(No Model.)

2 Sheets—Sheet 1.

L. W. SOUTHGATE.
MECHANICAL MOVEMENT.

No. 606,096. Patented June 21, 1898.

Fig. 1.

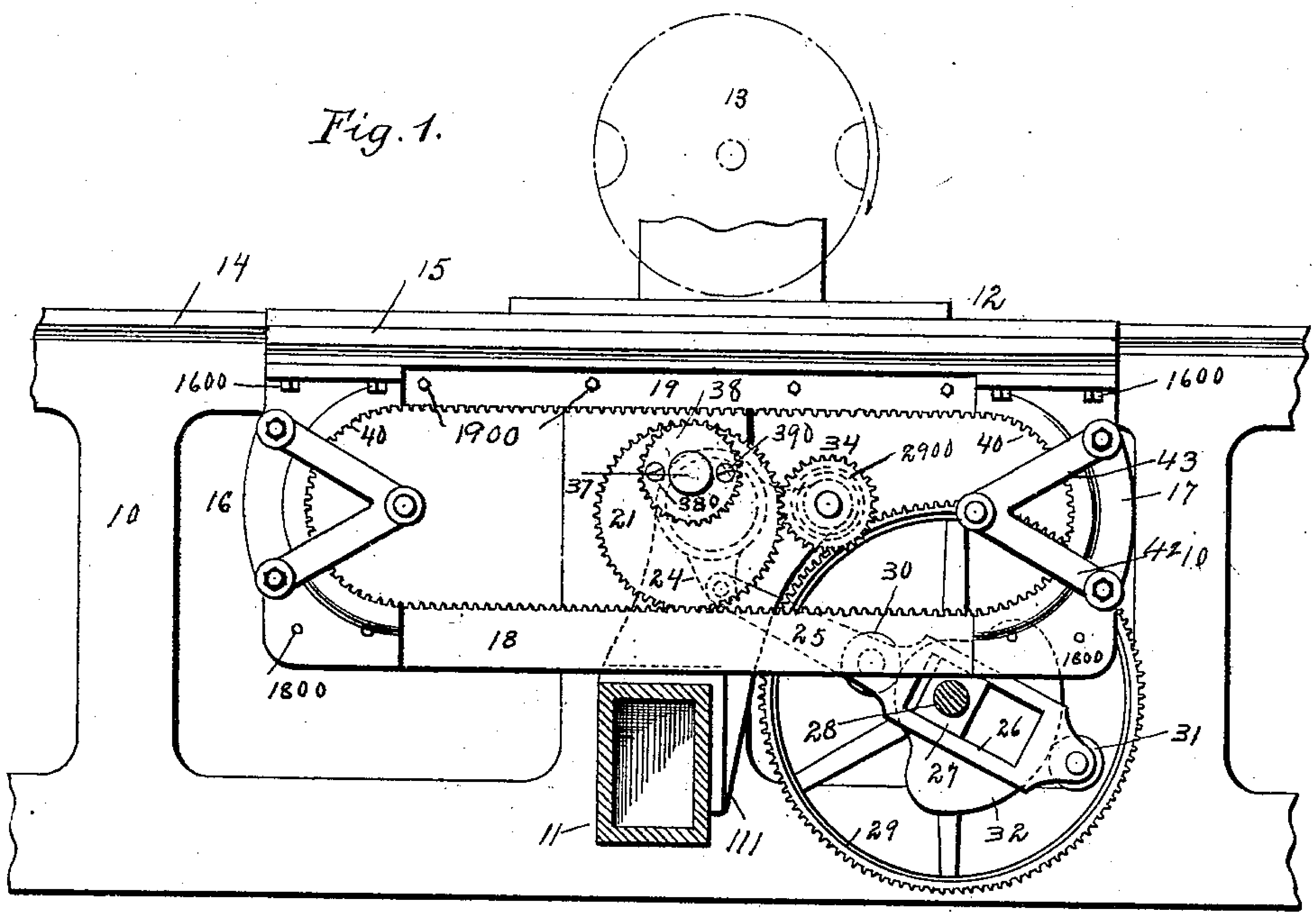


Fig. 5

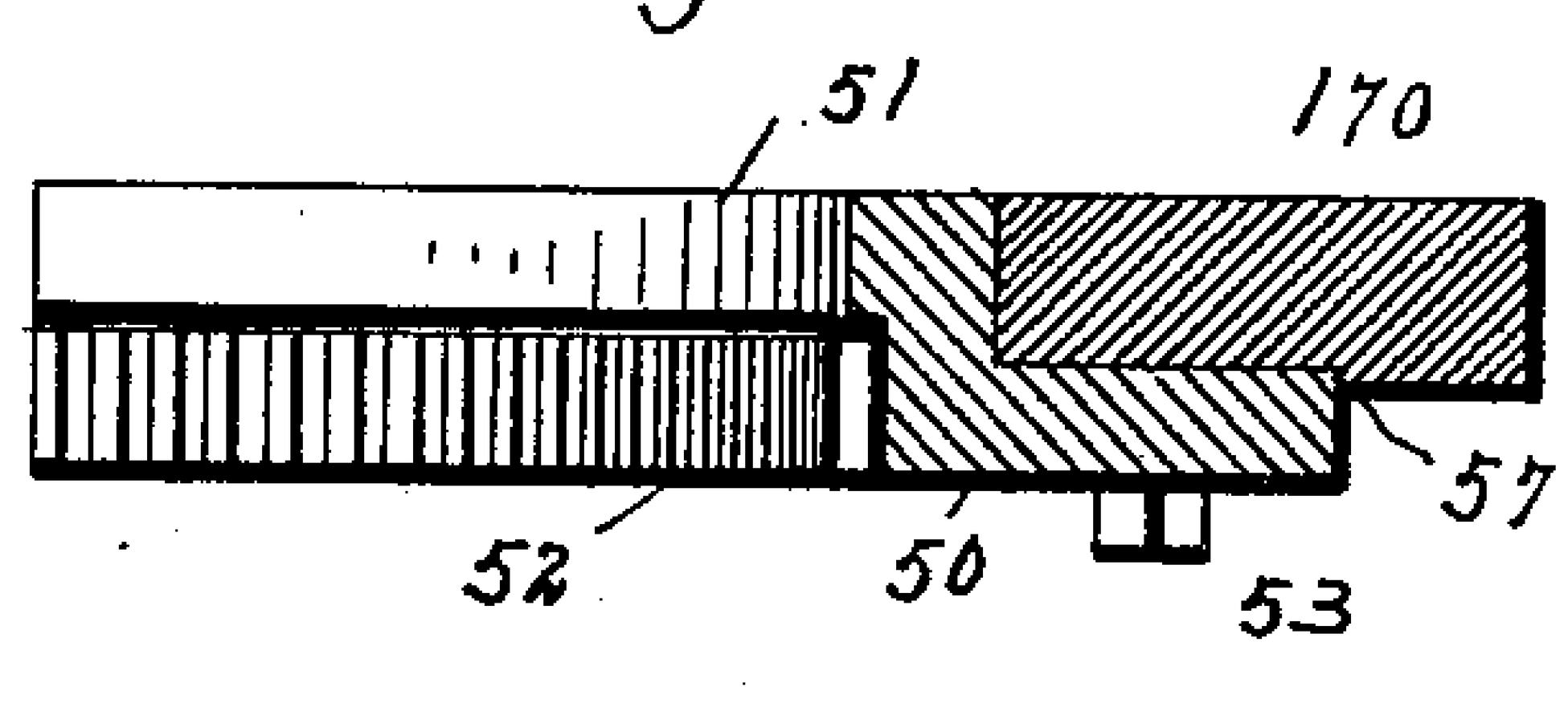
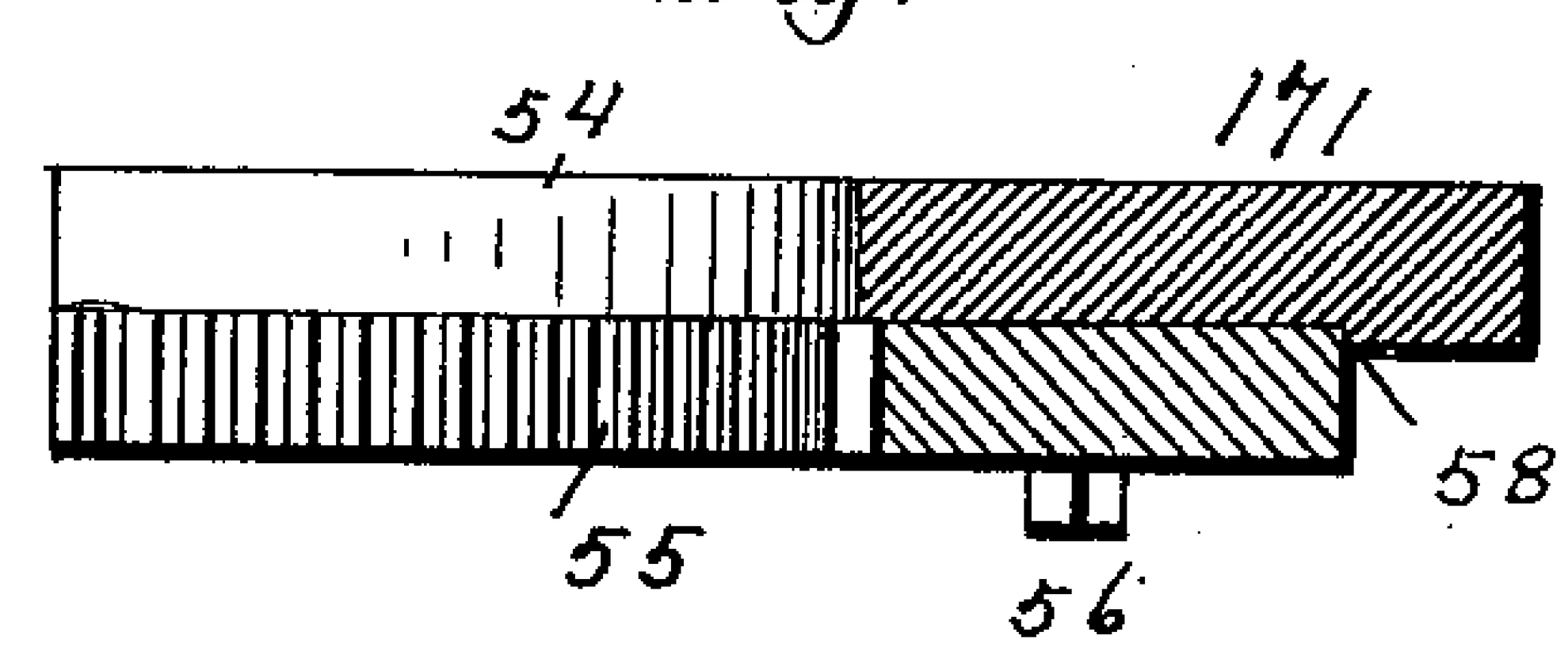


Fig. 6



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(No Model.) 2 Sheets—Sheet 2.

L. W. SOUTHGATE.

MECHANICAL MOVEMENT.

No. 606,096. Patented June 21, 1898.

Fig. 2.

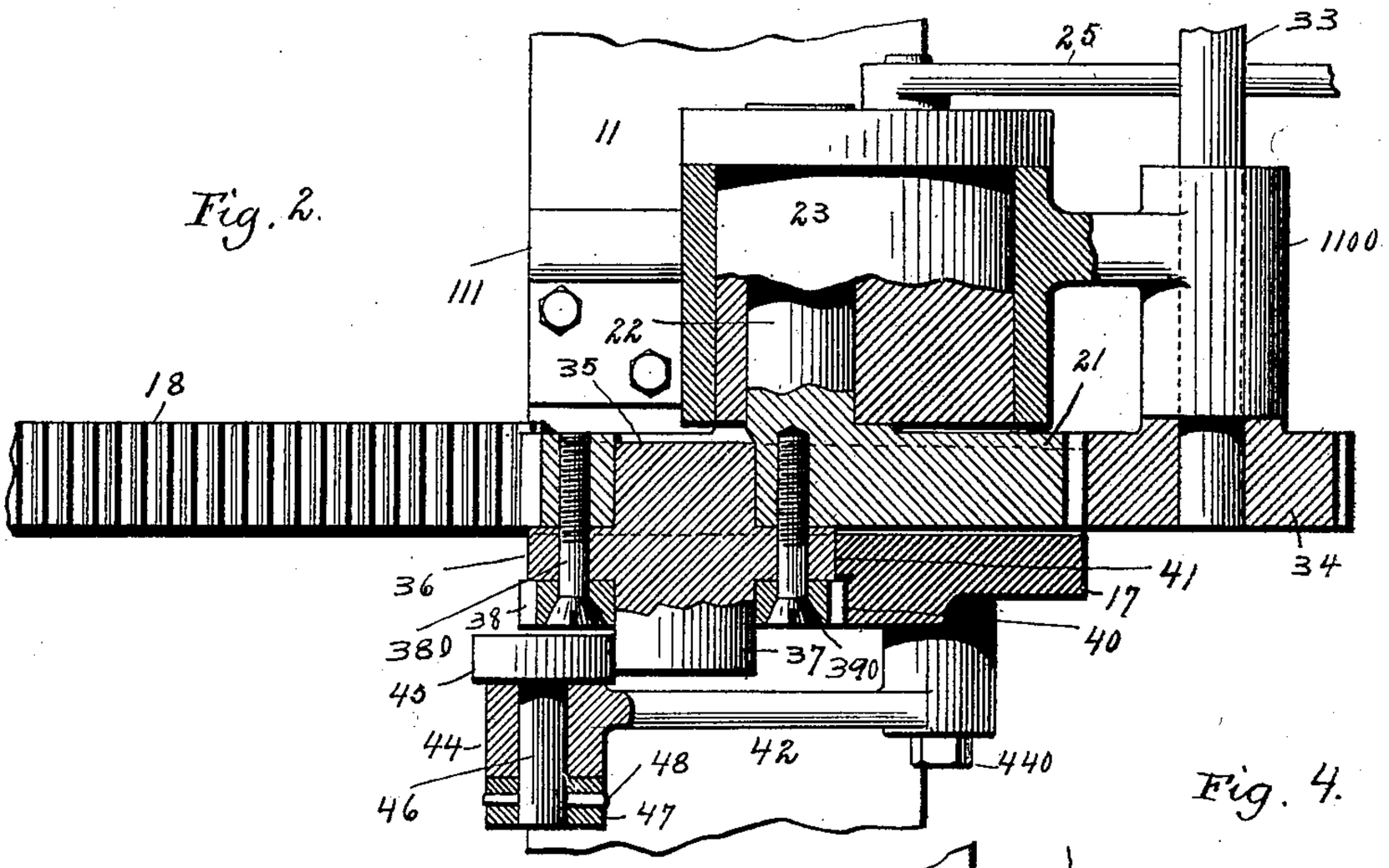

Fig. 4.

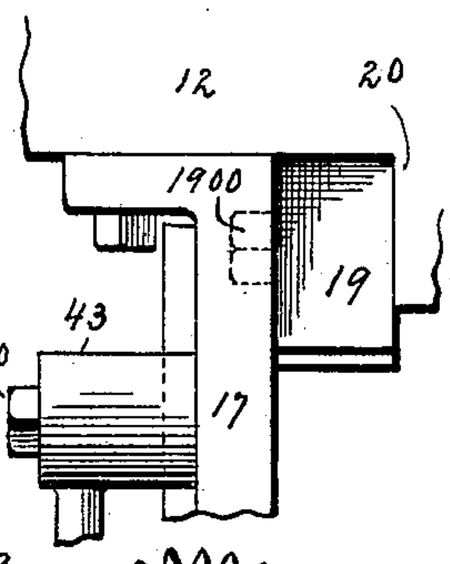

Fig. 3.

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UNITED STATES PATENT OFFICE.

LOUIS W. SOUTHGATE, OF WORCESTER, MASSACHUSETTS, ASSIGNOR TO THE CAMPBELL PRINTING PRESS AND MANUFACTURING COMPANY, OF NEW YORK.

MECHANICAL MOVEMENT.

SPECIFICATION forming part of Letters Patent No. 606,096, dated June 21, 1898.

Application filed May 31, 1895. Serial No. 551,282. (No model.)

To all whom it may concern:

Be it known that I, LOUIS W. SOUTHGATE, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Improvement in Mechanical Movements, of which the following is a specification.

The aim of this invention is to provide a new mechanical movement designed to transform rotary motion into rectilinearly-reciprocating motion, and the invention especially relates to an improvement upon the device shown, described, and claimed in an application filed by Winfield S. Huson February 20, 1893, Serial No. 463,003.

The invention is shown in detail in the accompanying two sheets of drawings, in which—

Figure 1 is a sectional elevation of the entire mechanism. Fig. 2 is a detail plan view of the operating parts upon an enlarged scale. Fig. 3 is an enlarged side elevation of the parts shown in Fig. 2. Fig. 4 is an end elevation of a detail, and Figs. 5 and 6 illustrate modifications hereinafter referred to at length.

While my invention is a mechanical movement which may be applied and adapted to any use or location, the same has been principally devised for use in connection with the beds of printing-presses, and I will herein describe my invention as applied and used in connection with a printing-press.

A printing-press bed to secure the best results must be run, preferably, at an even speed during the major portion of its forward and return strokes and must be gradually stopped and started again in the reverse direction or reversed without jar or vibration. There are many well-known mechanisms for giving the bed or reciprocating member its major or direct forward and backward movement whether the same is at an even speed or not. In the said application of Winfield S. Huson, above referred to, a reversing mechanism is described which consists of a curved rack attached to the bed and a pinion mounted in a revolving crank, which pinion is adapted to engage said curved rack to reverse the movement of the bed. A suitable guiding mechanism is also used to keep the reversing-pinion in mesh with the curved rack, and this guiding mechanism consists of a roller mounted in said revolving crank concentrically with the reversing-pinion and which runs through a curved guideway. The aim of my invention is to improve, simplify, and strengthen the parts.

The structure shown in this application consists of a main driving mechanism which may be of any improved type, and in the particular device shown comprises a continuously-revolving driving-gear disposed between two racks, which are arranged above and below said driving-pinion, and with means for raising and lowering said driving-gear to alternately mesh with said racks to give the bed the major part of its reciprocation.

The reversing device consists of a reversing-pinion fixed on a revolving crank, which crank is preferably the driving-gear. At each end of the bed is provided a curved rack which said reversing-pinion will engage, whereby there will be a constant mesh between the driving mechanism and the bed. Also mounted on the crank concentrically with this reversing-pinion I provide a large working shoulder or bearing, which will bear on a circular shoulder or bearing arranged concentrically with the curved rack. This mechanism will practically accomplish the reversal of the bed, as the same will take all the thrust of the bed when the same is retarded and brought to a state of rest and will also start the bed in the opposite direction. To keep the working shoulders in position and the reversing-pinion in mesh with the curved rack, I mount a roller on the bed with which a stud mounted on said crank concentrically with the reversing-pinion is adapted to coöperate.

As compared with the device shown in said application by Huson it will be seen that I have entirely omitted the curved guideway or slot and that there is no curved guideway or slot whatsoever in my device. This is an improvement, as with this construction there is no tendency for the parts to cramp and the parts are greatly simplified and strengthened. It should be understood, of course, that there is a curved rack, bearing shoulder,

and roller at each end of the bed, so that the same may be reversed in either direction.

Referring now to the drawings and in detail, I will describe one specific form of my invention.

10 designates the usual side frames of a printing-machine, and these side frames may be secured together by any suitable means, including a box-beam or girder 11.

The reciprocating bed or member is designated by 12, and coacting with this bed may be arranged any of the usual impression-cylinders, as 13. The bed or moving member has bearings 15, which engage in grooves 14 on the side frames, so that the bed may be reciprocated in a right line. Any of the other usual ways of mounting the bed on the frames may be employed.

Depending from the ends of the bed are brackets 16 and 17, which have projecting ledges, through which are passed bolts 1600, whereby the brackets are securely fastened to the bed. A rack 18 is fastened by means of screws 1800 to the lower ends of these brackets, as shown. A rack 19 is bolted by means of bolts 1900 to a shoulder 20, carried by the bed. These two racks 18 and 19 are arranged oppositely, so as to face each other, and are separated a distance greater than the diameter of the driving-gear hereinafter referred to, and these racks constitute part of the main driving-gearing.

21 designates the driving-gear, which is arranged between said racks 18 and 19. This driving-gear has a projecting shaft 22, which is eccentrically mounted in a bushing 23, which bushing is journaled in a bracket 111, secured to the tie-beam 11. The bushing 23 has an extending arm 24, to which is connected link 25. This link 25 is yoked, as shown at 26, and this yoke fits on a block 27, mounted on a shaft 28. Also mounted on this shaft 28 is a gear 29, which may be driven in the usual manner from any part of the gearing, as from the pinion 2900, mounted on the shaft 33, as shown in dotted lines in Fig. 1. The yoke 26 has rollers 30 and 31, which bear on a cam 32, mounted on said shaft 28. By this means the eccentric-bushing will be oscillated and the main driving-gear raised and lowered at the proper time to alternately engage the main racks 19 and 18.

33 designates the driving-shaft, to which power may be applied. This shaft is journaled in suitable bearings, and one of said bearings is the bearing 1100, projecting from the bracket 111. Arranged on the end of this shaft 33 is a pinion 34, which meshes with and drives the main driving-gear 21. This mechanism constitutes the main driving mechanism, which will give the bed its major reciprocation. The driving-gear 21 has a hole bored in the same, and fitting in this hole is a stud 35. This stud 35 has a large circular working shoulder 36 and a projecting stud 37. These parts 35, 36, and 37 are preferably one integral structure.

Fitting on the projecting stud 37 is a reversing-pinion 38, and this reversing-pinion and stud may be securely held in position by means of screws 380 and 390, which pass through the reversing-pinion 38 and the working shoulder 36 and are tapped into the main driving-gear 21.

The circular working shoulder 36 is preferably made of a diameter substantially equal to the pitch diameter of the reversing-pinion 38.

Formed on each of the depending brackets 16 and 17 is a curved rack 40, which is substantially half of an internal gear, the pitch diameter of which is the distance between the pitch-lines of the main racks 18 and 19. Also arranged concentrically with each internal rack 40 is a curved working shoulder 41. These working shoulders 41 are substantially of a diameter equal to the pitch diameter of the curved racks 40. This proportion between the working shoulders is the preferred one, although other proportions may be used. These shoulders 41 are arranged in the plane of the shoulder 36 carried by the driving-gear. The internal racks 40 are arranged in the plane of the reversing-pinion 38.

Secured to each of the brackets 16 and 17 is a bracket which consists of the two arms 42 and 43, which are secured to the brackets by means of screws 430 and 440, as shown. These two arms 42 and 43 unite and form a bearing 44. A collar 45 has a shaft 46, which fits into this bearing, and on the end of the shaft 46 is arranged a collar 47, which is secured thereto by pin 48.

As shown, the machine is designed to have what is known as a "three-revolution driving-gear"—that is, the driving-gear 21 will make one complete revolution to give the bed its forward movement, one complete revolution to give the bed its backward movement, and a half-revolution to reverse the movement of the bed in either direction. Then if the reduction between the pinion 34 and gear 21 is two to one the shaft 33 will make six revolutions for each complete forward and backward movement of the bed. As the cam 32 must make one complete revolution for each complete forward and backward reciprocation of the bed in the specific device shown, the reduction between the pinion 2900 and the gear 29 must be six to one.

The cam 32 is so proportioned and designed that the gear 21 will be held in engagement with one rack, as 18, during one movement of the bed, and while the reversing mechanism is acting the cam will actuate the gear, so that when the bed is given by the reversing mechanism back to the driving-gear the driving-gear will engage the other rack 19 and make a complete revolution in engagement with the same, and so that the gear will be lowered while the reversing mechanism is acting at the other end of the bed. It is understood that I do not limit myself to this proportion of gearing herein described, as the

same may be varied by a designer and the relative proportion of speed arranged in proportion to the stroke which it is desired to give the bed.

The reversing movement is accomplished by the working shoulder 36, carried by the driving-gear, bearing on the curved shoulders 41, carried by the bed. These parts are so arranged that there will be no friction between the working shoulders—that is, the working shoulder 36 will turn up or down on the curved working shoulders 41 without slip—and therefore these parts will last for a longer time, and also it will be seen that these parts are very strong and will receive the thrust of the bed as close to the bearing as is possible.

The function of the reversing-pinion and the curved racks is substantially the same as in the device shown in said application of Winfield S. Huson, and the same will provide a constant mesh between the driving mechanism and the bed.

The function of the rollers 45 and the stud 37 is simply to keep the working shoulders in engagement and the reversing-pinion in engagement with the curved racks during the reversing movement and to prevent slippage at this point. In the ordinary or normal operation of these parts practically no strain will come on the rollers 45, the same being simply provided to prevent accident or so that if the parts should be left with the reversing mechanism in gear the mechanism would start in operation.

In the specific device shown, as the curved racks are made of a larger diameter than the driving-gear they will greatly help and aid the operation of raising and lowering the driving-gear.

The movement of the bed forward and backward will be a pitch circumference of the main driving-gear plus two pitch diameters of the reversing-pinion, or substantially the pitch diameter of the main driving-gear.

In some cases I contemplate making the working shoulder and curved racks separate from the depending brackets, and such a construction is shown in Fig. 5. Referring to this figure, 170 designates one of the depending brackets, secured to which is the curved working shoulder 51 and the curved rack 52, which are in this modification formed integrally and with a projecting ledge 50, which fits against a shoulder 57, formed on said bracket 170 by means of bolts or screws 53.

In Fig. 6 I have shown a further modification in which I form the curved working shoulder 54 integrally with the depending bracket 171, but make the curved rack 55 separate from the bracket 171 and secure the same to the bracket 171 by screws 56, this rack fitting against a notch 58, cut in said bracket. The preferred construction of brackets, however, is shown in Fig. 1—that is, I make the working shoulders and internal racks integrally with the depending brackets. This provides a very strong structure and one which is very easy of manufacture—that is, the brackets 16 and 17 may be cast in one piece, the shoulders and internal racks turned out, the teeth cut exactly as the teeth of an internal gear are cut, and then the two brackets may be sawed apart, thus forming exact duplicates, or rights and lefts.

The operation of my improved device is as follows: The gear 21, meshing with the racks 18 or 19, will give or impart to the bed its main forward and backward reciprocation. The pinion 38, running around the curved racks 40 40, will keep a constant mesh of gearing during the reversing operation. The circular working shoulder 36, engaging the curved working shoulders 41, will impart to the bed the principal part of its reversing movement, and the stud 37, engaging the roller, will keep the gearing in mesh and the working shoulders together during the reversing operation.

In Fig. 1 the bed is shown as on its main reciprocation, and in Fig. 3 the bed is shown as at the end of its movement in one direction.

Thus it will be seen that my mechanical movement consists of a very few parts, which are extremely strong, and it will be seen that my improved mechanism thereby constitutes a very efficient device for driving printing-press beds.

The details and arrangements of parts herein shown and described may be varied by a skilled mechanic without departing from the scope of my invention as expressed in the claims.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a mechanical movement, the combination of the reciprocating bed or member, with means for giving the same its major reciprocation and a reversing mechanism consisting of a curved rack carried by said bed, a pinion fixed upon a revolving crank, adapted to engage said curved rack, a working shoulder fixed upon said crank, concentrically with said reversing-pinion, and a curved working shoulder mounted on the bed, concentrically with said curved rack, substantially as described.

2. In a mechanical movement, the combination of the reciprocating bed or member, a main driving mechanism adapted to give the same its major reciprocation, curved racks mounted at each end of said bed, a reversing-pinion fixed upon a revolving crank, and adapted to alternately engage said curved racks to reverse the movement of the bed in either direction, a working shoulder fixed concentrically with said reversing-pinion, and curved working shoulders arranged concentrically with said curved racks, substantially as described.

3. In a mechanical movement, the combination of the reciprocating bed or member, the main driving mechanism for giving the same its major reciprocation, a curved rack car-

ried by said bed, a reversing-pinion fixed upon a revolving crank, and adapted to engage said curved rack, a working shoulder fixed concentrically with said reversing-pinion, a working shoulder arranged concentrically with said curved rack, a stud arranged concentrically with said reversing-pinion, and a roller arranged concentrically with said curved rack, substantially as described.

4. In a mechanical movement, the combination of the reciprocating bed or member having the main racks, a driving-gear arranged between said main racks, means for raising and lowering the driving-gear to alternately engage said racks, curved racks secured to each end of said bed, a reversing-pinion fixed upon the main driving-gear, a circular working shoulder fixed upon said main driving-gear concentric with the reversing-pinion, and curved working shoulders arranged on said bed concentrically with said reversing-pinion, substantially as described.

5. In a mechanical movement, the combination of the reciprocating bed or member having two racks, a raising and lowering driving-gear engaging said racks, said gear carrying a reversing-pinion 38, a working shoulder 36 and a stud as 37, depending curved racks arranged at each end of the bed, working shoulders arranged concentrically with said curved racks, and rollers with which the stud mounted on the driving-gear is adapted to coact to keep the reversing-pinion in mesh with the curved racks and the working shoulders together, substantially as described.

6. The combination of the reciprocating bed or member, a main driving mechanism for giving the same its major reciprocation, and a reversing mechanism consisting of a reversing-pinion mounted on a revolving crank, a curved working shoulder also fixed upon said crank concentrically with said reversing-pinion, and of a diameter substantially equal to the pitch diameter of said pinion, a curved rack depending from said bed, and a curved working shoulder carried by said bed concentrically with said curved rack of a diameter substantially equal to the pitch diameter of said curved rack, substantially as described.

7. In a mechanical movement, the combination of the reciprocating bed or member, a main driving-gear 21, a stud 35 fitting therein, said stud having a working shoulder 36 and a projecting stud 37, a reversing-pinion 38 mounted on said stud 37, and curved racks, working shoulders and rollers secured to each end of said bed, substantially as described.

8. The combination in a mechanical movement of the reciprocating bed or member, the main driving mechanism for giving the same its major reciprocation, and a reversing mechanism consisting of a reversing-pinion mounted upon a revolving crank, a curved working shoulder arranged concentrically therewith substantially the pitch diameter of the reversing-pinion, brackets depending from each end of the bed having curved racks, and working shoulders formed integrally therewith, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

LOUIS W. SOUTHGATE.

Witnesses:

PHILIP W. SOUTHGATE,

E. M. HEALY.