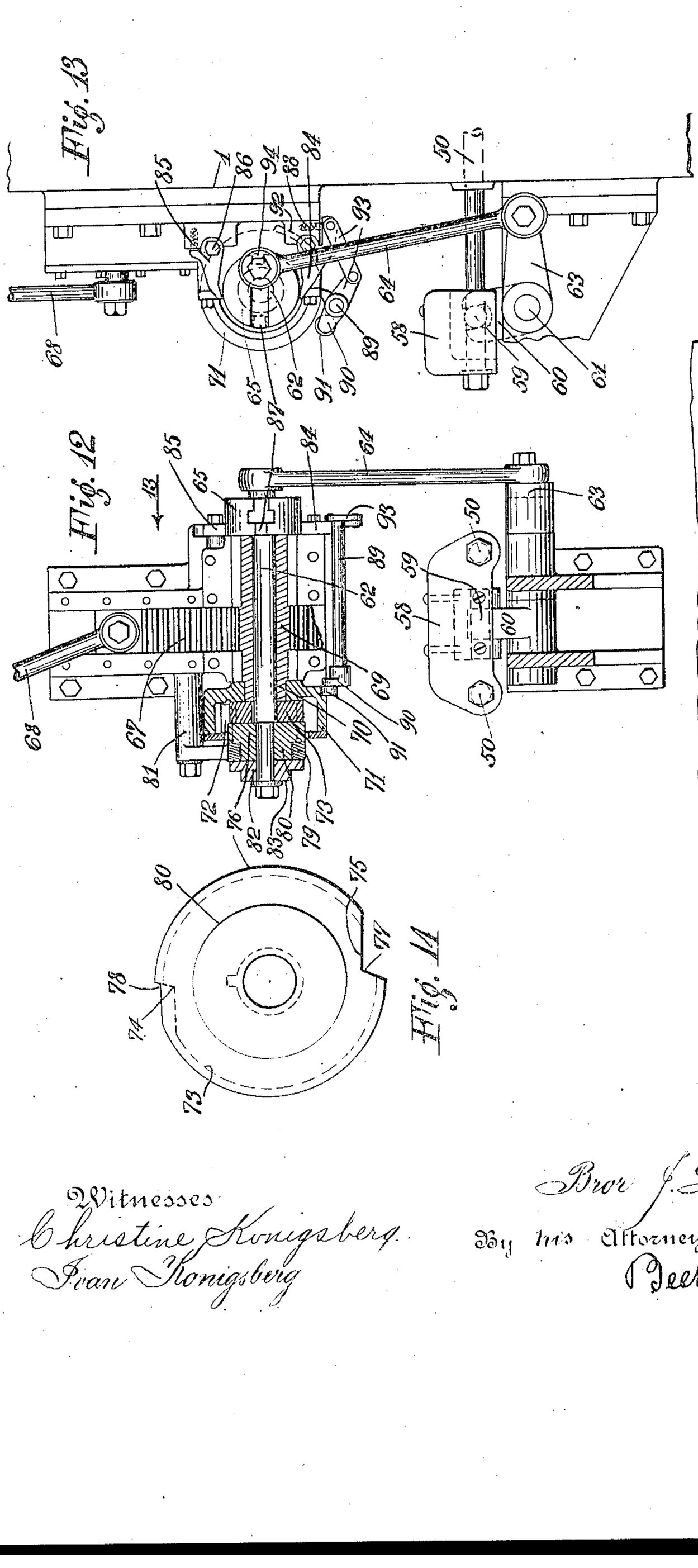

Fig. 13

Fig. 12

Fig. 14

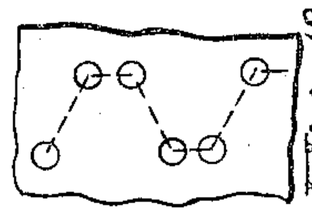

Fig. 18

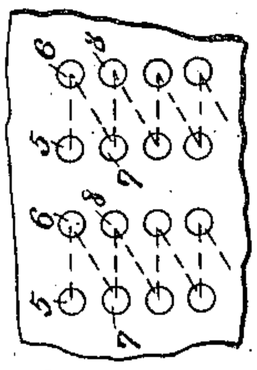

Fig. 17

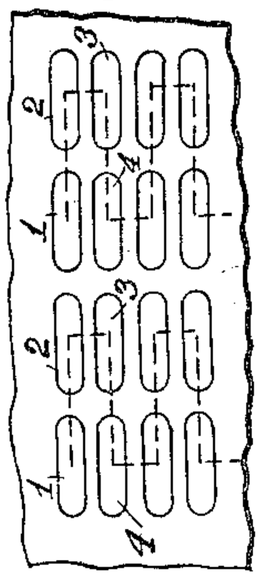

Fig. 16

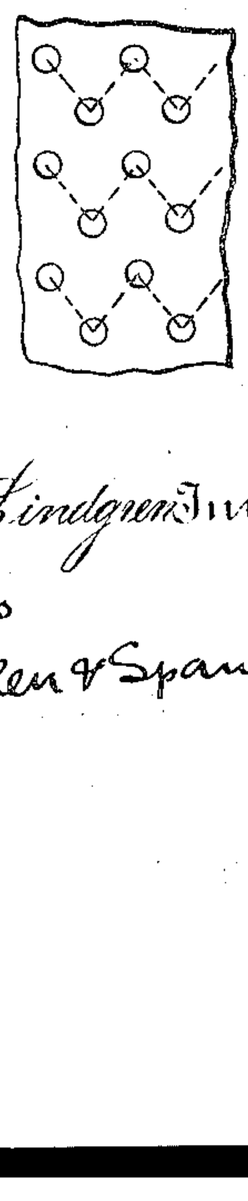

Fig. 15

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UNITED STATES PATENT OFFICE.

BROR J. LINDGREN, OF NEW YORK, N. Y., ASSIGNOR TO E. W. BLISS COMPANY, A CORPORATION OF WEST VIRGINIA.

PERFORATING-MACHINE.

No. 813,049. Specification of Letters Patent. Patented Feb. 20, 1906.

Application filed June 17, 1904. Serial No. 212,948.

To all whom it may concern:

Be it known that I, BROR J. LINDGREN, a citizen of the United States of America, and a resident of New York, borough of Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Perforating-Machines, of which the following is a specification.

My invention relates generally to perforating-machines used to perforate a sheet of material so as to convert it into a screen or the like, and has more particular reference to an improved mechanism for feeding the sheet both in a forward and a transverse direction. To this end the invention comprises the features of construction and combination of parts, as will more fully hereinafter appear.

In the accompanying drawings I have embodied my invention in a suitable form, but changes of construction and omission of parts may of course be made without departing from the spirit of the invention.

In the said drawings, Figure 1 is a front elevation of a machine embodying my invention. Fig. 2 is a side view of the machine looking in the direction of the arrow 2 in Fig. 1. Fig. 3 is a detail view of the mechanism for operating the advance feed independently of the punch and transverse-feed mechanism looking in the direction of the arrow 3 in Fig. 2. Fig. 4 is a side view of the machine looking in the direction of the arrow 4 in Fig. 1. Fig. 5 is a sectional detail view of the latch mechanism for the advance feed looking in the direction of the arrow 5 in Fig. 4. Figs. 6 and 7 are detail views of the means for moving the latch in and out. Fig. 8 is a detail view of the feed-rollers for the advance feed looking in the direction of the arrow 8 in Fig. 9 with the bed removed or looking from the inside of the machine. Fig. 9 is a sectional view on the line 9 9 in Fig. 8. Fig. 10 is a sectional view on the line 10 10 in Fig. 8. Fig. 11 is a view looking in the direction of the arrow 11 in Fig. 9. Fig. 12 is a detail view of the transverse feed with certain parts removed for the sake of clearness. Fig. 13 is a detail view of the same parts looking in the direction of the arrow 13 in Fig. 12. Fig. 14 is a detail view of the ratchets of the transverse feed. Fig. 15 is a diagrammatic view showing the effect produced when the advance and transverse feeds both act every time or periodically. Fig. 16 shows the effect produced when the advance and transverse feeds act alternately and semiperiodically. Fig. 17 shows the effect produced when the transverse feed acts every time or periodically and the advance feed acts every other time or semiperiodically. Fig. 18 shows the effect produced when the advance feed acts periodically and the transverse feed acts semiperiodically.

Similar characters of reference indicate corresponding parts in the different views.

In perforating a sheet of this kind the perforations are very close together, as best seen in Fig. 16. The result is that where a number of punches act together the dies will be too weak to stand the strain and will break between adjacent holes if one complete row of closely-adjacent perforations is punched out at one time.

The chief object of my invention is to produce a structure adapted to punch alternate perforations in one row, leaving a wide space between adjacent perforations, and then to perforate the intervening space in the same row on the next stroke of the machine. By this means the perforations are punched as closely adjacent as in the old style without subjecting the dies to an undue shock causing the same to break.

The present machine contemplates mechanism whereby the advance and transverse feeds are adjustable independently of each other, so that the sheet can be fed forward every time or every other time and fed transversely every time or every other time, or both the forward and transverse feed can take place with every stroke of the machine simultaneously at will in the same machine.

The nature and scope of the invention will best be understood by inspecting Figs. 15, 16, 17, and 18. In Fig. 16, for instance, the perforation 1 will first be punched, leaving an intervening space. Then the sheet will be fed transversely on the next stroke of the machine and the perforations 2 will be punched out, thus completing the first transverse row. On the next stroke of the machine the perforations 3 will be punched out by the sheet being fed in a forward direction. The sheet is then fed transversely and the perforations 4 are punched out. In this case, therefore, the advance and transverse feeds are operated semiperiodically and alternately of each other. In Fig. 17 the perforations 5 are first

punched out. Then the sheet feeds transversely and the perforations 6 are produced. The sheet is then fed both forward and transversely and the perforations 7 are punched out, after which the sheet moves transversely again and is perforated at 8. Here the sheet therefore is fed transversely every time, but forward every other time only, or transversely periodically and forward semiperiodically. In Fig. 18 the reverse takes place and the sheet is fed forward periodically, but transversely semiperiodically. In Fig. 15 I have shown the old style, where the sheet is fed both forward and transversely periodically. The dotted line indicates the path of travel in these several figures.

The general nature, object, and desired result of my invention being now understood, I shall proceed to describe the structure for producing these results.

1 indicates a framework for properly supporting the several parts comprising the machine. In this framework there are a plurality of dies, preferably arranged in one line only, and a corresponding number of punches mounted in the slider 2 and operated by means of the main shaft 3. The dies and punches are spaced a distance apart somewhat greater than the size of the perforations.

The advance-feed mechanism comprises in part a plurality of opposed sets of sheet-gripping rollers 4. In this instance there are four sets, only two of which can be seen. These rollers are knurled, as shown, and are adapted to seize the edge of the sheet to feed the same forward. Suitable means are provided for operating these advance-feeding rollers intermittently in one direction only. In the present instance these means take the following form: Extending transversely of the machine are two advance-feed shafts 5 and 6 for each two sets of rollers. The shaft 5 is operated periodically or semiperiodically at will by suitable driving means and proper connections. In this case there is mounted fast on the counter-shaft 7 a crank 8 and also a collar 9. Mounted loosely on the hub 10 of the crank 8 is a pinion 11, meshing with the gear 12 on the shaft 66. The proportion between the gear 12 and pinion 11 is such that the former makes one revolution to every two revolutions of the latter. In the collar 9 there is a spring-seated pin 13, normally adapted to engage in the aperture 14 of the pinion 11, so as to cause the crank 8 to move with the pinion. Pivoted adjacent to the collar 9 is a latch 15 in the form of a bell-crank, having one arm 16 adapted to engage in the aperture 17 of the pin 13 to move the latter out of engagement with the pinion, thereby disconnecting the crank 8 and pinion 11. The other arm 18 of the latch 15 is provided with a friction-roller 19, engaging with the cam 20 on the shaft 66. This cam is so constructed that it will move the latch out of pin 13 on every other revolution of the pinion 11, thereby operating the crank 8 semiperiodically. The arm 16 is normally held in engagement with the pin 13 by means of the spring 21 on the rod 22. This rod 22 is connected to the eccentric 23 by means of the rod 24. When the handle 25 of the eccentric is operated in one direction, the arm 16 is moved out of the pin 13 and the crank 8 is operated periodically, owing to the fact that the pin 13 will be in constant engagement with the pinion 11.

The crank 8 is provided with connecting-rod 26 for operating the pawl 27, engaging with the ratchet 28 on the shaft 5, thus driving the latter intermittently in one direction periodically or semiperiodically at will. The shaft 5 carries a gear 29, meshing with the intermediate 30, which in turn imparts its motion to the gear 31 on the shaft 6.

Mounted on the guides 32 of the framework and embracing the shafts 5 and 6 are four feed-roller frames 33, two on each shaft and one for each set of rollers. As these feed-roller frames are alike in their construction, only one will be described. The feed-roller frames 33 are provided with the housings 34, carrying the movable boxes 35, supporting the feed-rollers 4. Mounted on the shaft 5 (or 6, as the case may be) is a gear 36, capable of a lengthwise movement on the said shaft 5 by reason of the spline 37. Mounted on the studs 38 of the rollers 4 are the pinions 39 and 40, the pinion 39 receiving its motion from the pinion 41 and the latter and pinion 40 both being driven from the pinion 42, which in turn meshes with the gear 36. By the foregoing means the feed-rollers are operated from the crank 8 to feed the sheet in a forward direction.

Above the feed-roller frame is pivoted the arm 43, connected with the boxes of the upper rollers. The said boxes are normally held in their lowermost position by reason of the spring 44, connected to the arm 43. Means are provided, however, for lifting the upper feed-rollers up and out of contact with the lower feed-rollers, taking the form of a transversely-extending spindle 45, passing through the ears 46 and provided with a flat surface 47 and a round surface 48, against which the arm 43 is pressed by the spring 44. At one end of the spindle 45 there is a handle 49 for turning the said spindle. When this spindle has its flat surface 47 against the arm 43, the upper feed-rollers will be in their lowermost position. When it is desired to raise the said rollers out of contact with the lower rollers, the handle 49 is manipulated, thereby turning the round surface 48 of the said spindle adjacent to the arm 43, thereby depressing one end of the latter and raising the rollers. A cam or any other means could of course be used for the same purpose. There are two of these spindles 45, one for each two

sets of rollers in transverse alinement with each other.

Formerly it has been customary in the art to have bars extending the full length of the machine transversely for feeding the sheet. By the employment of side feed-rollers for gripping the side edges of the sheet only I am enabled to adjust the machine to different widths of sheets in the following manner: Extending transversely of the machine are two transverse-feed shafts 50, to which are attached the feed-roller frames by means of the bolts 51 and sleeves 52, as shown best in Fig. 10. Mounted on the framework is a transverse rack 53, and carried by each feed-roller frame is a pinion 54, mounted in the eccentric bushing 55. This eccentric bushing 55 carries a handle 56 for turning the same so as to bring the pinion 54 in and out of mesh with the rack 53. When it is desired to adjust the feed-roller frame, the bolt 51 is loosened and the pinion is brought into mesh with the rack. A wrench is then applied to the square 57, thereby turning the pinion and causing the feed-roller frame to slide on the guide on the frame and over the advance-feed shaft and transverse-feed shaft. Each feed-roller frame is adjustable independently of the other. In traveling the feed-roller frame carries the operating-pinions and gear 36 along with it. When the desired adjustment has been obtained, the pinion 54 is lowered out of mesh with the rack 53 and the bolt 51 is tightened.

The sheet is moved transversely periodically or semiperiodically by imparting a reciprocating motion to the transverse-feed shafts 50, to which shafts the feed-roller frames are attached. This motion is imparted to the transverse-feed shafts in this instance in the following manner: The two shafts 50 are connected together on one side of the machine by means of the cross-head 58. This cross-head is provided with a pin 59, embraced by the bifurcated arm 60, attached to the rock-shaft 61, disposed at right angles to the shafts 50. Located above the shaft 61 is a shaft 62, connected to the said rock-shaft 61 by means of the link 63 and rod 64, which latter is attached to the head 65 on the said shaft 62. This shaft 62 is given an intermittent motion in one direction either periodically or semiperiodically at will by some suitable means as the following: Adjacent to the gear 12 on shaft 66 and meshing with the former there is a pinion 66^a on the main shaft. The pinion 66^a operates the reciprocating rack 67 by means of the connecting-rod 68. The rack 67 in turn meshes with the pinion 69, mounted loosely on the shaft 62. The pinion 69 has mounted upon its hub 70 the pawl-casing 71, carrying the pawl 72, engaging with the ratchet 73, fast on the shaft 62. The ratchet 73 is provided with two teeth 74 and 75 for the reception of the pawl. On the forward stroke of the rack 67 the pawl will turn the ratchet one-half revolution, thereby operating the shaft 62. On the return stroke of the rack 67 the shaft 62 will remain in a state of rest. By this means the transverse-feed shafts 50 will be operated periodically or once to each complete movement of the machine. When it is desired to operate the said shafts 50 semiperiodically, a second ratchet 76 is used in addition to the first ratchet, but, unlike the latter, mounted loosely on the shaft 62. This loose ratchet 76 has one tooth 77 of the same depth as the teeth on the fast ratchet and another tooth 78 of a lesser depth. Assuming that the two ratchets are in the position shown in Fig. 14, then on the first forward stroke the pawl would engage with the tooth 78 and carry the loose ratchet around only, with the result that the shaft 62 would not be moved. In turning the loose ratchet, however, the deep tooth 77 will coincide with one of the teeth on the fast ratchet, so that after the return stroke of the pawl and on the next forward stroke of the same both ratchets will be carried around and the shaft 62 turned. By this means the said shaft 62 is operated semiperiodically. In connection with the loose ratchet I employ a brake 79, taking the form of a collar fitting around the hub 80 of the said loose ratchet and pivoted on the pin 81. This is done to prevent the loose ratchet from slipping back on the return stroke of the pawl. As previously indicated, the loose ratchet is removable. When this is done, then the sleeve 82 is reversed, the portion 83 of the same fitting in between the shaft 62 and the brake 79. In connection with this transverse-feed mechanism there is employed a stop-dog 84 and a check-dog 85. The stop-dog 84 is pivoted at 86 and is normally held in contact with the notch 87 in the head 65 of the shaft 62 by reason of the spring 88. Mounted on the framework below the shaft 62 is a stud 89, carrying an arm 90, provided with a roll 91, adapted to engage with the cam 92 on the pawl-casing. Interposed between the said stud 91 and the stop-dog 84 are toggle-links 93. As the shaft 62, and consequently the head 65, comes to the end of its motion after being moved forward the stop-dog will drop into the notch 87, thereby fixing the limit of the movement positively. The check-dog 85 will now drop into the notch 94 and prevent the head from moving back on the return stroke of the pawl. As the said pawl returns, however, the cam 92 will act on the roll 91 as it comes to the end of its return stroke, thereby releasing the stop-dog from the head, while the check-dog still remains in engagement with the head until the next forward stroke. By this means the movement of the shaft 62, and consequently of the transverse-feed shaft, is controlled positively at all times.

The motion is imparted to the main shaft 3 from the power-shaft 95 by means of the pinion 96 and gear 97, the latter mounted loosely on the said main shaft. A suitable clutch mechanism 97ª is provided on the main shaft to connect it with the gear 97. Owing to the large size of the machine, this clutch is operated by a fluid-actuated piston in the cylinder 98 and connected to the said clutch by the levers 99 in a well-known manner. This piston is operated to throw the clutch in by opening a suitable valve in the cylinder 98 by means of the pivoted rod 100 and connection 101. Any other means found suitable could of course be used. The spring 102 serves to release the clutch mechanism.

When the clutch is thrown in, the machine commences to operate, moving both the forward and transverse feeds, as well as the punch. It is desirable, however, to be able to operate the advance-feed mechanism independently of the transverse-feed mechanism and punch, especially when introducing the stock or sheet of material or for the purpose of adjusting the said sheet. This is accomplished by the following means: Below the power-shaft is an auxiliary shaft 103, carrying the belt-pulley 104, having the belt 105 passing over the pulley 106 on the said power-shaft. A clutch 107, controlled by either of the levers 108, serves to throw the pulley 104 into operative connection with the auxiliary shaft, thereby rotating the latter. On this shaft is a bevel-gear 109, engaging with the bevel-gear 110 on the shaft 111, which carries the worm 112, engaging with the worm wheel 113 on the shaft 6, which in turn imparts its motion to the shaft 5.

The operation is sufficiently evident from the foregoing description and need not be further enlarged upon. It is desired, however, to draw attention again to the manner in which the different perforations shown in Figs. 15, 16, 17, and 18 are punched out. In Fig. 15 both the forward and transverse feeds act periodically—that is to say, in adjusting the machine the latch 15 is moved out of engagement with the pin 13, so that the crank 8 will be constantly connected to the pinion 11, thereby operating the advance-feed mechanism on every stroke of the machine. Furthermore, the loose ratchet 76 is removed, causing the transverse-feed mechanism to act periodically. In Fig. 16 both the advance and transverse feeds act semiperiodically and alternately. In this instance the latch 15 is moved into engagement with the pin 13, whereby the cam 20 will operate the advance-feed mechanism semiperiodically. Also the loose ratchet 76 is introduced on the shaft 62, whereby the transverse-feed mechanism acts semiperiodically. In addition to this, however, and owing to the fact that the operation of the advance and transverse feed mechanisms alternate, the said loose ratchet 76 is adjusted or turned around a half-revolution on the shaft 62. In Fig. 17 the transverse-feed mechanism acts periodically, and the loose ratchet 76 is therefore left off, while the advance-feed mechanism acts semiperiodically, and the latch 15 is therefore moved into engagement with the pin 13. In Fig. 18 the transverse feed acts semiperiodically, and the loose ratchet 76 is therefore introduced, but is not adjusted to the position mentioned in connection with Fig. 16, as the action of the forward and advance feed is simultaneous. As the advance feed acts periodically, the latch 15 is moved out of engagement with the pin 13. Should it be desired to operate only the advance feed and punch, I simply disconnect the rod 68 from pinion 66ª on the main shaft 3, thereby rendering the transverse feed inoperative.

What I claim is—

1. In a machine of the character set forth, the combination with an advance-feed mechanism, and a transverse-feed mechanism, of means for operating the said feed mechanisms periodically or semiperiodically at will.

2. In a machine of the character set forth, the combination with an advance-feed mechanism, and a transverse-feed mechanism, of means for operating each of the said feed mechanisms periodically or semiperiodically at will independently one of the other.

3. In a machine of the character set forth, the combination with an advance-feed mechanism, and a transverse-feed mechanism, of means for operating the said feed mechanisms semiperiodically and alternately of each other.

4. In a machine of the character set forth, the combination with a pair of feed-rollers, of an advance-feed mechanism for rotating the rollers periodically or semiperiodically at will, and a transverse-feed mechanism for moving the feed-rollers transversely periodically or semiperiodically at will.

5. In a machine of the character set forth, the combination with a pair of feed-rollers, of an advance-feed mechanism adjustable to rotate the rollers periodically or semiperiodically at will, and a transverse-feed mechanism adjustable to move the feed-rollers transversely periodically or semiperiodically at will, each feed mechanism being adjustable one independently of the other.

6. In a machine of the character set forth, the combination with a pair of feed-rollers, of an advance-feed mechanism for rotating the rollers semiperiodically, and a transverse-feed mechanism for moving the rollers transversely semiperiodically, the said feed mechanisms acting alternately.

7. In a machine of the character set forth, the combination with a transversely-movable feed-roller frame, of a pair of feed-rollers carried by the same, an advance-feed shaft, means for rotating the said shaft intermittently, a train of gears, for imparting the mo-

tion of the advance-feed shaft to the feed-rollers, transversely movable with the feed-roller frame, a transverse-feed shaft attached to the feed-roller frame, and means for reciprocating the said transverse-feed shaft intermittently.

8. In a machine of the character set forth, the combination with a transversely-movable feed-roller frame, of a pair of feed-rollers carried by the same, an advance-feed shaft, means for rotating the said shaft intermittently and periodically or semiperiodically at will, a train of gears for imparting the motion of the advance-feed shaft to the feed-rollers, transversely movable with the feed-roller frame, a transverse-feed shaft attached to the feed-roller frame, and means for reciprocating the said transverse-feed shaft intermittently and periodically or semiperiodically at will.

9. In a machine of the character set forth, the combination with a transversely-movable feed-roller frame, of a pair of feed-rollers carried by the same, an advance-feed shaft, means for rotating the said shaft intermittently and adjustable to operate periodically or semiperiodically at will, a train of gears, for imparting the motion of the advance-feed shaft to the feed-rollers, transversely movable with the feed-roller frame, a transverse-feed shaft attached to the feed-roller frame, and means for reciprocating the said transverse-feed shaft intermittently and adjustable to operate periodically or semiperiodically at will, each means for operating the two feed-shafts being adjustable one independently of the other.

10. In a machine of the character set forth, the combination with a transversely-movable feed-roller frame, of a pair of feed-rollers carried by the same, an advance-feed shaft, means for rotating the said shaft intermittently and semiperiodically, a train of gears, for imparting the motion of the advance-feed shaft to the feed-rollers, transversely movable with the feed-roller frame, a transverse-feed shaft attached to the feed-roller frame, means for reciprocating the transverse-feed shaft semiperiodically, the means for operating the advance and transverse feed shafts acting alternately.

11. In a machine of the character set forth, the combination with an advance-feed mechanism, and a transverse-feed mechanism, of means for operating the said feed mechanisms in unison periodically or semiperiodically at will, and means for operating the advance feed independently.

12. In a machine of the character set forth, the combination with an advance-feed mechanism, and a transverse-feed mechanism, of means for operating the said feed mechanisms in unison each one independently adjustable of the other to operate periodically or semiperiodically at will, and means for operating the advance feed independently.

13. In a machine of the character set forth, the combination with an advance-feed mechanism, and a transverse-feed mechanism, of means for operating the said feed mechanisms in unison semiperiodically and alternately of each other, and means for operating the advance feed independently.

14. In a machine of the character set forth, the combination with a pair of feed-rollers, of an advance-feed mechanism for rotating the rollers periodically or semiperiodically at will, and a transverse-feed mechanism for moving the feed-rollers transversely periodically or semiperiodically at will in unison with the advance-feed mechanism, and means for operating the advance-feed mechanism independently.

15. In a machine of the character set forth, the combination with a pair of feed-rollers, of an advance-feed mechanism for rotating the rollers, a transverse-feed mechanism for moving the feed-rollers transversely in unison with the advance-feed mechanism, independently-adjustable means on the advance-feed mechanism and transverse-feed mechanism for causing each feed mechanism to operate periodically or semiperiodically at will, and means for operating the advance-feed mechanism independently.

16. In a machine of the character set forth, the combination with a pair of feed-rollers, of an advance-feed mechanism for rotating the rollers semiperiodically, and a transverse-feed mechanism for moving the rollers transversely semiperiodically, the said feed mechanisms acting in unison and alternately, and means for operating the advance-feed mechanism independently.

17. In a machine of the character set forth, the combination with a transversely-movable feed-roller frame, of a pair of feed-rollers carried by the same, an advance-feed shaft, a train of gears, for imparting the motion of the advance-feed shaft to the feed-rollers, transversely movable with the feed-roller frame, a transverse-feed shaft attached to the feed-roller frame, and means for rotating the advance-feed shaft and for reciprocating the said transverse-feed shaft intermittently and in unison, and means for operating the advance-feed shaft independently.

18. In a machine of the character set forth, the combination with a transversely-movable feed-roller frame, a pair of feed-rollers carried by the same, an advance-feed shaft, a train of gears for imparting the motion of the advance-feed shaft to the feed-rollers, transversely movable with the feed-roller frame, a transverse-feed shaft attached to the feed-roller frame, and means for rotating the advance-feed shaft and reciprocating the said transverse-feed shaft intermittently in uni-

son and periodically or semiperiodically at will, and means for operating the advance-feed shaft independently.

19. In a machine of the character set forth, the combination with a transversely-movable feed-roller frame, of a pair of feed-rollers carried by the same, an advance-feed shaft, a train of gears, for imparting the motion of the advance-feed shaft to the feed-rollers, transversely movable with the feed-roller frame, a transverse-feed shaft attached to the feed-roller frame, and means for rotating the advance-feed shaft and reciprocating the said transverse-feed shaft intermittently and in unison, independently adjustable to operate periodically or semiperiodically at will, and means for operating the advance-feed shaft independently.

20. In a machine of the character set forth, the combination with a transversely-movable feed-roller frame, of a pair of feed-rollers carried by the same, an advance-feed shaft, a train of gears, for imparting the motion of the advance-feed shaft to the feed-rollers, transversely movable with the feed-roller frame, a transverse-feed shaft attached to the feed-roller frame, means for rotating the advance-feed shaft and reciprocating the transverse-feed shaft in unison semiperiodically and alternately.

21. In a machine of the character set forth, the combination with a transversely-movable feed-roller frame, of a pair of feed-rollers carried by the same, an advance-feed shaft, means for rotating the said shaft intermittently, a train of gears, for imparting the motion of the advance-feed shaft to the feed-rollers, transversely movable with the feed-roller frame, a transverse-feed shaft attached to the feed-roller frame, means for reciprocating the said transverse-feed shaft intermittently, and means for adjusting the feed-roller frame transversely.

22. In a machine of the character set forth, the combination with a transversely-movable feed-roller frame, of a pair of feed-rollers carried by the same, an advance-feed shaft, means for rotating the said shaft intermittently and periodically or semiperiodically at will, a train of gears for imparting the motion of the advance-feed shaft to the feed-rollers, transversely movable with the feed-roller frame, a transverse-feed shaft attached to the feed-roller frame, means for reciprocating the said transverse-feed shaft intermittently and periodically or semiperiodically at will, and means for adjusting the feed-roller frame transversely.

23. In a machine of the character set forth, the combination with a transversely-movable feed-roller frame, of a pair of feed-rollers carried by the same, an advance-feed shaft, means for rotating the said shaft intermittently and adjustable to operate periodically or semiperiodically at will, a train of gears, for imparting the motion of the advance-feed shaft to the feed-rollers, transversely movable with the feed-roller frame, a transverse-feed shaft attached to the feed-roller frame, means for reciprocating the said transverse-feed shaft intermittently and adjustable to operate periodically or semiperiodically at will, each means for operating the two feed-shafts being adjustable one independently of the other, and means for adjusting the feed-roller frame transversely.

24. In a machine of the character set forth, the combination with a transversely-movable feed-roller frame, of a pair of feed-rollers carried by the same, an advance-feed shaft, means for rotating the said shaft intermittently and semiperiodically, a train of gears, for imparting the motion of the advance-feed shaft to the feed-rollers, transversely movable with the feed-roller frame, a transverse-feed shaft attached to the feed-roller frame, means for reciprocating the transverse-feed shaft semiperiodically, the means for operating the advance and transverse feed shafts acting alternately, and means for adjusting the feed-roller frame transversely.

25. In a machine of the character set forth, the combination with a transversely-movable feed-roller frame, of a pair of feed-rollers carried by the same, an advance-feed shaft, a train of gears, for imparting the motion of the advance-feed shaft to the feed-rollers, transversely movable with the feed-roller frame, a transverse-feed shaft attached to the feed-roller frame, means for rotating the advance-feed shaft and for reciprocating the said transverse-feed shaft intermittently and in unison, means for operating the advance-feed shaft independently, and means for adjusting the feed-roller frame transversely.

26. In a machine of the character set forth, the combination with a transversely-movable feed-roller frame, a pair of feed-rollers carried by the same, an advance-feed shaft, a train of gears for imparting the motion of the advance-feed shaft to the feed-rollers, transversely movable with the feed-roller frame, a transverse-feed shaft attached to the feed-roller frame, means for rotating the advance-feed shaft and reciprocating the said transverse-feed shaft intermittently in unison and periodically or semiperiodically at will, means for operating the advance-feed shaft independently, and means for adjusting the feed-roller frame transversely.

27. In a machine of the character set forth, the combination with a transversely-movable feed-roller frame, of a pair of feed-rollers carried by the same, an advance-feed shaft, a train of gears for imparting the motion of the advance-feed shaft to the feed-rollers, transversely movable with the feed-roller frame, a transverse-feed shaft attached to the feed-roller frame, and means, independently adjustable to operate periodically or semiperi-

odically at will, for rotating the advance-feed shaft and reciprocating the said transverse-feed shaft intermittently and in unison, means for operating the advance-feed shaft independently, and means for adjusting the feed-roller frame transversely.

28. In a machine of the character set forth, the combination with a transversely-movable feed-roller frame, of a pair of feed-rollers carried by the same, an advance-feed shaft, a train of gears, for imparting the motion of the advance-feed shaft to the feed-rollers, transversely movable with the feed-roller frame, a transverse-feed shaft attached to the feed-roller frame, means for rotating the advance-feed shaft and reciprocating the transverse-feed shaft in unison semiperiodically, and means for adjusting the feed-roller frame transversely.

29. In a machine of the character set forth, the combination of two feed-roller frames spaced a distance apart, a pair of feed-rollers carried by each frame for seizing the side edges of the sheet, and means for adjusting the said feed-roller frames transversely to suit different widths of sheets.

30. In a machine of the character set forth, the combination of two feed-roller frames spaced a distance apart, a pair of feed-rollers carried by each frame for seizing the side edges of the sheet, means for adjusting the said feed-roller frames transversely to suit different widths of sheets, and means for lifting the upper roller of each pair out of contact with the lower roller.

31. In a machine of the character set forth, the combination of a transversely-movable feed-roller frame, two housings carried by the said feed-roller frame, two superposed feed-rollers mounted in said housings, an advance-feed shaft extending through the said feed-roller frame, a gear slidingly mounted on the said advance-feed shaft and located intermediate the said two housings, and a train of gears imparting motion from the said gear on the advance-feed shaft to the feed-rollers, all movable with the said feed-roller frame.

32. In a machine of the character set forth, the combination of a transversely-movable feed-roller frame, two housings carried by the said feed-roller frame, two superposed feed-rollers slidingly mounted in said housings, an advance-feed shaft extending through the said feed-roller frame, a gear slidingly mounted on the said advance-feed shaft and located intermediate the said two housings, a train of gears imparting motion from the said gear on the advance-feed shaft to the feed-rollers, all movable with the said feed-roller frame, and means for lifting the upper feed-roll out of contact with the lower one.

33. In a machine of the character set forth, the combination of a shaft, a crank and a collar mounted fast on the same, a pinion interposed between the two and turning loosely the shaft, a pin for connecting the collar and pinion, a pivoted latch, for preventing the pin from uniting the pinion and collar, a cam for automatically moving the latch out of the pin semiperiodically, and means for moving the latch out of the pin whereby the collar and pinion are constantly connected, and the crank operates periodically.

34. In a machine of the character set forth, the combination of a reciprocating transverse-feed shaft, a rock-shaft for reciprocating the said transverse-feed shaft, an intermittently-rotatable shaft, connections between the latter and the rock-shaft, and means for operating the rotatable shaft periodically or semiperiodically at will.

35. In a machine of the character set forth, the combination of a reciprocating transverse-feed shaft, a rock-shaft for reciprocating the said transverse-feed shaft, an intermittently-rotatable shaft, connections between the latter and the rock-shaft, and means for operating the rotatable shaft periodically or semiperiodically at will, comprising: a ratchet having two teeth fast on the said shaft, a removable ratchet loose on the said shaft having two teeth, one of which is of a lesser depth than the teeth on the fast ratchet, and a pawl for engaging with the fast and loose ratchet or fast ratchet only.

36. In a machine of the character set forth, the combination of a shaft, a pinion mounted loosely on the said shaft, a ratchet fast on the said shaft, a pawl for imparting the motion of the pinion to the ratchet, a head on one end of the shaft, a cam moving with the pawl a stop-dog normally out of contact with the head, connections between the stop-dog and the cam moving with the pawl for causing the said stop-dog to engage with a notch in the said head after each feeding motion of the shaft.

37. In a machine of the character set forth, the combination of a shaft, a pinion mounted loosely on the said shaft, a ratchet fast on the said shaft, a pawl for imparting the motion of the pinion to the ratchet, a head on one end of the shaft, a cam moving with the pawl, a stop-dog normally in contact with the head, connections between the stop-dog and the cam moving with the pawl for causing the said stop-dog to move out of engagement with the notch in the said head at the beginning of the feeding motion of the shaft, and a check-dog for engaging with the head to prevent the shaft from returning with the ratchet when the latter is on the return stroke.

38. In a machine of the character set forth, the combination with a punching mechanism, an advance-feed mechanism, and a transverse-feed mechanism, of means for operating said feed mechanims so that the punch-

ing mechanism will operate to cut blanks in the same longitudinal row twice in succession.

39. In a machine of the character set forth, the combination with a punching mechanism, an advance-feed mechanism, and a transverse-feed mechanism, of means for operating said feed mechanisms, and means for adjusting the same so that the punching mechanism will operate to cut blanks once or twice in succession in the same longitudinal row.

40. In a machine of the character set forth, the combination with a punching mechanism, an advance-feed mechanism, and a transverse-feed mechanism, of means for operating said feed mechanisms, and means for adjusting the same so that the punching mechanism will operate to cut blanks once or several times in succession in the same longitudinal row.

Signed at Brooklyn, New York, this 11th day of June, 1904.

BROR J. LINDGREN.

Witnesses:
B. W. STONE,
MOSES ARONSON.