

No. 688,691.

Patented Dec. 10, 1901.

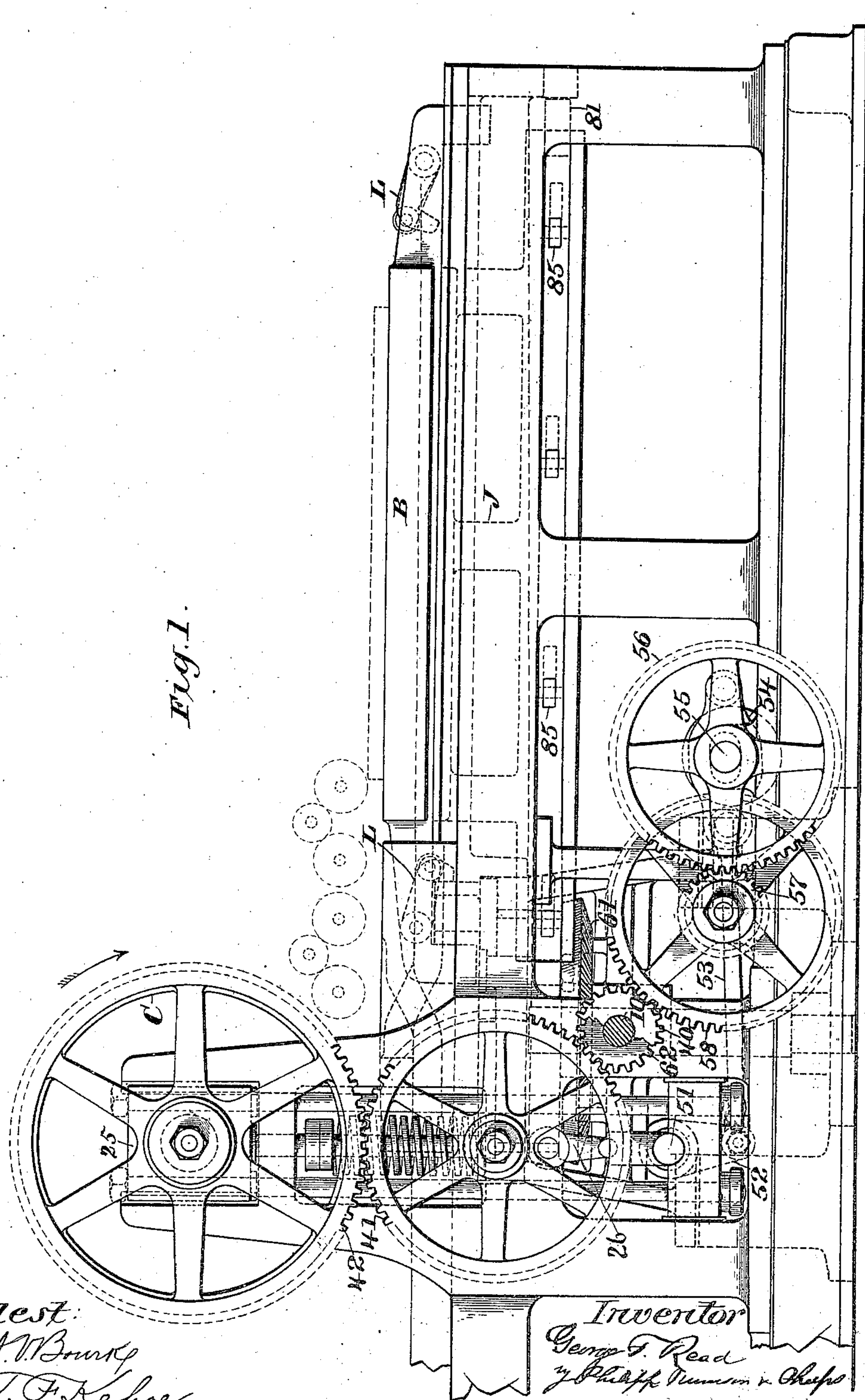
G. F. READ.

BED MOTION FOR CYLINDER PRINTING MACHINES.

(Application filed Mar. 20, 1896.)

(No Model.)

5 Sheets—Sheet 1.



Attest:
A. V. Brunk
T. F. Kehoe.

Inventor
George F. Read
By *Philip M. Munn & Co.*
Attys

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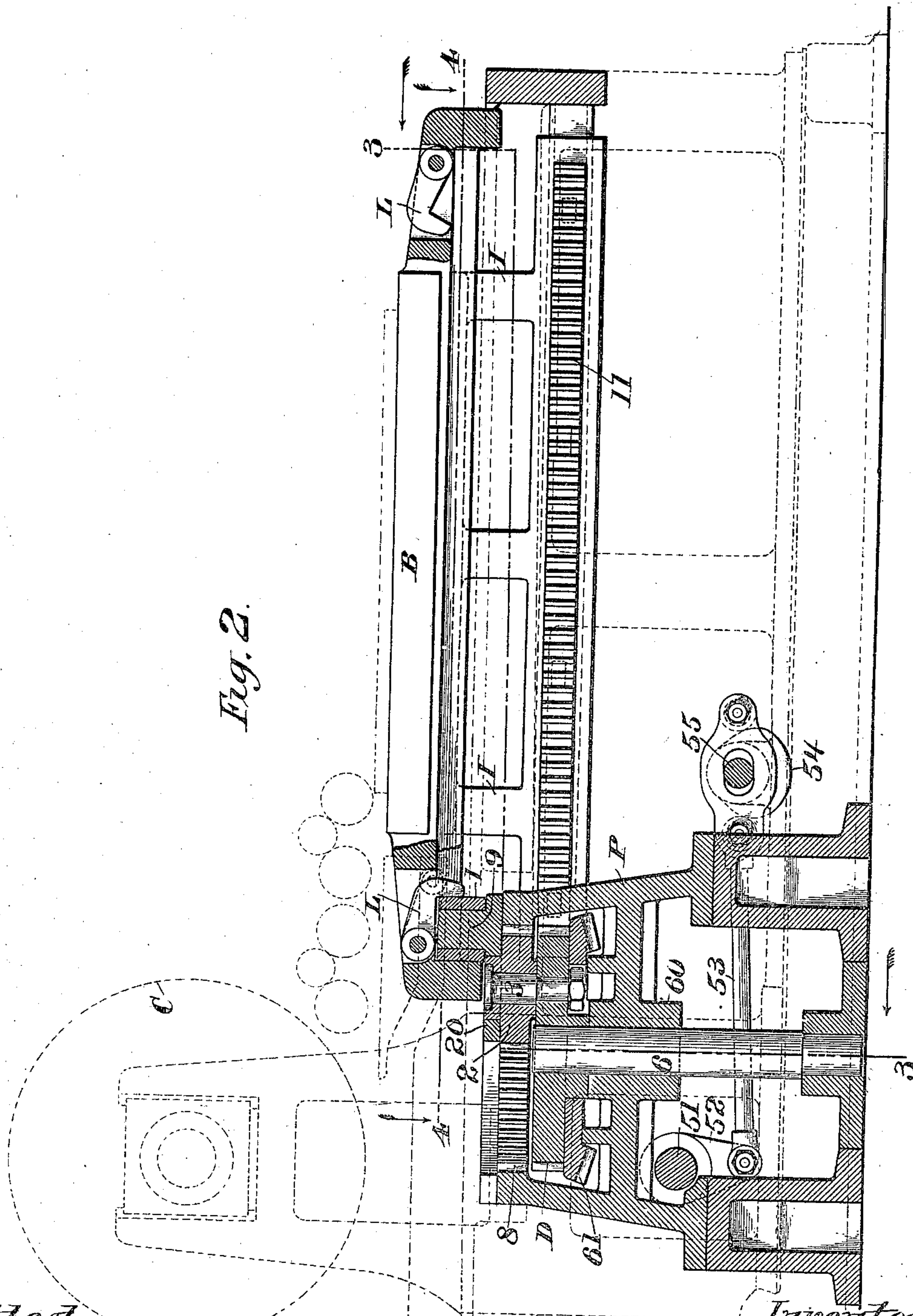
BED MOTION FOR CYLINDER PRINTING MACHINES.

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(No Model.)

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Fig. 2.



Attest
J. M. Bank
J. A. Kehoe.

Inventor
George F. Read
J. Shefferson & Shefferson
Attys

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G. F. READ.

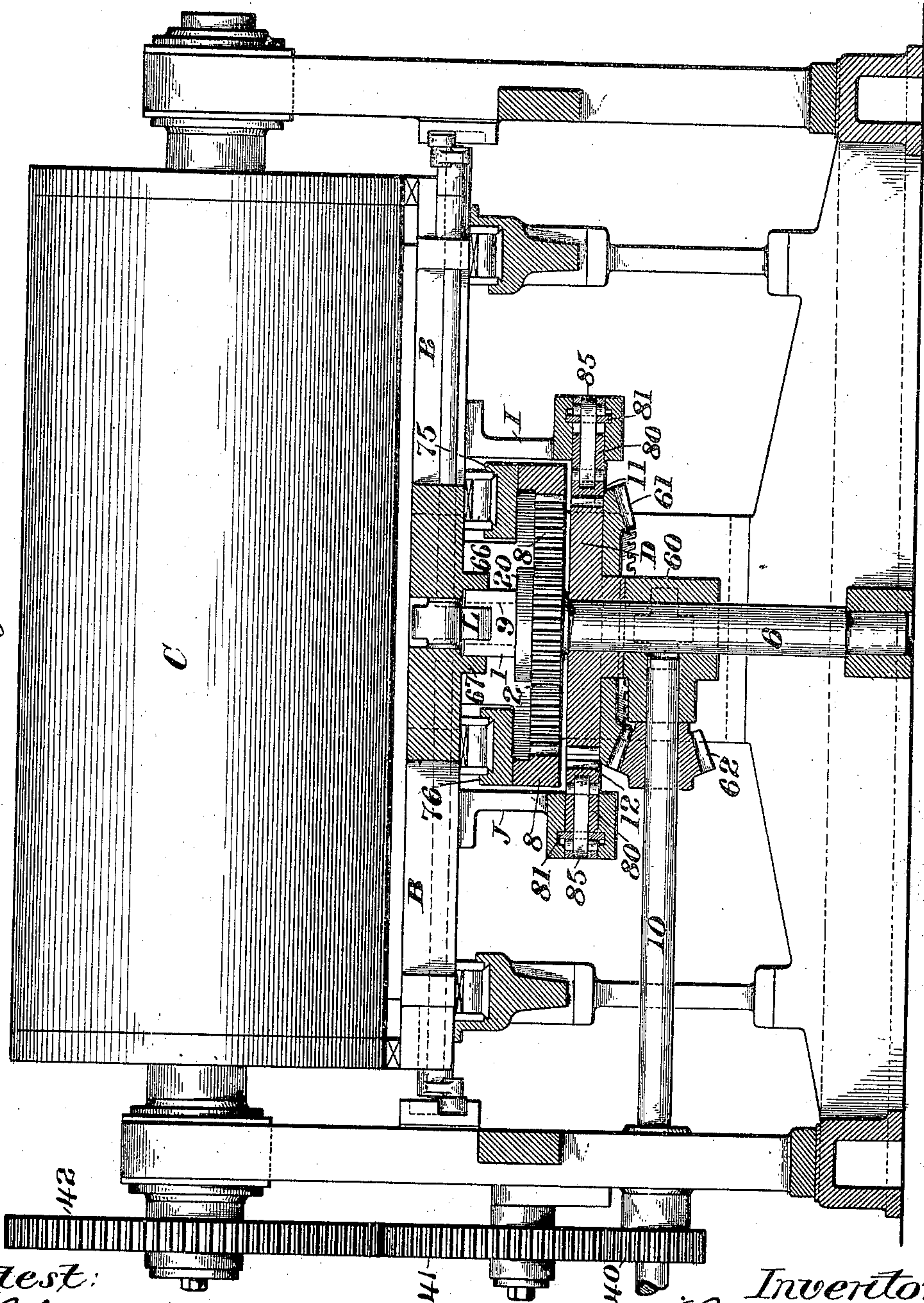
BED MOTION FOR CYLINDER PRINTING MACHINES.

(Application filed Mar. 20, 1896.)

(No Model.)

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Fig. 3.



Attest:
J. W. Binkley
T. F. Kehoe

Inventor:
George F. Read
J. Chieff, Munson & Phelps
Attys

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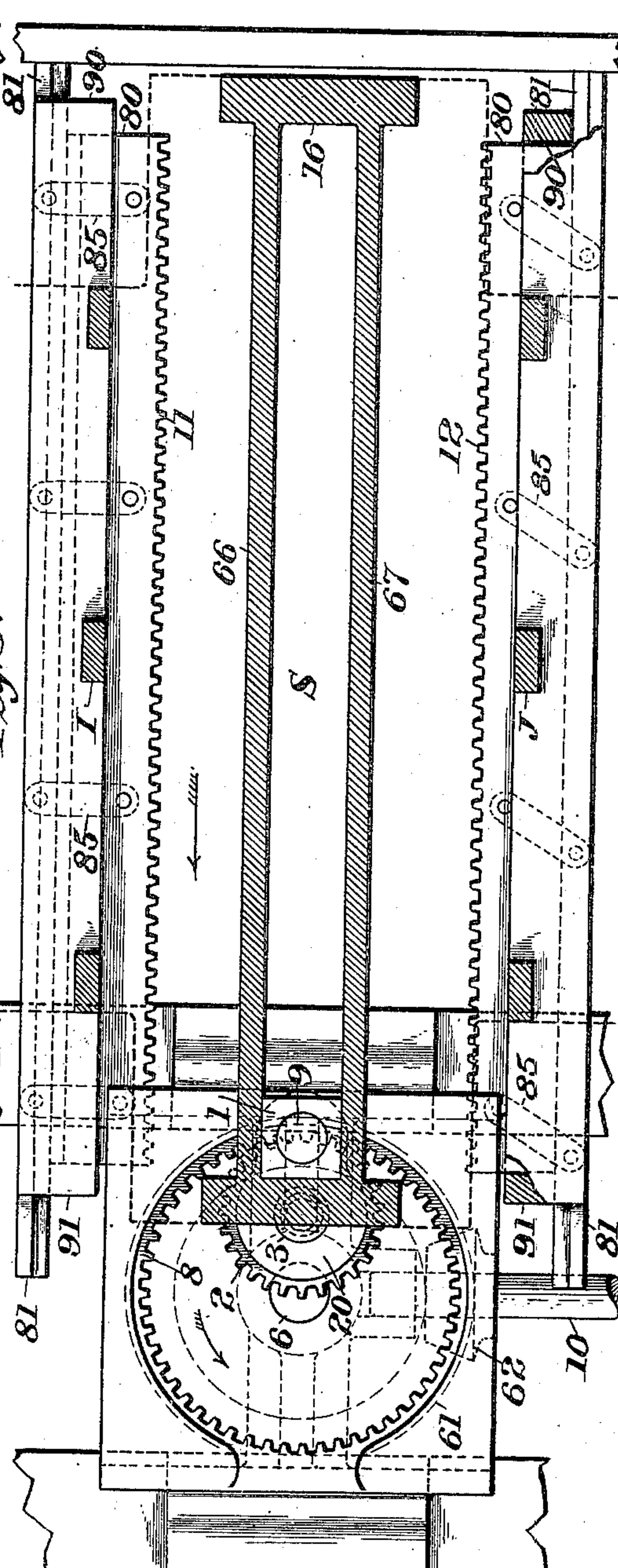
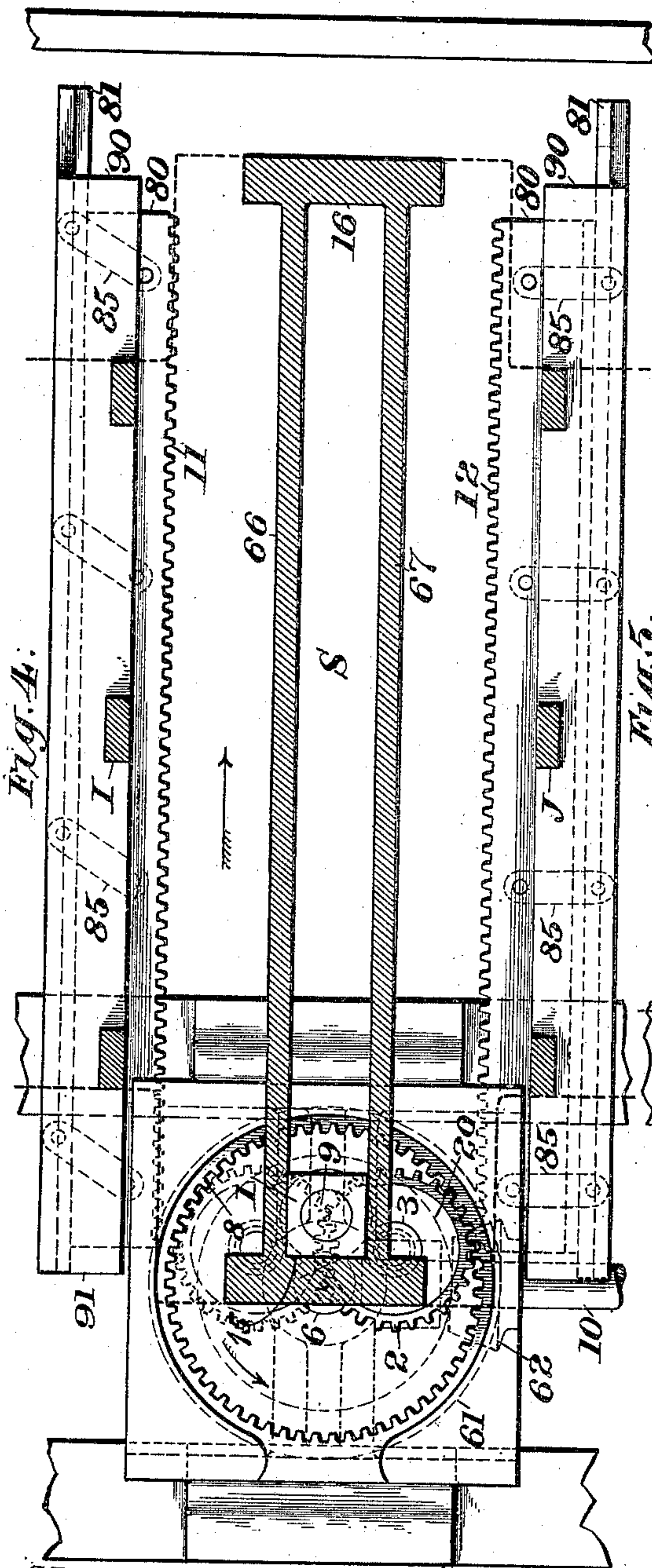
G. F. READ.

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(No Model.)

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Attest:

A. V. Bourke
T. F. Kelcey

Inventor:

George F. Read
by Phelps Munson & Phelps
Attys.

No. 688,691.

Patented Dec. 10, 1901.

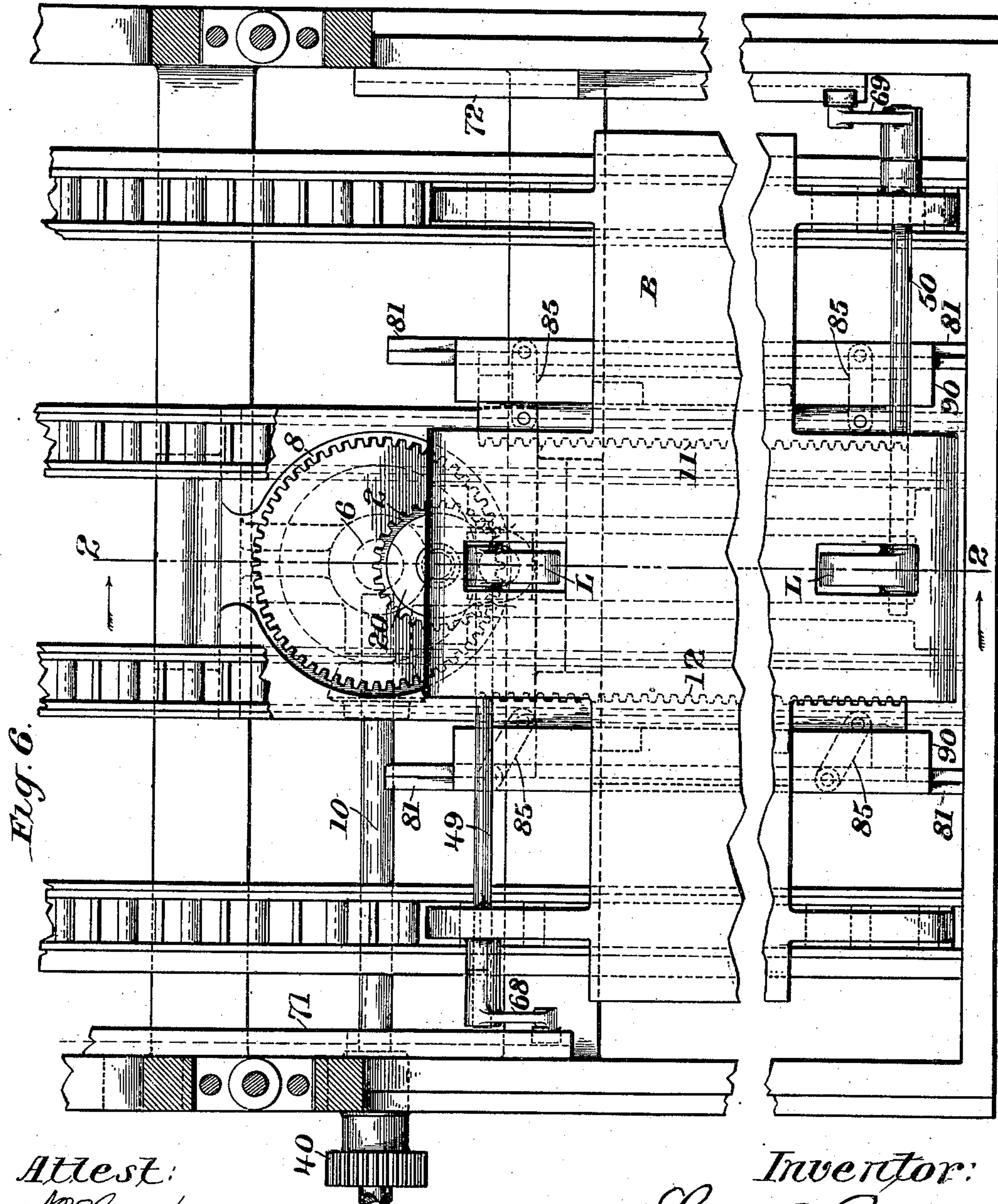
G. F. READ.

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(Application filed Mar. 20, 1896.)

(No Model.)

5 Sheets—Sheet 5.



Attest:
A. W. Brunk
T. F. Kehoe

Inventor:
George F. Read
J. P. Johnson & P. Phelps
Attys

UNITED STATES PATENT OFFICE.

GEORGE F. READ, OF BROOKLYN, NEW YORK, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO ROBERT HOE AND CHARLES W. CARPENTER, OF NEW YORK, N. Y., COPARTNERS DOING BUSINESS UNDER THE FIRM-NAME OF R. HOE AND COMPANY.

BED-MOTION FOR CYLINDER PRINTING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 688,691, dated December 10, 1901.

Application filed March 20, 1896. Serial No. 584,045. (No model.)

To all whom it may concern:

Be it known that I, GEORGE F. READ, a citizen of the United States, residing at Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Bed-Motions for Cylinder Printing-Machines, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to an improved means for propelling the type-bed of a bed-and-cylinder printing-machine in its reciprocating movement and for reversing its motion at each end of the stroke, which means may also be applied for reciprocating parts in other machines.

The invention consists in novel means for reversing the movement of the reciprocating bed after it has made the greater extent of its travel in either direction and whereby provision for its movements is made so that it may not only reciprocate in coöperation with an impression-cylinder revolving at a high velocity, but its reversal may be quickly accomplished without strain or jar and a high maximum of speed of the machine be thus made attainable, said means including mechanisms whereby a member is caused to reciprocate in a horizontal path of travel with successively decreasing and increasing velocities in coaction with an abutment on the bed, with which it coacts to slow down the bed from its high or normal velocity to a state of rest, then start the same in the opposite direction, and accelerate it to the normal velocity of the bed.

A practical embodiment of the preferred form of these improvements is illustrated by the accompanying drawings, in which—

Figure 1 represents a side elevation of a single-cylinder flat-bed printing-machine in which the invention is embodied. Fig. 2 represents a longitudinal sectional elevation of the principal parts thereof, said view being taken on the line 2 of Fig. 6 as seen looking in the direction of the arrows associated with said section-line. Fig. 3 is a partial end elevation and a partial vertical sectional elevation, the section being taken on the section-line 3 of Fig. 2 as seen looking in the direc-

tion of the arrow associated therewith, the impression-cylinder and some other parts being shown in elevation. Figs. 4 and 5 are plan views of the bed mechanism, the same being partially in section through the bed on the section-line 4 of Fig. 2. Fig. 6 is a plan view of most of the parts, though a part of the bed is broken away and the portion of the sliders therefor.

This invention may be applied generally to reciprocating beds, but is more especially adapted for use in connection with and is especially designed to form a part of the bed-motion of a cylinder printing-machine, and although illustrated here in connection with that type of bed-and-cylinder printing-machines which has but one impression-cylinder it is capable of use with any of the various forms of that class of printing-machines, the one illustrated being selected simply for convenience in explanation of the invention.

This printing-machine consists in general of an impression-cylinder C, mounted in suitable journals 25 in the framework, which journals are seated upon spring-supports and made capable of rising and falling by means of a lifting mechanism sufficiently illustrated and so common in the art of printing as to need no special description, being shown as including a toggle 26, operated by the rock-shaft 51, rock-arm 52, rod 53, cam 54 on a shaft 55, and actuating toothed wheels 56, 57, and 58, the latter of which meshes with the wheel 40 on the driving-shaft. This impression-cylinder coöperates with the type or form carrying reciprocating bed B, with which it engages and coöperates in performing the printing operation in a general sense, as usual in machines of this class. Herein this cylinder is shown as provided with a wheel 42, fast upon its shaft, which is engaged with and driven through an intermediate 41, that is driven by the wheel 40 on the main driving-shaft 10.

The type-bed B has rigidly projecting downwardly from it hangers I J, which respectively carry the bed-racks 11 12, which racks are on opposite sides of and alternately driven by the driving or crank wheel D for imparting

to the bed the major part of its movements of reciprocation in opposite directions, as will presently appear. In this construction of bed mechanism the crank or bed-driving wheel D applies its power directly from the driving-shaft 10 without complicated intermediate parts between that member of the mechanism which propels the bed at its uniform velocity and the one which retards, stops, starts, and accelerates its motion.

The mechanisms herein embodied are capable of applying motion to the bed by arranging the crank or driving wheel D in a horizontal or vertical plane. The horizontal disposition, however, has the advantage of enabling the crank-pin 9, hereinafter described, to take hold of the bed very close to its under surface or always near the body whose inertia has to be overcome and which is to be controlled by said pin in performing its function, as will now be explained. This crank or bed-driving wheel D is fast to a shaft 6 and arranged to revolve continuously in a horizontal plane, said shaft being journaled in a hub 60 and stepped in a suitable support at its lower end. On its under side this wheel D is provided with a beveled gear 61, with which another beveled gear 62 on the driving-shaft 10 meshes. As before stated, this crank or bed-driving wheel D is alternately engaged with one or the other of the bed-driving racks 11 12, and in order to render more stable the parts said racks in this instance are made the moving elements in accomplishing this alternate meshing with the wheel D. It is to be understood, however, that the invention is not to be limited to a construction in which the alternate meshing of the driving-wheel D with the two racks is accomplished by movement of the racks. The construction and operation of the racks for the purpose of causing the driving-wheel D to engage the racks alternately will now be explained. These bed-driving racks 11 12 are on either side of the driving or crank wheel D, and each is arranged to have a lateral motion by which it is alternately brought into and out of line with the said driving-wheel. Each rack is composed of two members 80 81, the inner member 80 being the rack proper, and by reason of its being capable only of moving between end guides it is only capable of side-wise movement, while the other member 81 or the outer one being housed in a longitudinal guide is capable of moving endwise only. These two members are connected together by a number of short links 85, so that the longitudinal movement of the outer member 81 will impart an inward or outward movement to the inner member 80 or rack it carries, which movement is analogous to that in a parallel-ruler. The longitudinal movements of these outer members, so as to cause the inward projection or outward withdrawal of the racks from alinement with the teeth of the bed-driving wheel, are accomplished by contact of their ends at the appropriate part

of the stroke of the bed in both directions with the end frames or suitably-positioned abutments. (Compare Figs. 4 and 5.)

The crank or bed-driving wheel D is of a size and so geared and driven as to revolve with a peripheral speed coincident with that of the impression-cylinder; but the relation is such that preferably this wheel makes three revolutions for each complete movement or reciprocation of the bed. This bed or crank wheel D carries a stud 3, set into it so that its center is exactly midway between the center of the crank-wheel and its pitch-line, and upon this stud 3 revolves a pinion 2, whose pitch-circle diameter is one-half that of the crank-wheel D, and its teeth engage with those of an internal annular rack or gear 8, having the same pitch-circle diameter as the crank-wheel D. This internal gear 8 is fixedly secured to the framework by the pedestal P, (see Fig. 2,) which pedestal, it will be perceived, houses the bed or crank wheel D, the beveled wheel 61 it carries, and pinion 2, and also by means of a flange extending upward from the web on the pedestal which carries hub 60 affords a steadying-bearing for the beveled wheel 61 and through it the crank-wheel D and pinion 2.

The crank-wheel D, carrying with it the center of pinion 2, causes the said pinion to revolve about its stud 3, and as the internal gear 8 has twice as many teeth as the pinion 2, carried by the stud 3, it follows that at each complete revolution of the crank-wheel D the pinion 2 is caused to make two complete revolutions about its stud, and any point in the pitch-circle of the pinion 2 will consequently move in a straight line a distance equal to the diameter of the internal gear 8 and at the same velocity as would be derived from a crank of the same radius as the pitch-radius of the crank-wheel D. A crank-pin 9 is therefore secured to the one side of the pinion 2 with its center coincident with a point in the pitch-circle of the pinion and in such a position that it will move back and forth in a right line horizontally or parallel with the path of travel of the bed. The pinion 2 and crank-pin 9 thus form a lever revolving bodily with the wheel D and rotating on an independent axis in the direction the reverse of the direction of rotation of the wheel D. This crank-pin 9 is secured to the pinion 2 by means of an arm or plate 20, fast to one face of the pinion 2, said crank-pin being preferably supplied with a square journal-box 1. For cooperation with this crank-pin 9 the bed is provided with projecting ribs 66 67, separated so as to provide a horizontal rectangular bearing-slot S, alined with the course of travel of the crank-pin 9, it being of a width suitable to receive the box 1 of said crank-pin and allow the same to slide or travel freely horizontally therein and of sufficient length to allow the bed to travel a distance substantially equal to one circumference of the bed-driving or crank wheel D. Each end of this

slot S provides an abutment against which the box 1 of the crank-pin 9 contacts, these contacting portions being the true abutment and the sides between which the crank-pin 9 travels being in effect simply guides and not essential.

At each end of the bed B there is provided a pivoted latch L, (see Figs. 2 and 6,) the office of which latches is to couple the crank-pin through its box 1 to the bed when the said crank-pin is controlling the bed and to uncouple or unlatch them when the bed is to be driven solely by the driving-wheel D through the racks connected with said bed. The movements of the latches are accomplished here by means of rock-shafts 49 50, journaled in the bed, to which shafts they are fast, and which shafts are appropriately moved through their respective rock-arms 68 69, the studs upon which travel in camways 71 and 72, fixed to the side frames.

Bearing in mind that during the greater part of the movement of reciprocation of the bed or while the same is driven by the crank or bed-driving wheel D when engaged with one or the other of the bed-racks, that the abutments at each end of the guide-slot S travel free of the crank-pin 9, and that it is during the slowing down, stopping, starting, and accelerating movements of the bed at each end of its stroke or while the same is being reversed that the crank-pin or its box 1 contacts with said abutments and acts to control the movement of the bed, the following operations of the mechanisms as thus far described will be readily understood. For the purposes of the description of the operation it is to be observed that as illustrated (see Fig. 4) the bed B has while running at the uniform speed of the cylinder C and in the direction indicated by the arrow in Fig. 4 made the major part of its outward or non-printing movement while the rack 12 was engaged with the crank or bed-driving wheel D, during which the slot S traveled over the crank-pin 9 until the latter contacted with said abutment 15, and being now locked to it by the latch L the movement of the bed is controlled by it, the rack 12 having run out of engagement with the driving-wheel D, and that there remains of its movement in such direction only that portion of it necessary to reverse it, and at which time the movable members of the racks will abut against the end frame, so that the completion of this movement will cause the movable member of the rack 12 to slide in its guide and withdraw said rack from alinement with the wheel D, as it has done in Fig. 5. When the rack 12 disengages from the driving action of the wheel D, the office of the crank-pin 9 is to gradually slow down the movement of the bed until a state of rest is attained, which is accomplished while the said crank-pin is moving from the position it has in Fig. 4 to that it has in Fig. 5, at which time and during which movement it will be observed from Fig. 5 that the rack 12 has

been moved out of alinement with the wheel D (whose pitch-line, it will be remembered, coincides with that of the internal gear 8) and that the rack 11 has been thrown into alinement with the path of the said wheel D. The office of the crank-pin 9 is now to overcome the inertia of the bed and to start it in the direction for the performance of the printing operation and accelerate it while the crank-pin travels from the position it has in Fig. 5 to that it has in Fig. 4, (in dotted lines,) with an accelerating motion which will raise its speed, so that when the rack 11 engages the wheel D the movement of the bed will be at the same velocity as that of the impression-cylinder. The bed will thus have been run outward at the same velocity as the impression-cylinder and will have been slowed down, stopped, and reversed or started in the opposite or printing direction and again have the velocity of the impression-cylinder imparted to it, so that when the rack 11 is geared with the wheel D the said bed will be wholly driven by the wheel D and the slot S will traverse the crank-pin 9 while the latter makes an ineffectual reciprocation and be brought into the position and move in a right line appropriately to contact with the abutment 16 at the opposite end of the slot S and operate in the manner, as has just been described, to slow down and arrest the movement of the bed in the printing direction and to start and accelerate it in the opposite direction or reverse its movement, in making which reverse movement the rack 11 will run out of gear with the wheel D and the moving members of the two racks will abut against the end frame and cause the rack 11 to be moved out of alinement with the wheel D and the rack 12 to be moved into alinement with that wheel, so that the major part of the non-printing movement will be accomplished, as before described, while the wheel D is geared with said rack 12.

The sides bordering the way or slot S are not essential, though preferable, since the active abutments 15 16, which are at the ends of said slot or way, constitute the part which actively coöperates with the crank-pin 9, and hence such abutments may be simply projecting parts secured at proper points to the bed, the seating-surfaces for the crank-pin being either straight or curved, according as the crank-pin is provided with the box 1; but it is preferable to have the sides and the box for obvious reasons.

From the foregoing it will be readily apparent that by this disposition of the parts great simplicity is attained, and the desirable feature of driving the heavy bed by mechanisms connected close to it is attained, and the couple between the bed and its driver is made very direct. In this arrangement of moving racks it will be observed that when either is being driven by the wheel D and the links whereby the pitch-line of such rack has been brought into coincidence with the

pitch-line of the wheel D, which drives it, the arrangement of parts is such as to prevent dislocation of the rack by the thrust of the teeth in the wheel D, for the reason that the sustaining-links 85 are then straightened and afford great resistance. This arrangement of moving racks is also practicable when the crank-wheel D revolves in a vertical plane. Moreover, by this horizontal arrangement of the parts it is to be observed that the structure becomes such as to permit runners for the bed, as 75 76, to be placed quite near to the center thereof, for the reason that the pedestal housing the horizontal wheels affords a strong support therefor. This is an important feature, made possible by the simplicity of the mechanism and its arrangement.

What is claimed is—

1. The combination with means for driving the bed throughout the greater extent of its movement in either direction, and an abutment on the bed, of a bed-driving wheel, a crank connection on a pinion pivoted to said wheel, and a fixed internal gear with which said pinion meshes, said wheel and pinion being arranged to revolve in a horizontal plane whereby the crank-pin engages the bed close thereto and said crank-pin is caused to travel in a right line at successively decreasing and increasing velocities in its coaction with said abutment in slowing down and arresting the movement of the bed in one direction and in starting and accelerating it in the other direction, substantially as described.
2. The combination with means for driving the bed throughout the greater extent of its movement in either direction, and abutments on the bed, of a bed-driving wheel, a crank connection on a pinion pivoted to said wheel, and a fixed internal gear with which said pinion meshes, said wheel and pinion being arranged to revolve in a horizontal plane whereby the crank-pin engages the bed close thereto and said crank-pin is caused to travel in a right line at successively decreasing and increasing velocities in its coaction with said abutments in slowing down and arresting the movement of the bed in one direction, and in starting and accelerating it in the other direction, substantially as described.
3. The combination with a bed provided with a driving-rack, a driving-wheel and means for engaging said rack and wheel, a pinion pivoted to said wheel, a member carried by said pinion, a fixed internal gear for actuating the pinion, and an abutment fast to the bed and cooperating with said member to slow down and arrest the movement of the bed in one direction and start and accelerate it in the other, substantially as described.
4. The combination with a bed provided with driving-racks, a driving-wheel and means for engaging said racks and wheel, a pinion pivoted to said wheel, a member carried by said pinion a fixed internal gear for actuating the pinion, and abutments fast to

the bed and cooperating with said member to slow down and arrest the movement of the bed in one direction, and start and accelerate it in the other at both ends of the stroke, substantially as described.

5. The combination with the part to be reciprocated, means comprising a rack and a gear for reciprocating said part throughout the greater portion of its movement, of a member revolving bodily with said gear and rotating on an independent axis in a direction opposite to the direction of rotation of said gear, and means in connection with said part to be reciprocated adapted to engage with said member, substantially as described.

6. The combination with the part to be reciprocated having parallel racks and a gear mounted between said racks to engage said racks alternately, of a lever revolving bodily with said gear and rotating on an independent axis in the direction the reverse of the direction of rotation of said gear, and means carried by said reciprocating part for engagement with said lever, substantially as described.

7. The combination with the part to be reciprocated having parallel racks and a gear mounted between said racks to engage said racks alternately, of a shaft secured eccentrically to and supported by said gear and a pinion and an actuating member mounted on said shaft and constituting a lever, a non-rotative gear engaging with said pinion, and means carried by said part to be reciprocated for engaging with said actuating member, substantially as described.

8. The combination with a bed and a bed-driving wheel revolving in fixed bearings, of a cooperating bed-rack carried by the bed and consisting of two moving members linked together, one sliding longitudinally and moving the other laterally, and abutments engaged by the longitudinally-sliding member at the end of the bed-stroke to actuate the laterally-moving member to engage and disengage the rack and driving-wheel, substantially as described.

9. The combination with a bed and a bed-driving wheel revolving in fixed bearings, of two cooperating bed-racks carried by the bed and each consisting of two moving members linked together, one member of each rack sliding longitudinally and moving the other laterally, and abutments engaged by the longitudinally-sliding members at the end of the bed-stroke to alternately engage and disengage the racks and driving-wheel, substantially as described.

10. The combination with a driving-wheel revolving in fixed bearings, of a cooperating rack consisting of a rack-bar 80 mounted to move laterally between bearings by which it is prevented from moving longitudinally, a bar 81 mounted to move longitudinally between bearings by which it is prevented from moving laterally, links 85 connecting the rack-bar 80 and the bar 81, and abutments engaged

by the bar 81 at the end of the stroke to move the bar longitudinally to engage and disengage the rack-bar 80 and driving-wheel, substantially as described.

5 11. The combination with a bed and a bed-driving wheel revolving in fixed bearings, of two cooperating bed-racks carried by the bed, each rack consisting of a rack-bar 20 mounted to move laterally between bearings by which it is prevented from moving longitudinally, a
10 bar 81 mounted to move longitudinally between bearings by which it is prevented from moving laterally, links 85 connecting the rack-bar 80 and the bar 81, and abutments
15 engaging the bars 81 at the end of the bed-stroke to actuate the bars 81 and alternately engage and disengage the rack-bars 80 and the bed-wheel, substantially as described.

20 12. The combination with a bed provided with a rack, of a driving-wheel revolving horizontally in fixed bearings, a cranked pinion hung eccentrically to said wheel and a fixed internal gear for actuating the same, an abutment carried by the bed and coacting

with said pinion, and means for periodically
25 moving said rack into position to engage said wheel, substantially as described.

13. The combination with a bed provided with two racks of a driving-wheel revolving horizontally in fixed bearings, a cranked pinion hung eccentrically to said wheel and a
30 fixed internal gear for actuating the same, abutments carried by the bed and alternately coacting with said pinions and means alternately moving said racks into position to en-
35 gage said wheel, substantially as described.

14. The combination with the bed the horizontal bed-driving wheel and pedestal housing the latter and acting as a support therefor, of bed-runners sustained over said bed-
40 driving wheel, substantially as described.

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

GEORGE F. READ.

Witnesses:

F. W. H. CRANE,
E. L. SPEIR.