

No. 615,887.

Patented Dec. 13, 1898.

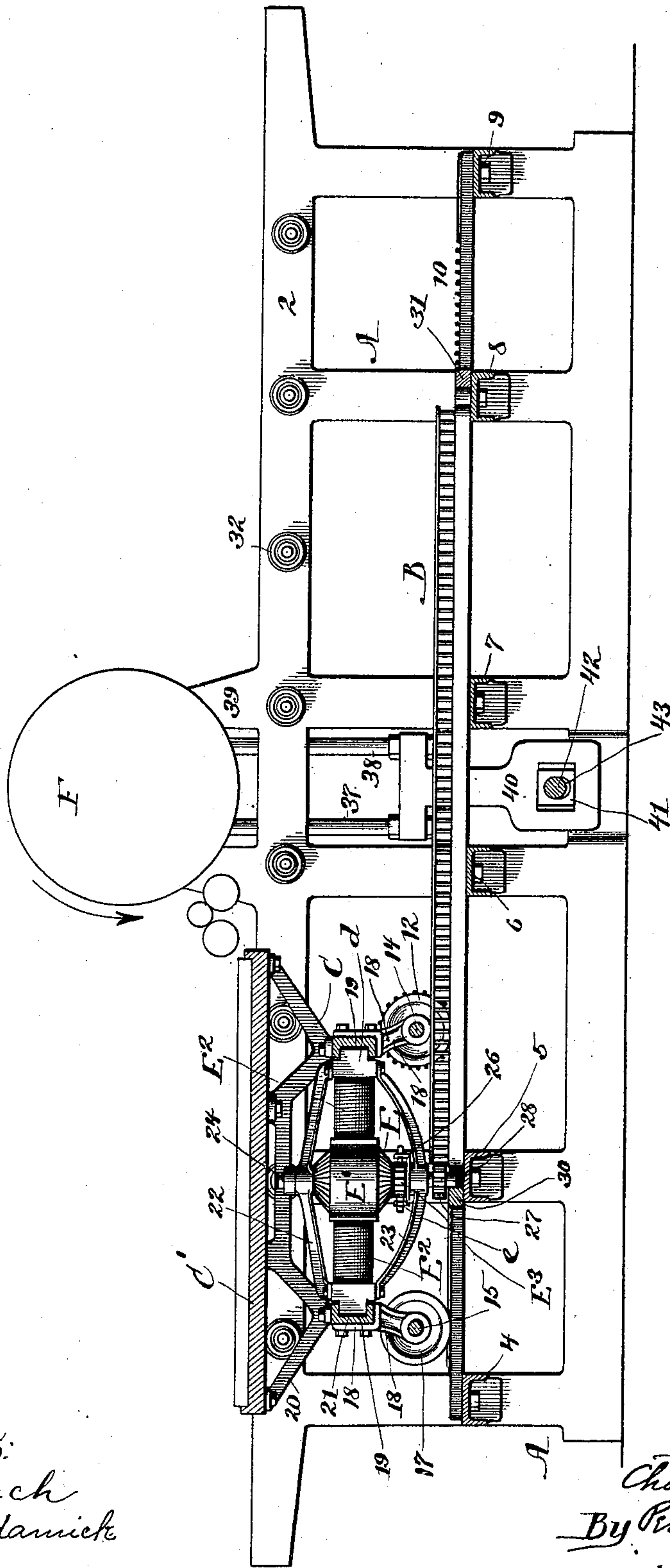
C. F. OWEN.
PRINTING PRESS.

(Application filed July 10, 1893. Renewed Nov. 11, 1898.)

(No Model.)

4 Sheets—Sheet 1.

Fig. 1



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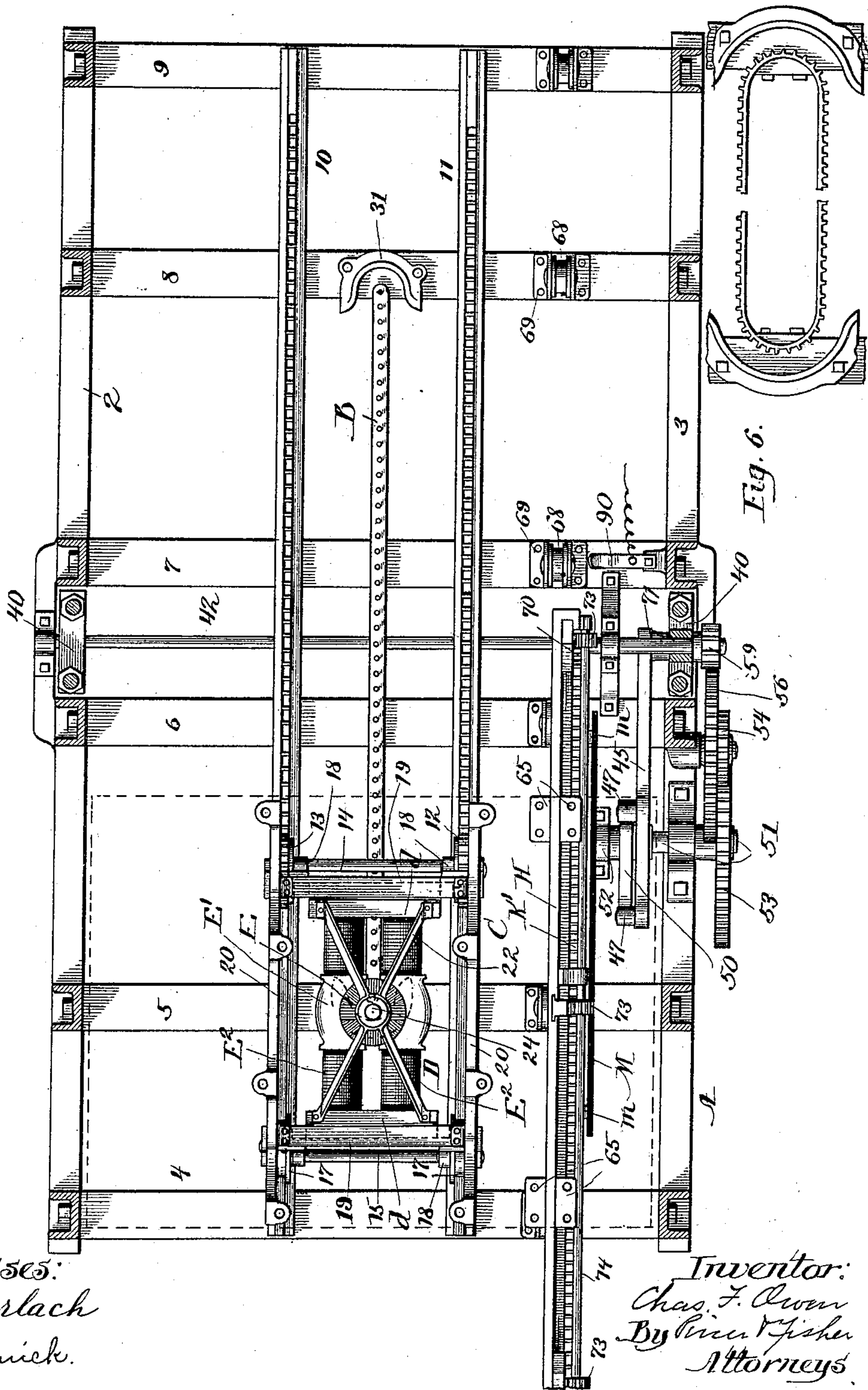
PRINTING PRESS.

(Application filed July 10, 1893. Renewed Nov. 11, 1898.)

(No Model.)

4 Sheets—Sheet 2.

Fig. 2.



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(No Model.)

4 Sheets—Sheet 4.

Fig. 5.

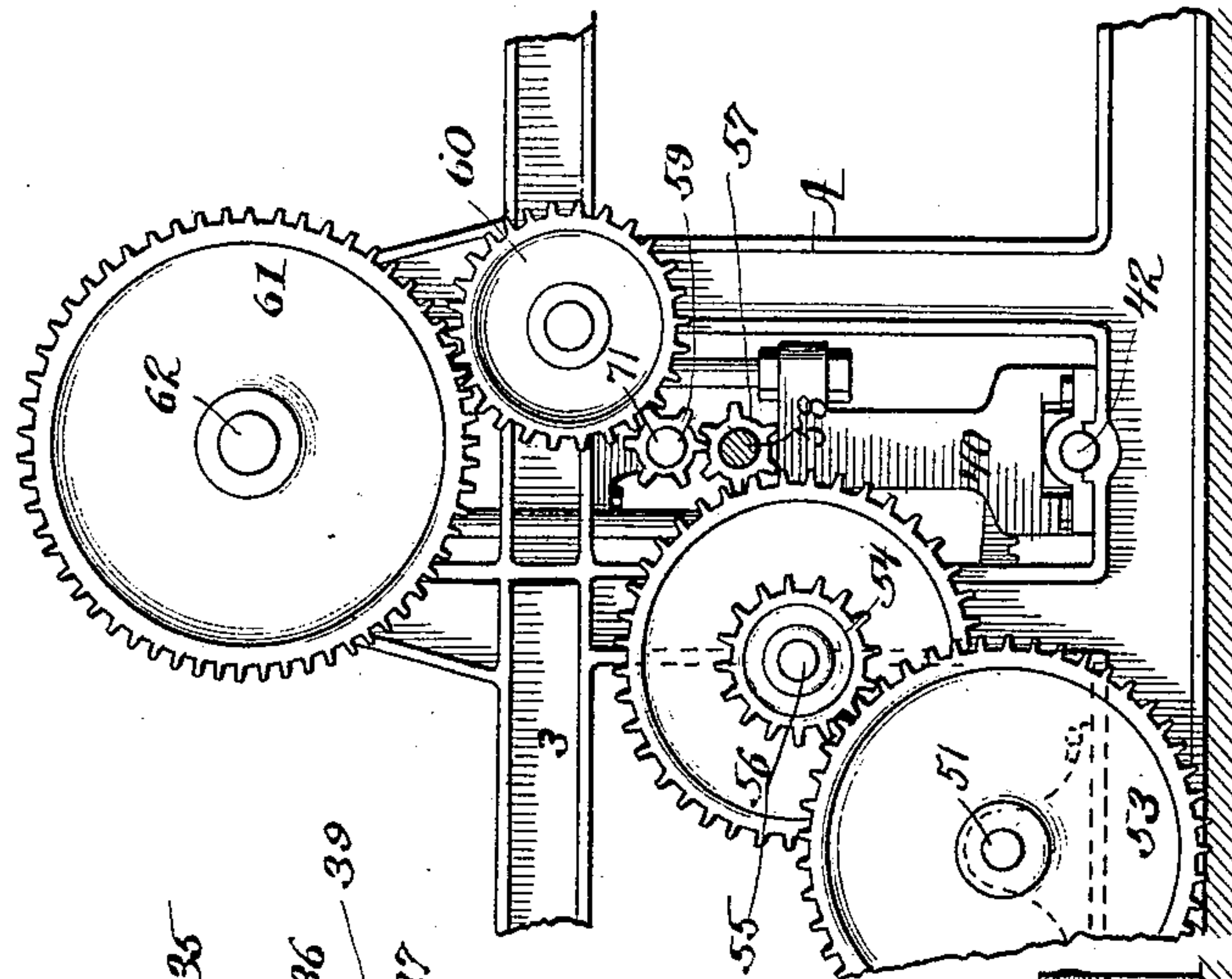
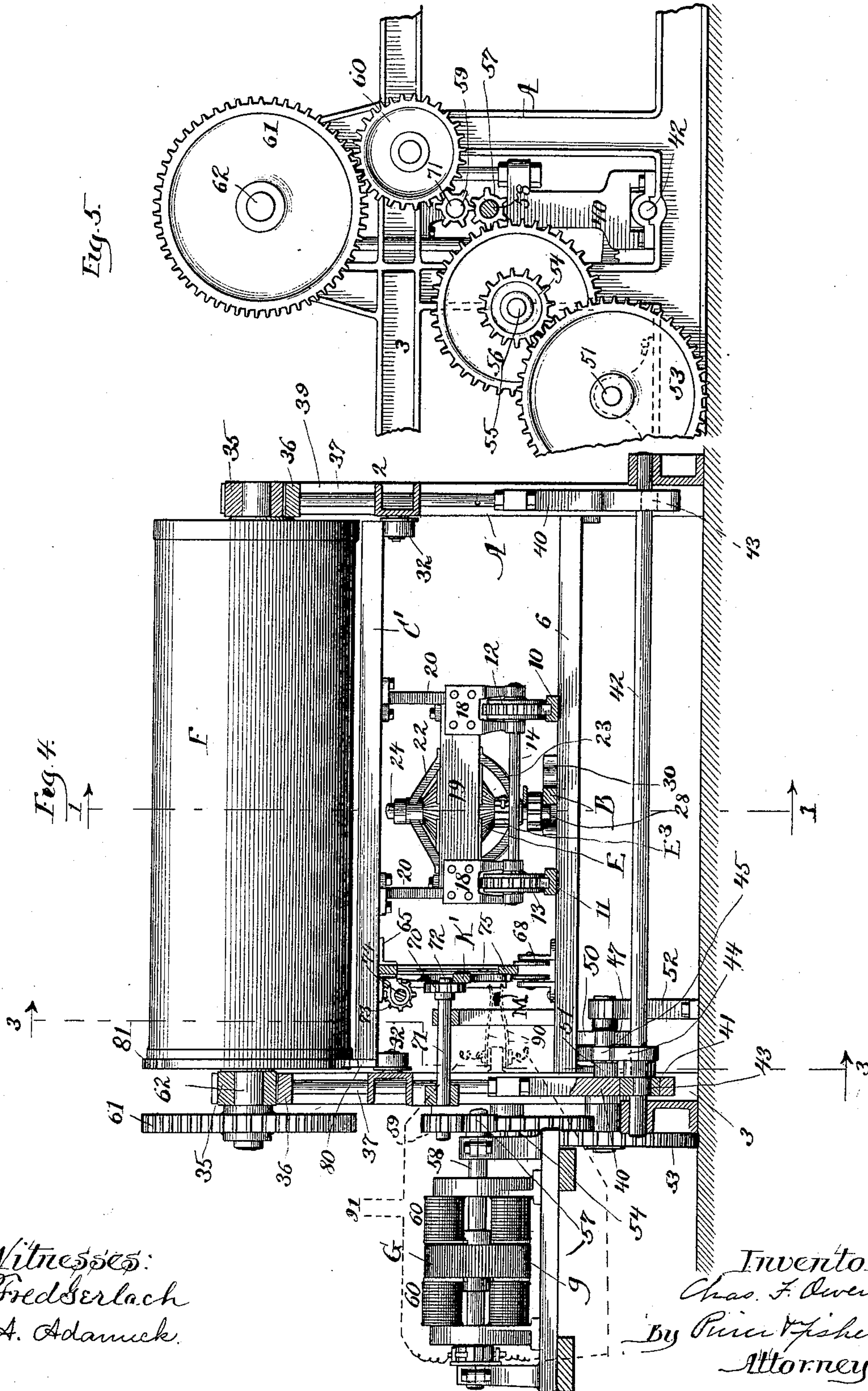


Fig. 4.



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UNITED STATES PATENT OFFICE.

CHARLES F. OWEN, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE MIEHLE PRINTING PRESS AND MANUFACTURING COMPANY, OF SAME PLACE.

PRINTING-PRESS.

SPECIFICATION forming part of Letters Patent No. 615,887, dated December 13, 1898.

Application filed July 10, 1893. Renewed November 11, 1898. Serial No. 696,185. (No model.)

To all whom it may concern:

Be it known that I, CHARLES F. OWEN, a citizen of the United States, residing in Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Printing-Presses and other Machines, of which I do declare the following to be a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My present invention, while directed more particularly to the improvement of printing-presses of the type commonly known as "bed-and-cylinder" presses, is applicable, so far as many of its features are concerned, to a variety of other machines, and I do not wish, therefore, that the invention should be understood as restricted to printing-presses alone.

In the construction of bed-and-cylinder presses of the class in which a reciprocating type-bed and a continuously-rotating impression-cylinder are employed it is the common practice to drive the bed and cylinder from a single source of power, and it is also customary to impart the desired reciprocation to the type-bed by means of a rack and pinion, the rack being fixed to the bed, so as to move back and forth therewith.

One of the objects of my present invention is to provide for a more effective and economical application of power to the driving of the movable type bed or carriage, and this object I accomplish by providing the carriage with a pinion sustained thereon and adapted to travel therewith, this pinion being movably mounted in such manner that it can engage the opposite sides of a fixed rack-bar in order to transmit the desired reciprocation to the bed or carriage.

Another object of my invention is to provide the type-bed and the impression-cylinder with independent motors and to connect the bed and cylinder by a synchronizing-gear, so that a direct and effective application of the power shall be had to both the bed and the cylinder and a precision of unison movement shall be imparted to the bed and cylinder by reason of the fact that the synchronizing-gear has simply to perform the function of insuring such unison movement, whereas in prior

constructions in which a gear has been interposed between the bed and cylinder such gear has been forced to perform the function of transmitting movement between the parts and has consequently been subjected to such strains as in time effect so great a wear of the parts that the precision of movement between the bed and cylinder is destroyed.

My invention consists in various novel features of construction in the combination of parts hereinafter described, illustrated in the accompanying drawings, and particularly pointed out in the claims at the end of this specification.

Figure 1 is a view, partly in elevation and partly in section, on line 1 1 of Fig. 4. Fig. 2 is a plan view, the impression-cylinder and printing-bed being removed and parts of the main frame being shown in section. Fig. 3 is a view in side elevation and partly in vertical section on line 3 3 of Fig. 4. Fig. 4 is a view in vertical transverse section on line 4 4 of Fig. 3. Fig. 5 is a partial view in side elevation, the cylinder-motor being removed, looking toward the impression-cylinder. Fig. 6 is a detail plan view of a modified construction of rack-bar and guide-shoes.

A designates the main frame of the machine, between the sides 2 and 3 of which extend the cross-bars 4, 5, 6, 7, 8, and 9, in convenient number and arrangement, and upon these cross-bars are sustained the cog-rails 10 and 11 and a rack-bar B. With the teeth of the rails 10 and 11 engage the cog-wheels 12 and 13, that are fixed to the axle 14 of the main carriage or truck frame C, the purpose of the cog-wheels and racks being to insure a uniform movement of both sides of the carriage. The axle 15 of the carriage C is provided with flanged wheels 17, that ride upon the smooth portions of the rails 10 and 11, and the axles 14 and 15 are connected by suitable arms or brackets 18 with the cross-bars 19 of the carriage C. These cross-bars 19 are bolted to the side plates 20 of the carriage, these side plates extending upwardly and serving to support the bed C', whereon the type or plates from which the impression is to be made will be carried. Upon the carriage C is mounted the transversely-movable frame

or support D, comprising, preferably, the head-blocks d , having ribs that enter the grooves 21, formed in the cross-bars 19 of the main carriage C. To the head-blocks d are connected the upper and lower spider-arms 22 and 23, in the hubs of which are journaled the ends of the shaft 24, that carries the armature E of an electric motor. About this armature E extend the pole-plates E' , that are connected to the field-magnets E^2 of the motor, these field-magnets being suitably secured to the head-blocks d of the transversely-movable frame or support D. Upon the motor-shaft 24, adjacent the armature E, is mounted also the commutator E^3 , against which bear the brushes e , that are attached to the brackets 26, projecting from the hub of the spider-arms 23. The lower part of the shaft 24 is provided with a drive-pinion 27, that engages with the teeth of the rack-bar B, and the extreme lower end of the shaft 24 extends sufficiently downward to contact with the inner curved faces of the guide blocks or shoes 30 and 31, that are bolted to the transverse bars 5 and 8, respectively, opposite the ends of the rack-bar B. When a broad type-bed, such as shown at C', is employed, the side bars 2 and 3 of the main frame are preferably furnished with inwardly-projecting friction-rollers 32 to sustain the bed, these rollers being conveniently journaled upon studs projecting from the main frame.

From the construction of parts as thus far defined it will be seen that when the electric current from a suitable dynamo is delivered to the motor a rotation of the armature E will be effected, and inasmuch as the motor-shaft 24 of this armature carries the drive-pinion 27, that engages the rack-bar B, the rotation of the shaft 24 will cause the pinion to travel along the rack-bar B and carry with it the carriage C and the parts sustained thereby. It is manifest that when the drive-pinion 27 reaches the end of the rack-bar B the projecting end 28 of the shaft 24 will contact with the inner faces of the guide blocks or shoes 30 and 31, thereby insuring the passage of the pinion around the ends of the rack-bar B in order to effect the reversal of the direction of travel of the carriage C and so impart the desired reciprocating movement to the bed C'. Inasmuch as the frame or support D is mounted in a manner permitting it to move transversely to the path of the carriage C it will be seen that the transverse movement of the frame or support D will occur as the drive-pinion 27 crosses the ends of the rack-bar B, thereby permitting a continuous and easy movement of the pinion and of the type-bed. Any desired extent of lateral travel may be given to the transversely-movable frame or support D, depending upon the shape of the rack-bar B. Thus, for example, in Fig. 6 of the drawings the rack-bar B is shown as formed of two sides arranged at a distance from each other and united by curved portions at their ends. By

thus giving to the ends of the rack-bar B a broad or more gradual curve the reciprocating movement of the main carriage C may be more gradually checked and reversed, this construction being especially advantageous where a rapid reciprocation of the carriage is to be effected. In the preferred embodiment of my invention, which is that illustrated in the drawings, the motor is so mounted upon the carriage D that the shaft 24 shall, through the medium of the pinion 27, directly engage with the rack-bar B, thus applying the power of the motor in the most direct and effective manner. This direct application of the power is particularly beneficial at the time when the pinion 27 is traversing the ends of the rack-bar B, since at such times the pinion being movably sustained has a movement of translation as well as of rotation and is consequently enabled to pass around the ends of the rack-bar and apply the power in most effective manner for accomplishing the reversal of the carriage C and also for causing any easy lateral shift of the transversely-movable frame or support D. It is manifest that the feature of mounting the drive-pinion in a movable support so that it can pass around the ends of the rack-bar and engage its opposite sides is a most important one and can be used with advantage in a variety of situations in which it has heretofore been customary to employ a fixed pinion, thereby forcing the pinion not only to drive, but to laterally shift the rack-bar.

The mechanism whereby the impression-cylinder F is driven will next be described. This cylinder F is journaled within suitable bearing-blocks 35, sustained by the cross-bars 36 at the upper ends of the lifting-rods 37 and 38, that extend upwardly at the sides of the main frame, the extensions 39 of the main frame serving as guides for the blocks 35. The rods 37 and 38 pass through suitable perforations formed in the side bars 2 and 3 of the main frame and have their lower ends secured to the yoke plates or bars 40, within which are held the blocks 41, through which pass the crank portions of the transverse shaft 42. Hence it will be seen that when the shaft 42 has rotation imparted thereto these crank portions 43 will cause the lifting of the plates 40 and rods 37 and 38, and thus insure the lifting of the impression-cylinder F to such distance as will prevent its contact with the type or impression plates carried by the reciprocating bed C'. The shaft 42 is journaled in suitable bearings at the sides of the machine, and upon this shaft is mounted at one end a segment-pinion 44, that is engaged by the toothed arm or rack-bar 45. This arm or bar 45 has its end formed with a space to receive the bearing-block 46, and at the ends of this space project the studs 47, that engage the periphery of a cam 50, that is fixed to the short shaft 51. This shaft 51 is journaled in the bracket 52 and in the main frame,

and at its opposite end carries the gear-wheel 53, that engages with the pinion 54 on the stud-shaft 55, this stud-shaft having fixed thereto also a gear-wheel 56, that meshes with the pinion 57 on the drive-shaft 58 of an electric motor G. This motor G may be of any well-known or suitable construction, and need not therefore be particularly described, it being understood, of course, that the shaft 58 carries the armature *g*, that revolves between the field-magnets 60. By reference more particularly to Figs. 4 and 5 of the drawings it will be seen that the pinion 57 of the drive-shaft 58 meshes with a pinion 59, which in turn engages with the pinion 60, that meshes with the pinion 61, that is fixed to the end of the shaft 62 of the impression-cylinder F, and hence it will be seen that motion from motor G will be imparted through the medium of the shaft 58 and intermediate pinions and gear-wheels to the impression-cylinder.

In order to synchronize the movement of the type-bed C' and of the impression-cylinder F, I employ a suitable gearing or connector, one form of gearing being that illustrated in the accompanying drawings and next to be described. To the under side of the bed C' is attached, as by brackets 65, the rack-bar frame H, the vertical end bars of which are grooved to receive the vertically-movable shoes K, that carry the rack-bar K'. (See Figs. 2 and 3.) The bottom bar *h* of the frame H preferably rests upon suitable guide-rollers 68, journaled in brackets 69, that rise from the cross-bars 4 5, &c., of the main frame, the purpose of these rollers being to accurately guide the frame H in its back-and-forth movement. With the rack-bar K' meshes the pinion 70, that is carried by the shaft 71, on which is held the pinion 59, and this shaft 71 has the projecting inner end 72, that will engage with the curved faces of the vertically-movable shoes K, and thus hold the pinion 70 in gear with the rack-bar K' and cause the pinion to pass around the ends of the rack-bar and lift the rack-bar K' and the shoes K at such times. In order to insure a uniform movement of the rack-bar K' and avoid all danger of binding of the shoes K, I prefer to form these shoes with indentations or teeth *k*, that engage the pinions 73 on the shaft 74, this shaft being journaled in suitable brackets secured to the frame H. Preferably also the frame H will be furnished with the central vertical rack-plate 75, the teeth of which will engage the pinion 76 on the shaft 74. Hence it will be seen that as the bed C is reciprocated back and forth a like movement will be imparted to the rack-bar K'. As this rack-bar corresponds in all respects with the rack-bar B, which coöperates in effecting the movement of the bed C, and as the ends of the rack-bar K' engage with the pinion 70 the projecting end 72 of the pinion-shaft 71 will contact with the curved faces of the shoes K and will cause the lifting

of the rack-bar in manner hereinbefore defined. As the shaft 71 is, through the medium of the pinion 59 and gear-wheels 60 and 61, in gear with the impression-cylinder, and is, through the medium of the pinion 70, the rack-bar K', and the frame H, connected with the reciprocating bed C' it follows that the movement of the cylinder and the bed must at all times accurately correspond and this, too, notwithstanding the intermittent lifting of the impression-cylinder in manner to be presently described.

In the preferred embodiment of my invention the type-bed C' is provided with a rack-bar 80, that engages with the corresponding segment-gear 81, formed adjacent the periphery of the impression-cylinder F, the purpose of this rack-bar and segment being to insure to the utmost degree a correspondence of movement between the impression-cylinder and the type-bed and take up the "backlash" or lost motion in the synchronizing-gear.

From the foregoing description it will be seen that as the type-bed C' is reciprocated through the medium of its motor, as hereinbefore described, rotation will be imparted to the impression-cylinder F from the motor G, and by means of the synchronizing-gear or connecting mechanism herein described an exact correspondence in movement between the impression-cylinder and the bed C' will be effected. During the forward movement of the type-bed C' the rack-bar 80 will be in engagement with the segment-gear 81 of the impression-cylinder F; but as the type-bed completes its forward movement (in direction of the arrow, Fig. 3) the rotation of the shaft 51, through the medium of the gear-wheels 54 and 56 and pinions 55 and 57, will cause the cam 50 to move forward the rack-bar 45, thereby forcing this bar to turn the segment-gear 44 and shaft 42 to a sufficient extent to cause the cranks 43 of the shaft to lift the yoke-plates 40 and rods 37 and 38, and thus raise the impression-cylinder F to such extent as to prevent the engagement of the segment-gear 81 and rack-bar 80 as the type-bed C' is reversed and moved backward and as to raise also the cylinder F from contact with the type carried by the bed C', the cylinder being free to continue its revolution notwithstanding such reversal of the bed. Inasmuch, however, as the teeth of the segment-gear 81 and rack 80 are much shallower than the teeth of the pinion 60 and gear-wheel 61 (see Figs. 3 and 5) it will be seen that the impression-cylinder will remain constantly in gear with the type-bed, through the medium of the gear-wheels 61 and pinions 60 and connected parts, notwithstanding the disengagement of the segment-gear 81 and rack 80.

I consider it desirable in printing-presses of the character above described that the impression-cylinder F should be driven by the bed C' during the time that the impression from the type is being made and that during

such time the cylinder-motor G should be thrown out of action. In order to throw the cylinder-motor out of action at such time, I employ a switch adapted to admit current to the motor G at all times except while the type-bed C' is coöperating with the impression-cylinder in making the impression. The switch illustrated in the drawings consists of an insulating-bar M, that is carried by the arms *m*, depending from the shifting rack-bar K', this bar M extending into position to pass between and thus insulate the pole-plates or springs 90, through which current is delivered to the motor G, as shown by dotted lines in Fig. 4. It will thus be seen that when the bed C' is moving forward in the direction of the arrow, Fig. 3, the insulating-bar M will pass between the spring-plates 90, and thus break the flow of current through the wires 91 of the motor G, and consequently the impression-cylinder F' will at such time be driven from the type-bed C' by the rack and gear 80 and 81. When, however, the type-bed has moved a sufficient distance to effect the impression from the type, the insulating-bar will pass from between the spring-plates 90, thus allowing current to flow through the wires 91 to the motor G, and current will thus continue to flow until the next forward movement of the type-bed, since during the backward movement of the type-bed the insulating-bar is lifted with the shifting-rack K' to such extent that it will not pass between the spring-plates 90.

While my invention is directed more particularly to the improvement in printing-presses of the class described, it is manifest that features of the invention are applicable for use in a variety of other machines. So also many changes and modifications in the details of construction may be made by the skilled mechanic without departing from the spirit of the invention.

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

1. The combination with a reciprocating carriage, of a rack-bar and a pinion for reciprocating said carriage, said pinion being movably supported to permit it to shift bodily with respect to the carriage as the pinion crosses the ends of the rack-bar, and a suitable motor for driving said pinion mounted to shift with the pinion as the latter crosses the ends of the rack-bar.

2. In a printing-press the combination with an impression-cylinder and the type-bed, of independent motors for driving said parts, a rack-bar and pinion for reciprocating said type-bed, said pinion being movably supported to permit it to shift bodily with respect to the type-bed as said pinion crosses the ends of the rack-bar, the individual motor for driving said pinion being mounted to shift with the pinion as the latter crosses the ends of the rack-bar.

3. In a printing-press the combination with

an impression-cylinder and a reciprocating type-bed, of independent motors for driving said parts, a synchronizing gear or connector for uniting said parts, a rack-bar and a pinion for reciprocating the type-bed, said pinion being independent of the synchronizing mechanism and being movably supported to shift bodily with respect to the type-bed as said pinion crosses the ends of the rack-bar, the motor for said type-bed being mounted to shift bodily with the pinion as the latter crosses the ends of the rack-bar.

4. The combination with the impression-cylinder and the type-bed of independent motors for driving said parts, a rack and pinion for connecting said bed and cylinder and suitable means for throwing the impression-cylinder motor out of action during a part of the revolution of the cylinder, substantially as described.

5. In a printing-press the combination with the impression-cylinder and a reciprocating type-bed, of a reciprocating carriage for sustaining said type-bed, a rack-bar, a driving-pinion for shifting said carriage, said driving-pinion being movably supported to permit it to shift bodily with respect to said carriage as the pinion crosses the ends of the rack-bar, means for causing the pinion to engage opposite sides of the rack-bar, a motor for driving said impression-cylinder, synchronizing-gear mechanism between said impression-cylinder and the type-bed and an independent motor for said driving-pinion mounted to shift bodily with the pinion as the latter crosses the ends of the rack-bar.

6. In a printing-press, the combination with an impression-cylinder and the reciprocating type-bed, of a reciprocating carriage for sustaining said type-bed, a rack-bar, a driving-pinion for shifting said carriage, said driving-pinion being transversely movable upon said carriage, means for causing said pinion to engage the opposite sides of the rack-bar, suitable individual motors for said driving-pinion and said impression-cylinder, and synchronizing-gear between said impression-cylinder, and the type-bed, substantially as described.

7. The combination of a movable carriage, a transversely-movable frame or support mounted thereon, a fixed rack-bar, a drive-pinion carried by said transversely-movable frame or support, a motor sustained by said carriage and connected with said drive-pinion and means for shifting said motor transversely, substantially as described.

8. The combination of a movable carriage, a transversely-movable frame or support mounted thereon, a fixed rack-bar, a drive-pinion engaging said rack-bar, an electric motor mounted upon said transversely-movable frame or support, the armature of said motor being connected to the shaft of the drive-pinion and means for transversely shifting said motor, substantially as described.

9. The combination of a movable carriage,

a transversely-movable frame or support mounted thereon, an electric motor connected to said transversely-movable frame or support, a fixed rack-bar, a drive-pinion engaging said rack-bar, the shaft of said drive-pinion serving also to carry the armature of the motor and suitable guide shoes or blocks at the end of said rack-bar to reverse the direction of travel of said pinion substantially as described.

10. The combination with a vertically-movable impression-cylinder and a reciprocating type-bed of a movable carriage for sustaining

said type-bed, a rack and pinion for shifting said carriage, a motor mounted upon said carriage and connected with a pinion-shaft, an independent motor for driving the impression-cylinder, a synchronizing gear or connector between the type-bed and the impression-cylinder and means for lifting the impression-cylinder during part of the movement of the bed, substantially as described.

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