No. 864,839. PATENTED SEPT. 3, 1907.

J. C. FOWLER.

BLOCK PRESS.

APPLICATION FILED APR. 30, 1906.

4 SHEETS—SHEET 1.

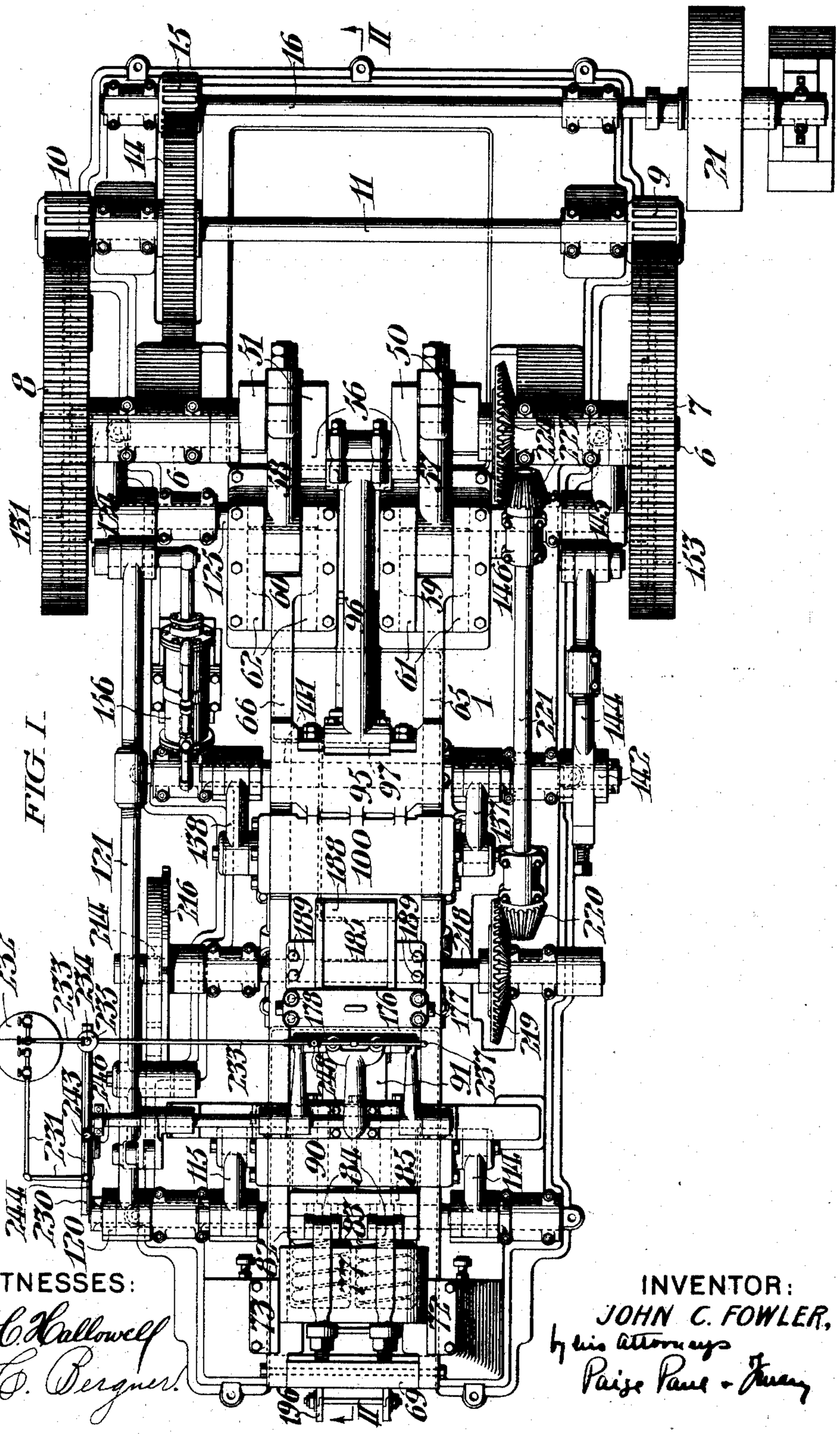

FIG. 1.

WITNESSES:

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INVENTOR:

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Paige Page & Terry

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4 SHEETS—SHEET 2.

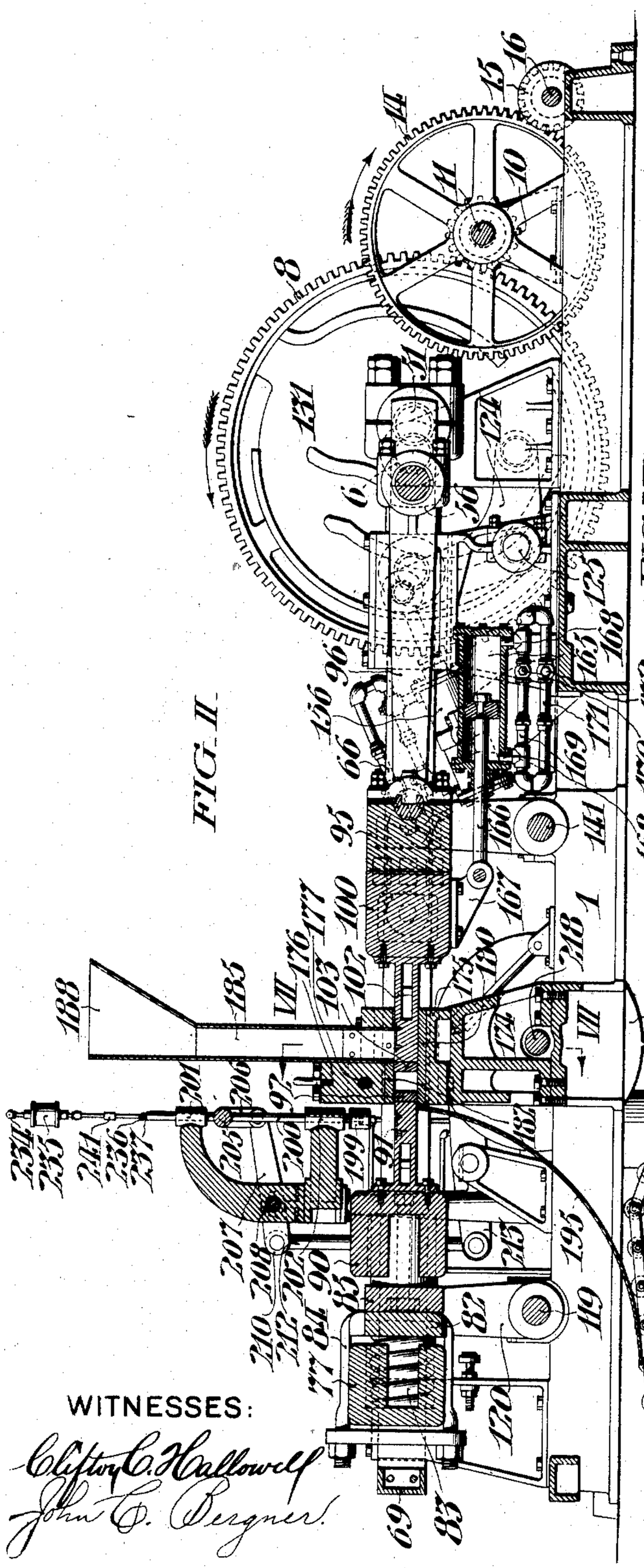

FIG. II.

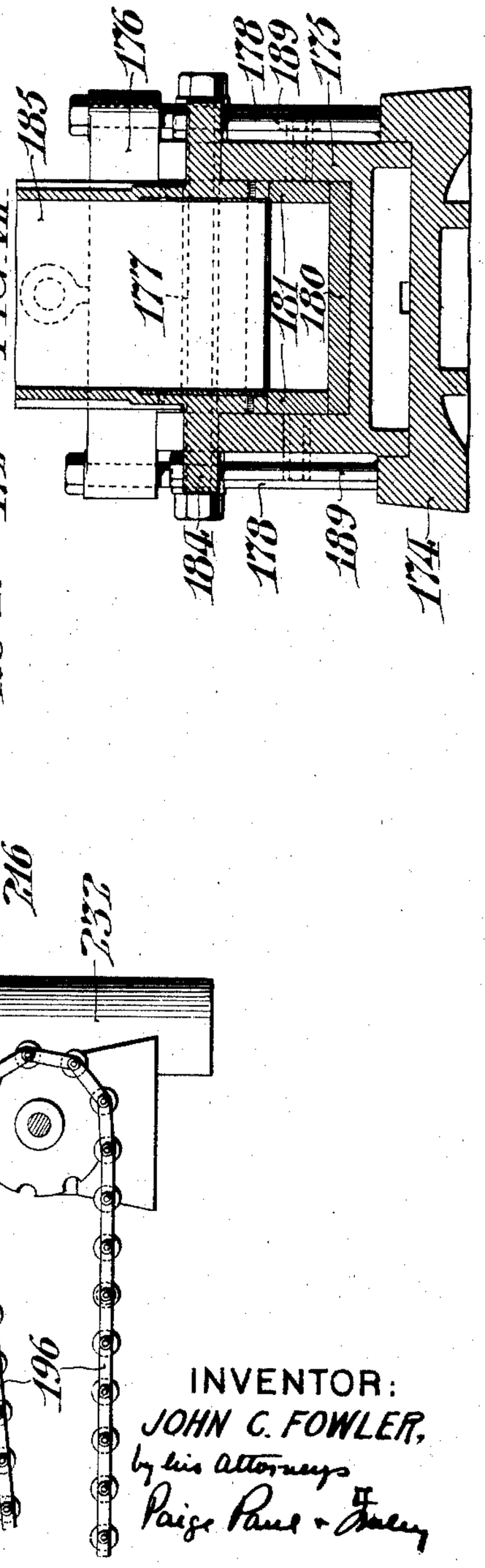

FIG. VII.

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4 SHEETS—SHEET 3.

FIG. III.

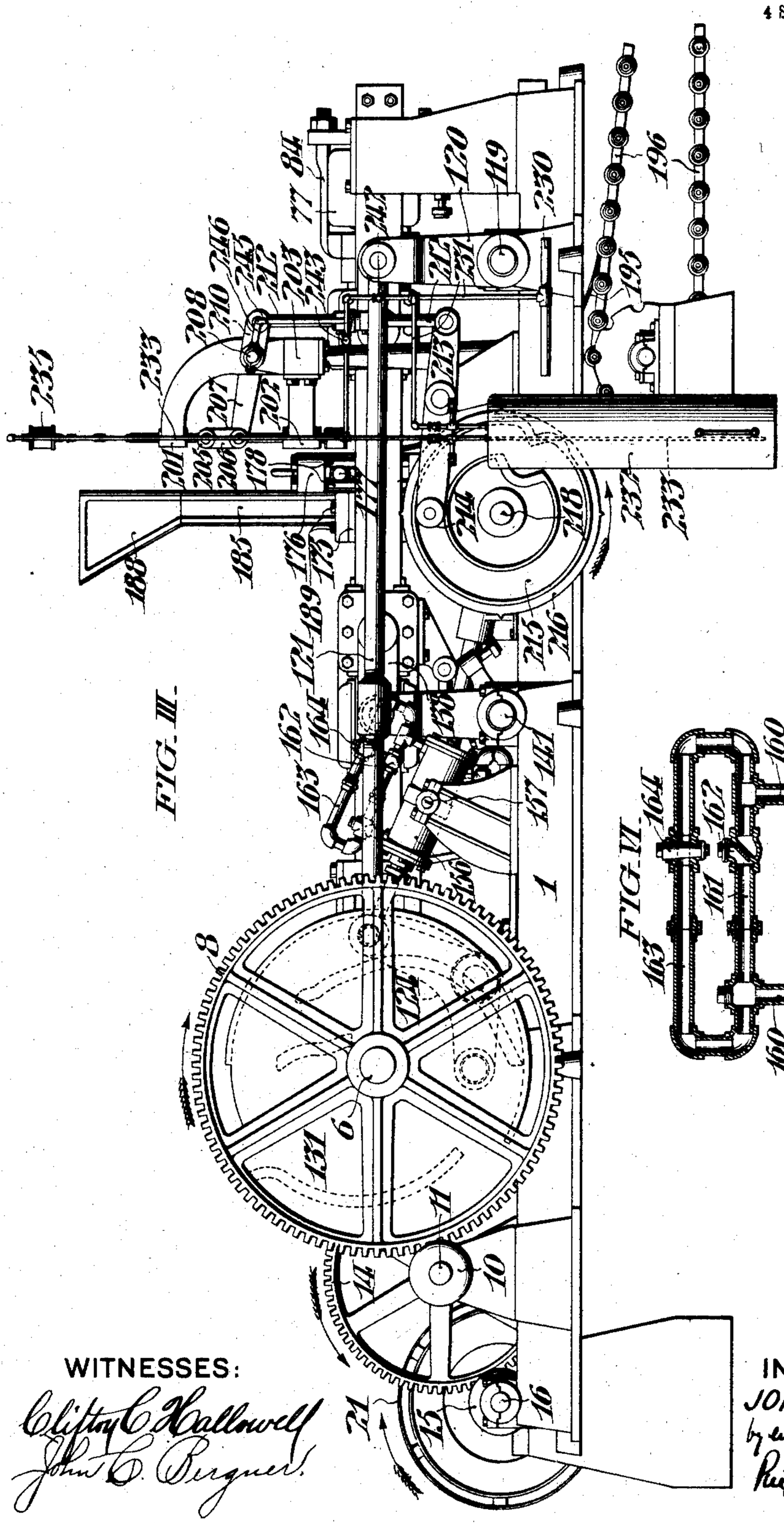

FIG. VI.

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4 SHEETS—SHEET 4.

FIG. IV.

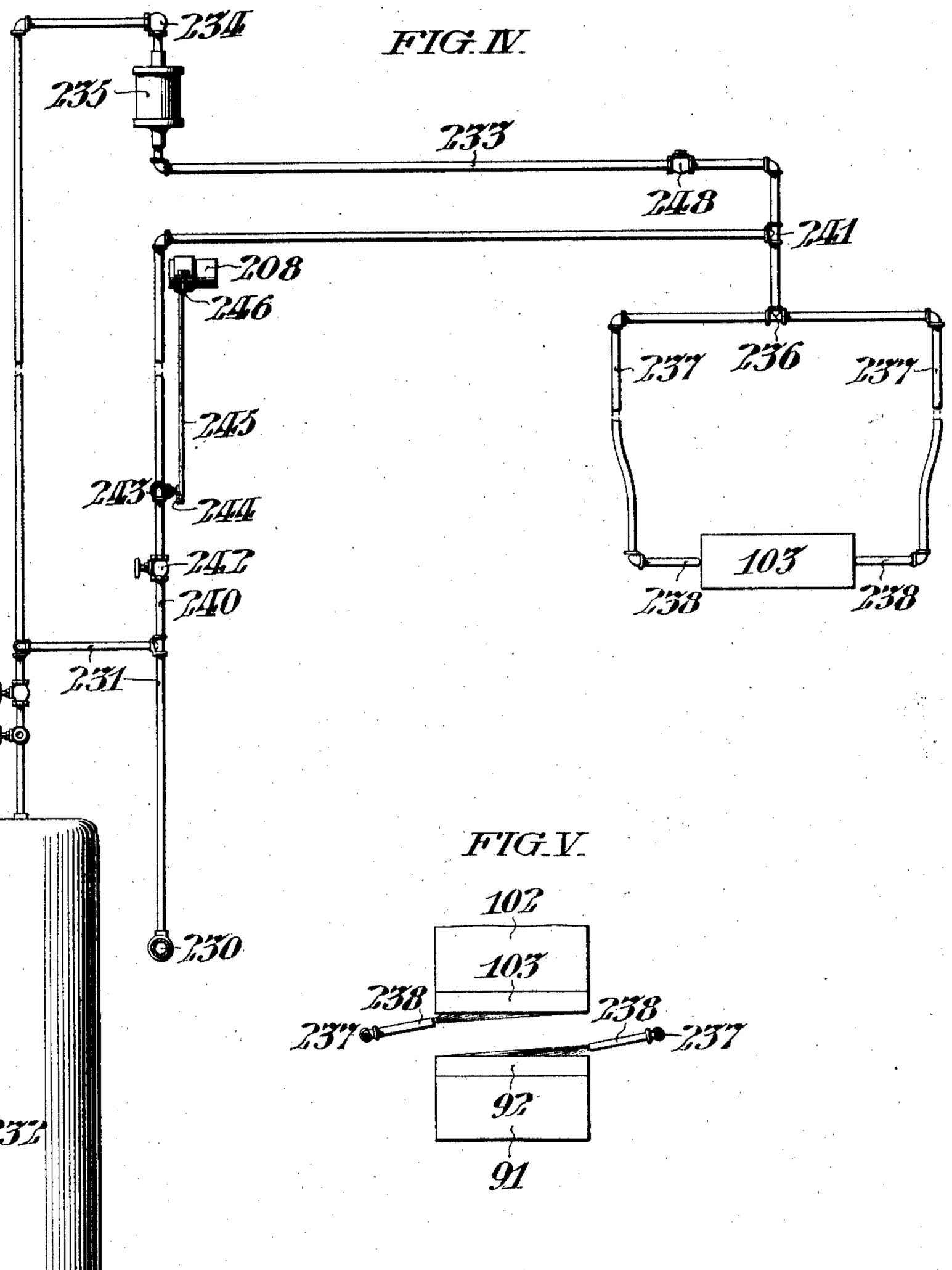

FIG. V.

WITNESSES:

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Paige Pond & Fraley

UNITED STATES PATENT OFFICE.

JOHN C. FOWLER, OF SEWAREN, NEW JERSEY, ASSIGNOR TO THE BARBER ASPHALT PAVING COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF WEST VIRGINIA.

BLOCK-PRESS.

No. 864,839. Specification of Letters Patent. Patented Sept. 3, 1907.

Application filed April 30, 1906. Serial No. 314,396.

To all whom it may concern:

Be it known that I, JOHN C. FOWLER, of Sewaren, in the county of Middlesex, in the State of New Jersey, have invented certain new and useful Improvements in Block-Presses, whereof the following is a specification, reference being had to the accompanying drawings.

My invention relates to a press adapted for the compression of blocks of any suitable material, but especially designed for the formation of such blocks under conditions requiring the exercise of great pressure to effect the formation of the block. Accordingly, the block press in connection with which I have illustrated my invention belongs to that type in which the motion of the dies which carry the material into the mold frame, there compress it, and subsequently deliver it, is reinforced at the moment of compression by the compressive force of two reciprocating cross heads moving in line with but independently of the dies. As is usual in this type of press the movement of the dies in carrying and compressing material, being a somewhat irregular one, is effected by cam controlled arms, while the movement of the cross heads, by the opposition of which the extreme compressive force is exercised, is effected by opposed cranks.

My invention relates more especially to the employment of cushioning cylinders for the purpose of easing and regulating the motion of the dies; to the delivery chute by which the plastic material is fed to the dies; to the construction of the mold-frame; to the means for lubricating the surfaces of the dies and adjacent parts; to the slide whereby the block after compression is delivered to an endless carrier, and to certain other details which will be more particularly described in the specification and pointed out in the claims appended hereto.

I have shown an embodiment of my invention especially adapted for the compression of blocks of asphalt, but it will be understood that it is applicable to blocks of other plastic material.

In the accompanying drawings, Figure I, is a plan view of a block press embodying my invention. Fig. II, is a central vertical section of the same along the line II, II, in Fig. I. Fig. III, is an elevational view of the machine. Figs. IV, and V, are diagrammatic views illustrating the lubricating system. Fig. VI, is a detail section of one of the cushioning cylinders. Fig. VII, is a partial vertical section through the delivery tube and the mold frame, taken along the line VII, VII, in Fig. II.

In the figures,—1, is a bed frame provided with pedestals upon which are mounted bearings for the crank shaft 6, which is driven by the master gears 7, and 8, mounted on its outer ends. These gears mesh with pinions 9, and 10, on the countershaft 11, which carries the driving gear 14, meshed with the pinion 15, on the driving shaft 16, which carries the driving pulley 21. The crank shaft 6, comprises the paired cranks 50, and 51, and between them the diametrically opposed single crank 56. The paired cranks 50, and 51, are connected by connecting rods 57, and 58, to the cross heads 59, and 60, sliding in guides 61, and 62. Connected with said cross heads are two parallel side bars 65, and 66, which are secured together at their rear ends by the cross beam 69. These bars are supported in slideways 72, and 73. They carry near their rear end the cross head 77, which is provided with a bumper plate 82, seated on the coiled springs 83, and strapped to the cross head by the yoke frames 84, as shown in Figs. I, and II. This bumper plate 82, is arranged to encounter the opposed plate 85, which is connected to the follower 90, which carries the plunger 91, to which the rear die plate 92, is detachably secured. This follower 90, is supported by and slides upon the side bars 65, and 66.

The single central crank 56, is connected to the cross head 95, by the pitman 96, which is provided with a knuckle shaft 97, journaled in suitable bearings in said cross head 95. This latter cross head is arranged to slide reciprocally on the side bars 65, and 66, and by virtue of this reciprocatory motion engages a follower 100, which is both supported upon and slides upon the side bars 65, and 66, and which carries a plunger 102, to which the front die plate 103 is detachably secured.

The followers 90, and 100, are capable of independent motion with relation to the cross heads 77, and 95, and for this purpose the following mechanism is provided. The follower 90, is provided with wrist pins connected by the rods 114, and 115, to rocker arms carried by the rock shaft 119, which has an arm 120, connected by the rod 121, to the vertical arm of the bell crank lever 124, on the rock shaft 125. The horizontal arm of this bell crank lever is provided with a cam roller which encounters the cams on a cam plate 131, carried by the master gear 8. The follower 100, is provided with wrist pins connected by the rods 137, and 138, to rocker arms carried by the rock shaft 141, which has the arm 142, connected by rod 144, to the verical arm of the bell crank lever 145, on the rock shaft 146. The horizontal arm of the bell crank lever 145, is provided with a cam roller which encounters the cams on the cam plate 153, carried by the master gear 7.

By the operation of the parts thus far described it will be understood that the cams of the cam plates 131, and 153, which are carried by the master gears, impart an irregular reciprocatory movement to the plungers 91, and 102, by means of which, as will be hereinafter more fully described, the plastic material is carried by the dies 92, and 103, from the end of the delivery chute

into the mold, and is there compressed into a block, which is subsequently carried out through the rear side of the mold and delivered. Simultaneously with the irregular reciprocation of the followers which accomplishes this, there is a regular opposed reciprocation of the cross heads 77, and 95, due to the opposed cranks upon the crank shaft 6. The motions of these several parts are so timed that the followers 90, and 100, are not in contact with the cross heads during the greater part of their play, but at the same moment when the extreme compressive force is required to compress the block, the opposed cross heads come in contact with the followers and add their direct compressive force to the motion of the latter, thereby securing a maximum compression of the block which is being formed.

Owing to the somewhat irregular motion of the followers 90, and 100, and the irregular strains to which they are exposed, I have found it to be of great importance to properly cushion the parts by which said followers are actuated. This I accomplish by means of two cushioning cylinders. The means for cushioning the follower 90, as best shown in Fig. VI, comprises a cushioning cylinder 156, fitted with trunnions 157, arranged to be journaled in suitable bearings mounted near the side of the bed frame 1, adjacent to the connections by which this follower is actuated. The protruding end of the piston 158, of this cylinder, is connected to the vertical arm of the bell crank lever 124. Said cylinder is provided at each end with the ports 160, connected by a pass 161, fitted with a one-way check valve 162; and a second pass 163, fitted with a retardation valve 164, which may be set to impose any desired degree of resistance to the passage of the oil or glycerin with which the cylinder is filled. During the rearward stroke, the follower 90, is subjected to a heavy stress by reason of the compression of the block. Accompanying this the piston 158, is driven to the rear of the cylinder, during which motion the pass 161, affords an easy passage for the fluid contained in the cylinder. But during the forward stroke, the follower 90, is subjected to no operative strains, and to compensate for this, and thereby equalize the tension upon the parts, and especially upon the cams of the plate 131, the accompanying forward motion of the piston 158, drives the fluid contained in the cylinder through the pass 163, (for the one-way valve 162, prevents its passage in this direction through the pass 161), subject to such countervailing resistance as the adjustment of the valve 164, of pass 163, imposes. In this way an even motion of the operative parts of the follower 90, is insured, free from any slamming of the arm of the bell crank lever 124, against the cams of the cam plate 131. The means for cushioning the follower 100, as best shown in Fig. II, comprises the cushioning cylinder 165, mounted centrally upon the bed frame 1, and provided with a piston 166, the protruding extremity of which is connected to a bracket 167, depending from the follower 100. This cushioning cylinder 165, is similarly provided with ports 168, at each end, which are connected by a pass 169, fitted with a one-way valve 170; and another pass 171, fitted with a retard valve 172, by the adjustment of which a predetermined resistance may be imposed during the forward stroke of the piston to counterbalance the operative stress which accompanies its rearward stroke, and in this way I am able to so temper the movement of the follower 100, as to secure a very easy and regular movement notwithstanding the irregular strains to which it is subjected.

The mold pier 174, supports the mold box 175, over which is superimposed the mold bridge 176, which depends into said box and forms the top of, and completes the mold frame. Said mold bridge 176, covers only that portion of the mold box, where the compression of the block takes place, and is rigidly secured to the box by the horizontal through-bolt 177, which extends through both, thereby tying the side walls of the box together and securing the bridge within said box. The structure thus formed is rigidly secured to the mold pier 174, by the vertical bolts 178.

The mold box 175, is provided with liners 180, 181, and 182, preferably of manganese steel, of which the bottom liner 180, and the side liners 181, coincide in length with the mold box, while the top liner 182, precisely fits that portion of the mold bridge which depends into the mold box. The forward portion of the mold box, not covered by the bridge, is covered by the horizontal base flange 184, of the long vertical chute 185, which delivers the material from the hopper 188. As is shown in vertical longitudinal section in Fig. II, and in vertical transverse section in Fig. VII, the lower extremity of the vertical chute 185, depends within the mold box to the level of the top of the side liners 181, upon which it is secured by the vertical bolts 189, which extend through the flange 184, in threaded engagement with the mold pier 174. The lower end of the chute 185, is flush with the upper wall of the mold cavity so as to deliver its material directly in the path of the dies which reciprocate within the mold box. It may be noted that the side liners 181, are overlapped above and below by the top and bottom liners, as shown in Fig. VII. By varying the thickness of the liners, and by substituting a delivery tube of suitable width, the mold frame may be arranged to produce blocks of different dimensions, the plungers and their dies being correspondingly varied.

The chute 185, is of considerable length, and throughout its extent its rectangular dimensions are constant and correspond to the dimensions of the block of plastic material which it is its function to deliver from its lower end into the mold cavity in the path of the reciprocating die 103. By thus prolonging the hopper tube of constant dimension, I find that a much more perfectly compacted mass of material is delivered to the dies than when fed directly to the mold cavity, from the hopper, or even by the interposition of only a short neck as has hitherto been the practice.

The delivery of plastic material to the mold cavity from the lower end of the chute 185, occurs when the die 103, is withdrawn to its extreme right hand or forward position, with respect to Fig. II. As the plunger 102, reciprocates towards the left in Fig. II, it cuts off the material which has been fed from the chute and closes the delivery aperture at the bottom of the chute, simultaneously carrying the material into that portion of the mold box, beneath the bridge 176, where its further progress is opposed by the die 92, and compression of the block occurs; after which the rearward movement of both dies continues, although the space between

them is slightly increased, and the completed block is carried out of the mold frame, and is delivered upon the curved metal slide 195. This slide effects a quarter turn of the block in its descent and delivers it gently upon an endless conveyer 196, on which it cools and by which it is carried to a suitable point of ultimate delivery.

In order to prevent the accidental sticking of the block between the die plates after their withdrawal from the mold frame there are provided twin plungers 199, which reciprocate vertically between the die plates 92, and 103, immediately after the block last formed has been carried by them from the mold frame. These plungers are conveniently provided with a rubber facing, and are mounted upon stems 200, which are arranged to reciprocate vertically in guides 201, and 202, formed in the upright frame 203. The stems are secured to the yoke 205, which is connected by the link 206, to the rocker arm 207, on the rock shaft 208, which is provided with an oppositely extending arm 210, connected by the link 212, to a lever 213, which is provided at its opposite end with a cam roller 214, which traverses a cam groove 215, in the cam disk 216. Said cam disk 216, is mounted on the cam shaft 218, which carries a bevel gear 219, meshing with a bevel pinion 220, on the longitudinal countershaft 221, which carries the bevel pinion 222, meshing with the bevel gear 224, on the crank shaft 6. By the co-action of these parts the proper reciprocation of the plungers 199, is effected.

For the proper operation of a machine of the class described, especially when dealing with the manufacture of asphaltic blocks, where a hot asphalt composition is compressed, I have found that the proper lubrication of the dies, the mold frame, and their related parts is of the highest importance and for this purpose, I have provided a lubricating system which I will now describe.

As best shown diagrammatically in Fig. IV, compressed air is taken from the air line 230, through the pipes 231, and led to the top of the reservoir 232, which contains lubricating material. From the bottom of this reservoir, a pipe 233, extends and carries lubricating fluid under pressure, the rate of flow of which being regulated by a needle valve 234, from whence the pipe leads to a sight feed 235, thence to a T fitting 236, where it divides into two branches 237, 237, each of which is provided at its extremity with a nozzle 238, arranged in such a position as to spray the adjacent faces of the dies 92, and 103. This spraying operation is intermittent and takes place only once during each cycle of the press when the dies are in registry with the lubricating nozzles as best shown in Fig. V. For this purpose, the lubricant must be ejected intermittently in proper sequence with the reciprocation of the plungers 91, and 102, which is conveniently effected by the following mechanism, which comprises a pipe 240, leading from the compressed air pipe 231, and joining the pipe 233, at the T fitting 241, a short distance above the division of the pipe 233, at the T fitting 236. The line of pipe 240, includes a globe valve 242, and a chronometer valve 243, the latter being intermittently operated by a lever arm 244, connected by a link 245, to the lever arm 246, which is secured on the rock shaft 208. Said shaft as has hitherto been described is operated intermittently from the cam disk 216, so as to depress the plungers 199, for the purpose of releasing any block, which may adhere to the dies. The vertical reciprocation of the plungers 199, occurs when the die plates 92, and 103, have been shifted to their rearmost position and it is substantially at this moment that the lubrication is effected. The opening of the chronometer valve 243, causes the compressed air to drive through the lubricating nozzles as much of the lubricant as, since the last operation of said valve 243, has flowed through the pipe 233, past the T fitting 241. The rate of this flow, and consequently the extent of lubrication, may be accurately regulated by the needle valve 234. In order to prevent the opening of the valve 243, from exerting back pressure upon the lubricating system a check valve 248, is interposed in the pipe 233, between the T fitting 241, and the reservoir 232.

I find that the most efficient lubricant to use in connection with the production of blocks made of asphaltic composition is a mixture of soap and water. By maintaining this soapy solution of a proper consistency I am able to spread a saponaceous film on the faces of the dies at the termination of their reciprocation which serves to prevent the adherence of the asphaltic compound. As the dies are retracted within the mold frame they communicate their surplus lubricant to the surface of the liners and keep all of the molding surfaces well lubricated. As best shown in Fig. II, the curved slide 195, is arranged to receive the dripping of lubricant which thereby maintains the surface of said slide smooth, so that no shock or distorting strain is imposed upon the completed block as it falls thereon from between the compressing dies.

The curvature of the steel plate which forms the slide is such that the blocks are delivered at a rate of speed very closely approximating that of the endless conveyer upon which they are shot by the slide so that there is no injury done to them by the transference from the one to the other.

I claim:—

1. In a block press, the combination of a reciprocating cam actuated plunger, coöperating with an opposed plunger for the compression of a block within a mold frame, and its delivery therefrom; and a cushioning cylinder operatively connected to said plunger, provided with two passes between its extremities, one of which is valved to permit easy motion of the piston of the plunger in that direction which corresponds to the compressive action of the plunger, and the other of which is valved to interpose an adjustable retardation to the motion of the plunger in the opposite direction, substantially as set forth.

2. In a block press, a plunger, a cam-actuated arm by which the plunger is reciprocated, a swiveled cushioning cylinder, a piston in said cylinder connected with said cam-actuated arm, a pass connecting the opposite ends of said cylinder, with a one-way check valve interposed therein, and another pass affording the same connection and provided with an interposed retardation valve, substantially as set forth.

3. In a block press, the combination of opposed reciprocating dies, and a mold frame; said frame comprising a mold box forming its bottom and sides, a mold bridge which depends into the box and forms its top, and a through-bolt uniting the sides of the mold box and passing through the depending portion of the mold bridge, substantially as set forth.

4. In a block press, the combination of the mold frame and dies; a conveyer for the blocks; a curved slide plate reaching from the delivery side of said mold frame to the

conveyer, the curvature of said slide being arranged so as to deliver the block to the conveyer at a rate of speed corresponding approximately to that of the conveyer, substantially as set forth.

5. In a block press, the combination of the mold-frame; reciprocating dies; a delivery slide reaching from the delivery side of the mold-frame; and lubricating jets discharging upon the dies while on the delivery side of the frame whereby the excess of lubricant falls upon and lubricates the slide, substantially as set forth.

6. In an asphaltic block press, the combination of the mold frame and dies; a saponaceous lubricant for said dies; a reservoir for holding said lubricant; means for spraying said lubricant upon the dies; a conveyer for the blocks; and a curved slide plate reaching from the delivery side of said mold frame to the conveyer, substantially as set forth.

In testimony whereof, I have hereunto signed my name, at Sewaren in the State of New Jersey this 12th day of April 1906.

JOHN C. FOWLER.

Witnesses:
H. HOLZSCHUHER,
STACY M. COUTTS.