No. 809,520. PATENTED JAN. 9, 1906.

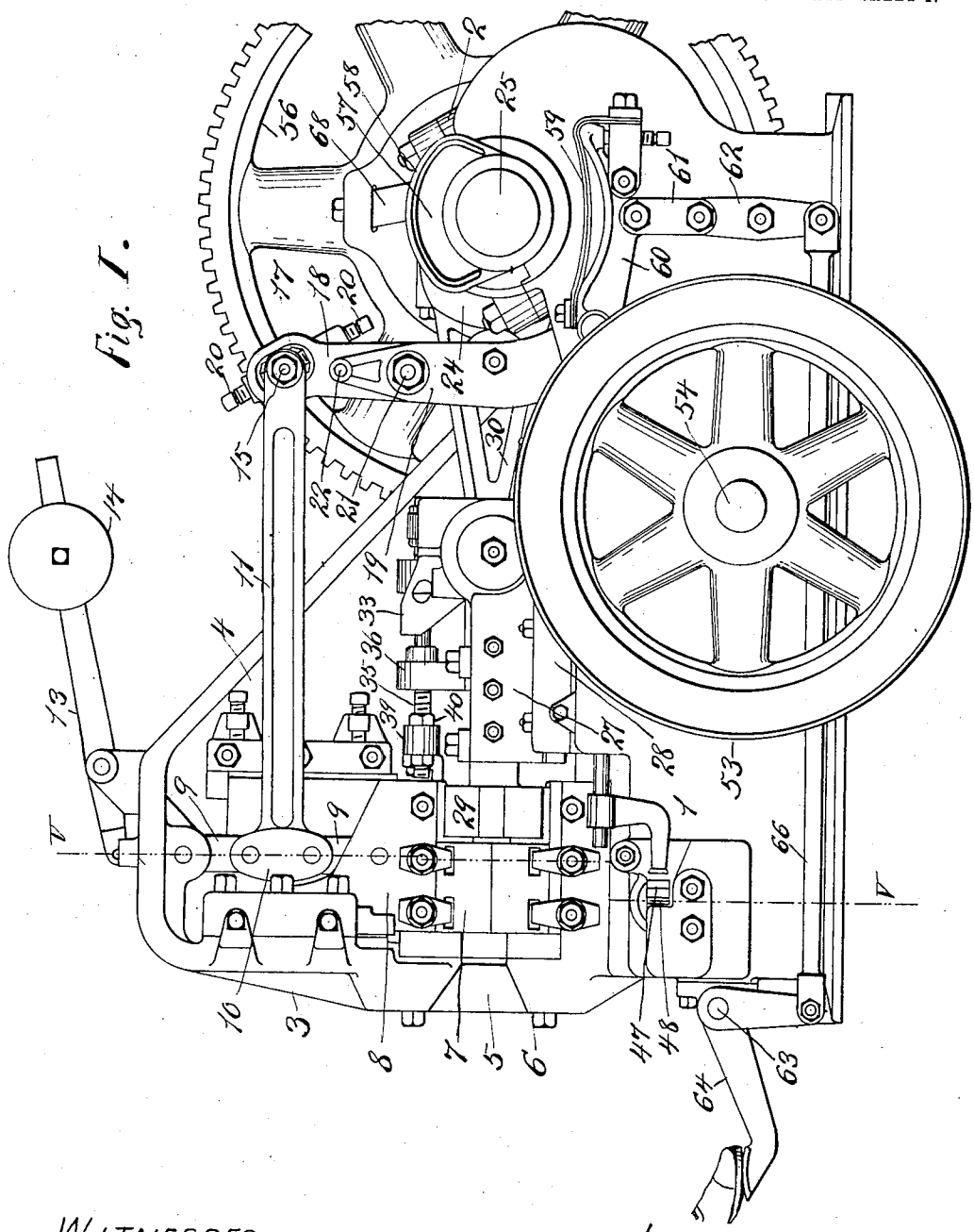
E. C. MEYER.

HEADING MACHINE.

APPLICATION FILED JAN. 2, 1904.

8 SHEETS—SHEET 1.

Fig. 1.



WITNESSES.

Alphonse A. Adler.

C. E. Johnson, Jr.

INVENTOR,

E. C. Meyer,

by Jno. Secor

ATTORNEY.

No. 809,520. PATENTED JAN. 9, 1906.

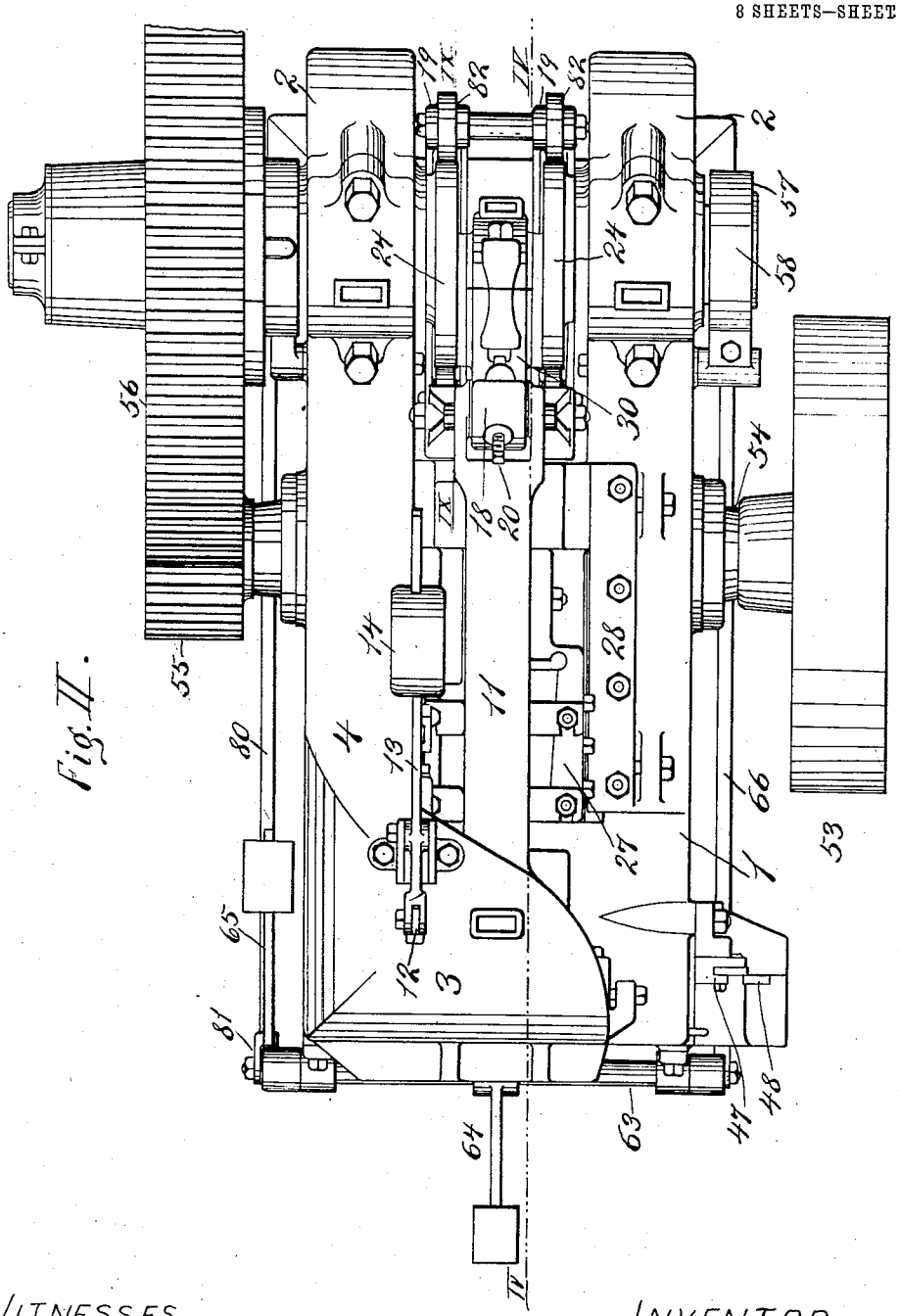
E. C. MEYER.

HEADING MACHINE.

APPLICATION FILED JAN. 2, 1904.

8 SHEETS—SHEET 2.

Fig. II.



WITNESSES

Alphonse A Adler.

C. E. Johnson, Jr.

INVENTOR,

E. C. Meyer,

by Wm. Fecher

ATTORNEY.

No. 809,520. PATENTED JAN. 9, 1906.

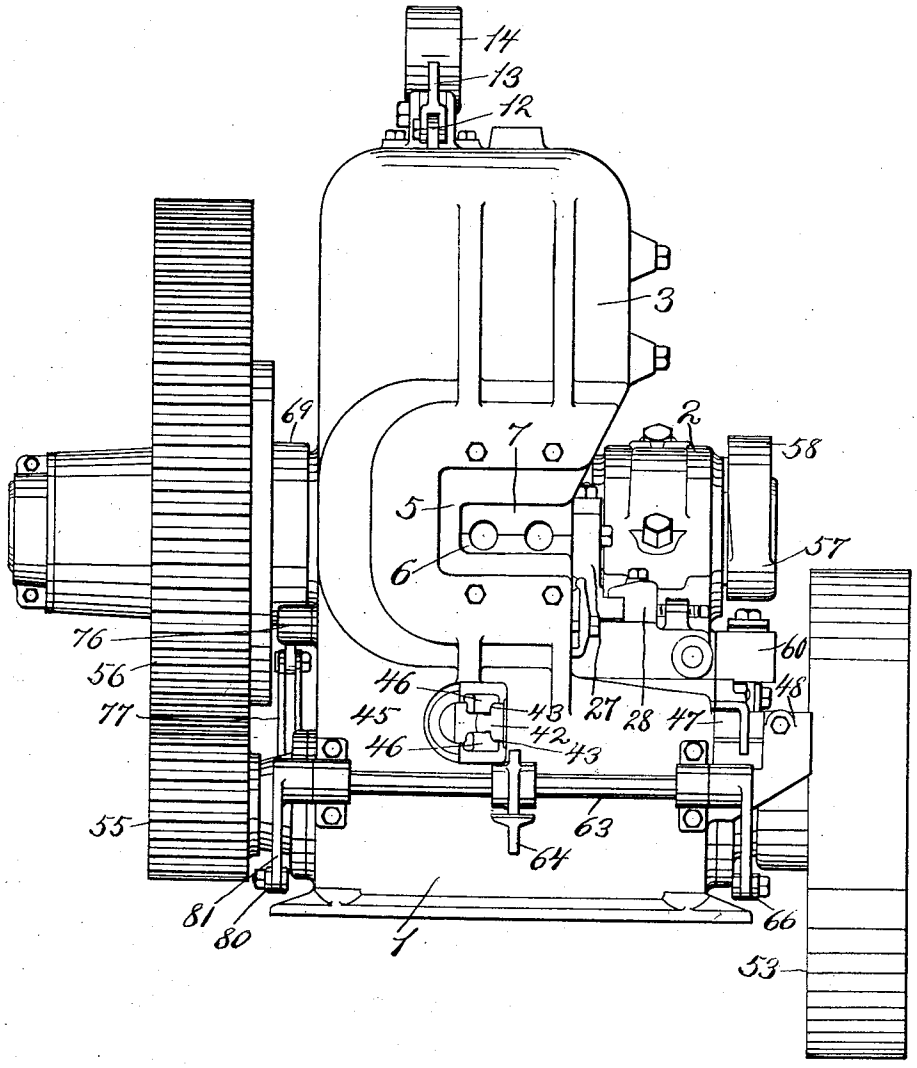
E. C. MEYER.

HEADING MACHINE.

APPLICATION FILED JAN. 2, 1904.

8 SHEETS—SHEET 3.

Fig. III.



WITNESSES

Alphonse A. Adler

E. E. Johnson Jr.

INVENTOR;

E. C. Meyer,

by Jno. Secher

ATTORNEY.

No. 809,520. PATENTED JAN. 9, 1906.

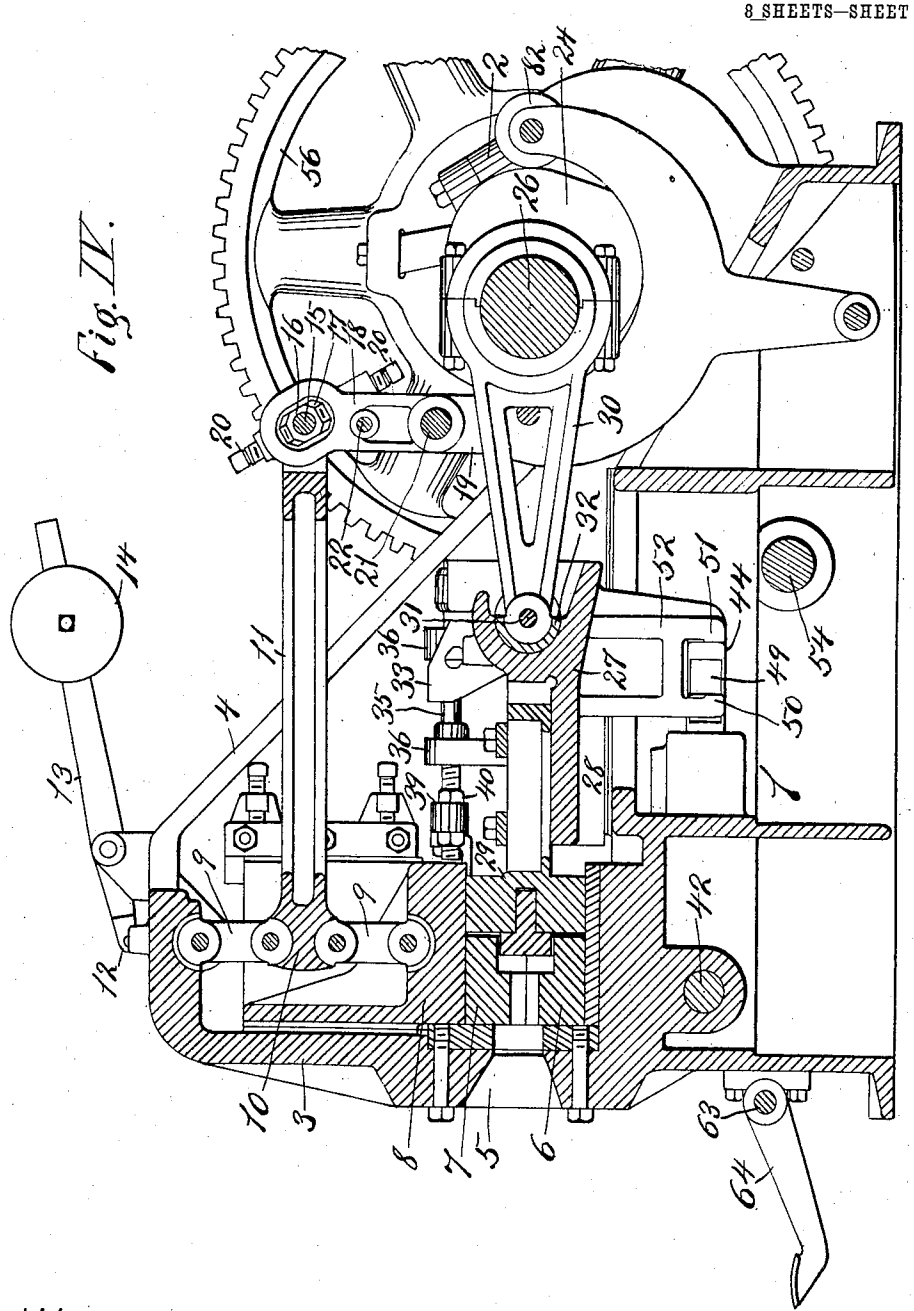
E. C. MEYER.

HEADING MACHINE.

APPLICATION FILED JAN. 2, 1904.

8 SHEETS—SHEET 4.

Fig. IV.



WITNESSES

Alphonse A. Adler

C. E. Johnson, Jr.

INVENTOR,

E. C. Meyer,

by Thos. Fletcher

ATTORNEY.

No. 809,520. PATENTED JAN. 9, 1906.

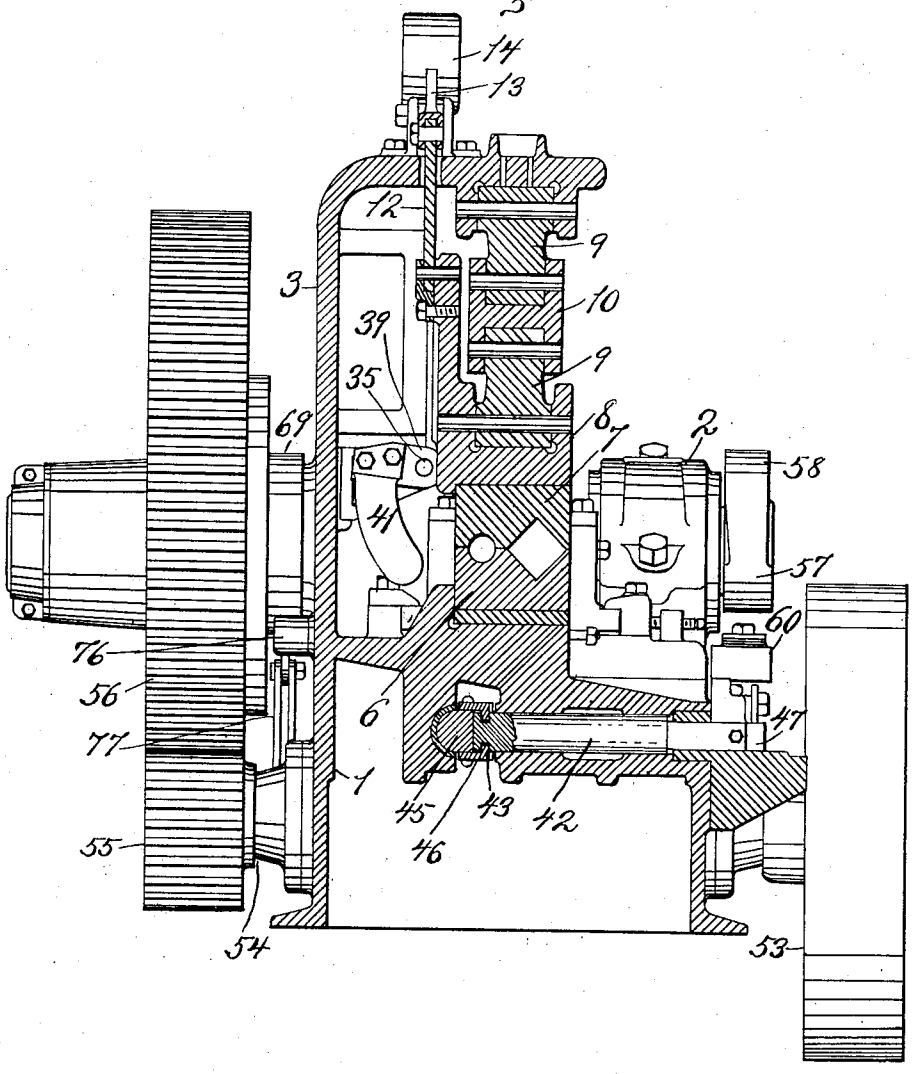
E. C. MEYER.

HEADING MACHINE.

APPLICATION FILED JAN. 2, 1904.

8 SHEETS—SHEET 5.

Fig. V.



WITNESSES

Alphonse A. Adler.

C. E. Johnson, Jr.

INVENTOR,

E. C. Meyer,

by Wm. Secker

ATTORNEY

No. 809,520. PATENTED JAN. 9, 1906.

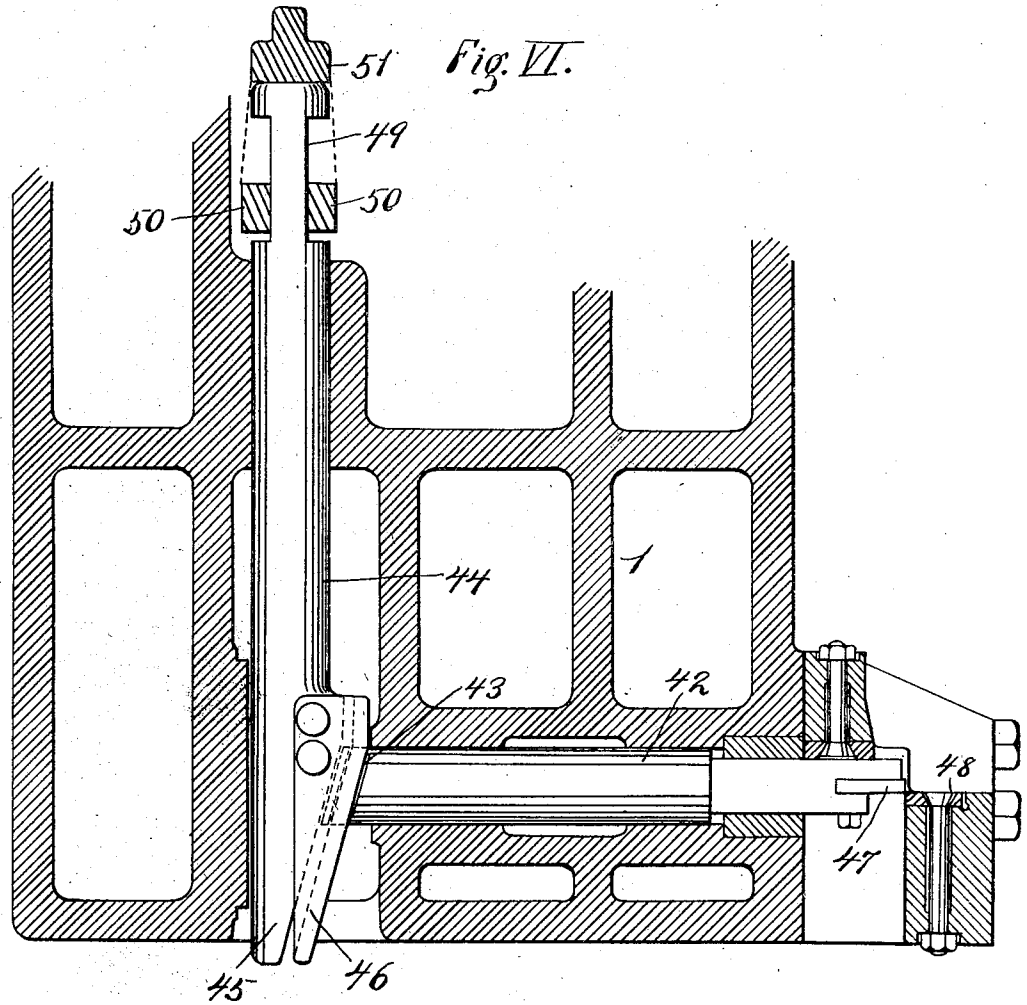
E. C. MEYER.

HEADING MACHINE.

APPLICATION FILED JAN. 2, 1904.

8 SHEETS—SHEET 6.

Fig. VI.



WITNESSES

Alphonse A. Adler.

C. E. Johnson Jr.

INVENTOR,

E. C. Meyer,

by Wm. Seller

ATTORNEY.

No. 809,520. PATENTED JAN. 9, 1906.

E. C. MEYER.

HEADING MACHINE.

APPLICATION FILED JAN. 2, 1904.

8 SHEETS—SHEET 7.

Fig. VII.

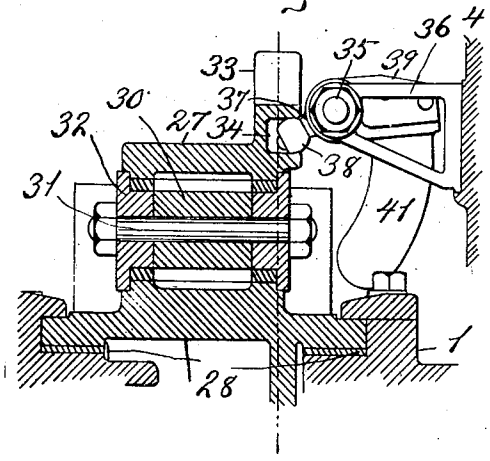


Fig. VIII.

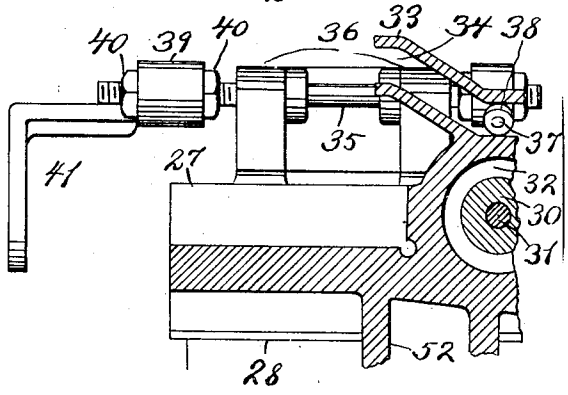


Fig. IX

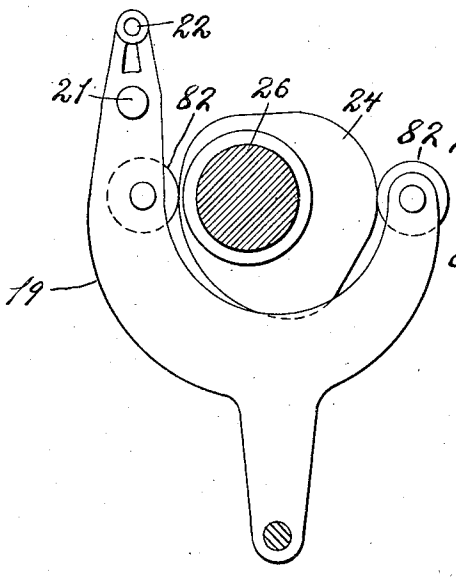
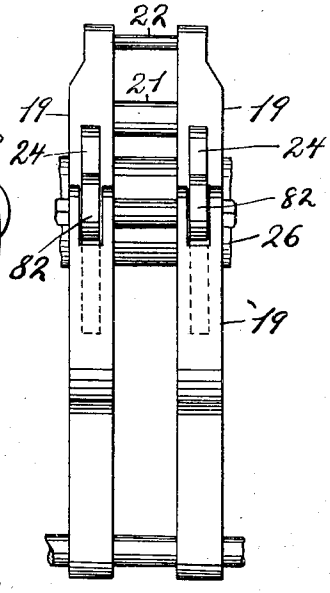


Fig. X



WITNESSES

Alphonse A Adler.

C. E. Johnson Jr.

INVENTOR,

E. C. Meyer,

by Wm Secker

ATTORNEY.

No. 809,520. PATENTED JAN. 9, 1906.

E. C. MEYER.

HEADING MACHINE.

APPLICATION FILED JAN. 2, 1904.

8 SHEETS—SHEET 8.

Fig. XIII.

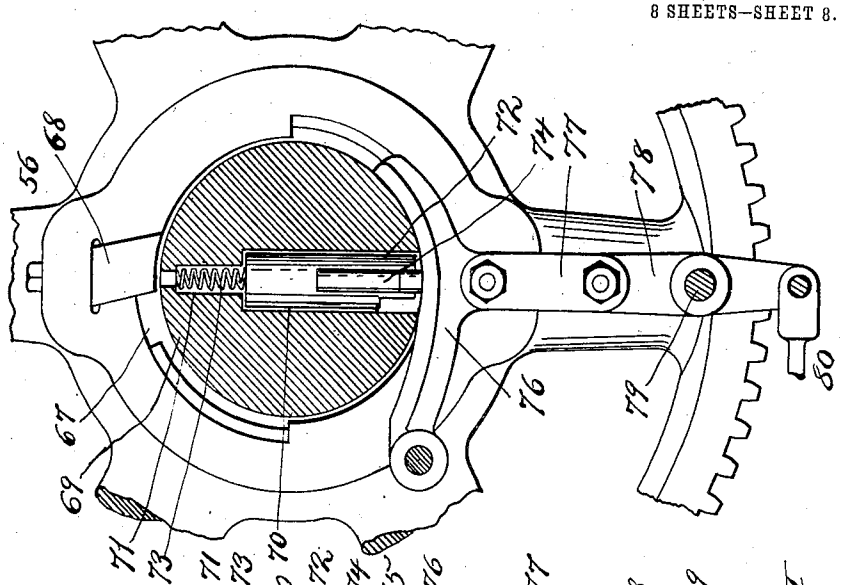


Fig. XII.

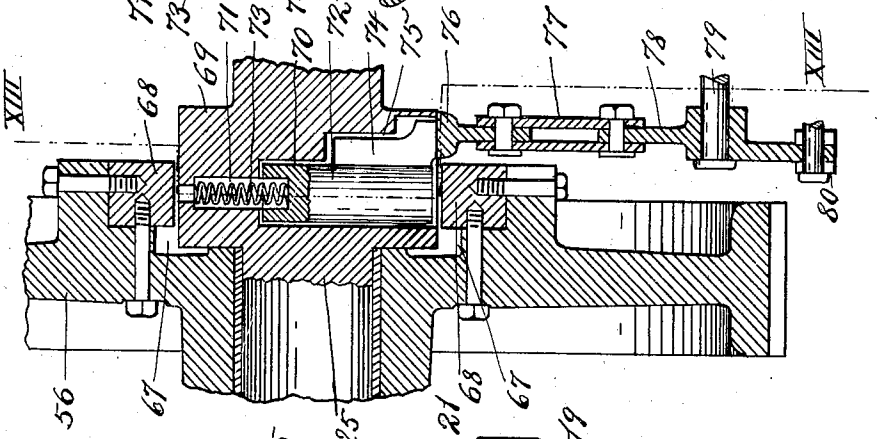
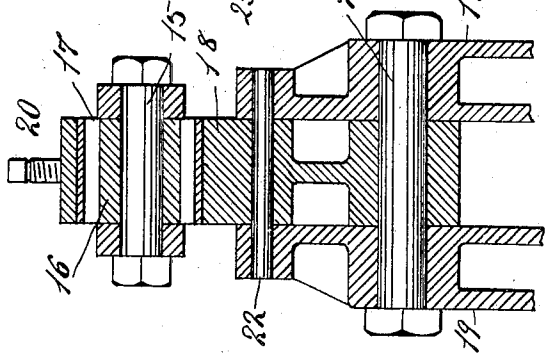


Fig. XI.



WITNESSES

Alphonse A. Adler

C. E. Johnson, Jr.

INVENTOR,

E. C. Meyer,

by Thos. Seaton,

ATTORNEY.

UNITED STATES PATENT OFFICE.

ERNEST C. MEYER, OF CLEVELAND, OHIO, ASSIGNOR TO THE CHAMPION MACHINERY COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

HEADING-MACHINE.

No. 809,520. Specification of Letters Patent. Patented Jan. 9, 1906.

Application filed January 2, 1904. Serial No. 187,464.

To all whom it may concern:

Be it known that I, ERNEST C. MEYER, a citizen of the United States, and a resident of Cleveland, county of Cuyahoga, and State of Ohio, have invented certain new and useful Improvements in Heading-Machines, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

The annexed drawings and the following description set forth in detail one mechanical form embodying the invention, such detail construction being but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawings, Figure I represents a side elevation of my improved heading or forging machine; Fig. II, a top plan view of the machine; Fig. III, a front elevation of the machine; Fig. IV, a longitudinal section on the line IV IV in Fig. II; Fig. V, a transverse section on the line V V in Fig. I; Fig. VI, an enlarged horizontal section of the forward part of the machine, illustrating the shear mechanism; Fig. VII, a sectional detail view illustrating the stop or gage as seen from the rear of the machine; Fig. VIII, a sectional detail view of such mechanism in side elevation; Fig. IX, a detail view of the cam mechanism for the toggles, taken on the line IX IX in Fig. II; Fig. X, an edge view of the rock-arm and cam; Fig. XI, a transverse sectional detail view of the forward arm of the forked cam-lever operating the toggles and illustrating the break-pin therein; Fig. XII, an axial section of the clutch mechanism for the main cog-wheel, and Fig. XIII a section on the line XIII XIII in Fig. XII.

The machine has a bed-frame 1, formed with bearings 2 at its rear end. The frame has an upright front 3, which is braced to the rear by a web 4. The front has an opening 5, open at one side and beveled on top, bottom, and opposite side, and inside of this opening the stationary clamping-die 6 is secured in a horizontal position, with the opening of the die-recess toward the open front or side of the opening in the frame-front. A movable die 7 is secured in the lower end of the slide-head 8, vertically guided in the frame-front, and said die and head are movably opposed to the stationary die, so as to move upward and admit of the stock or blank to be placed in the stationary die and to move downward and clamp the stock or blank for the action of the heading-die. Two toggle-links 9 are pivoted to a toggle-head 10 upon the end of an arm 11, and the lower end of the lower link is pivoted to the slide-head and the upper end of the upper link is pivoted to the overhanging top of the frame-front. A link 12 is pivoted to the side of the slide-head and to the short arm of a lever 13, fulcrumed upon the top of the frame-front, and said lever has a weight 14, adjustable upon its long arm, which weight is adjusted upon the lever-arm to counterbalance or slightly overbalance the weight of the slide-head and die, and thus relieve the pivot-pins for the toggle-arms from strain in lifting the slide-head. The joints of the links are knuckle-joints, so that the thrust in straightening the toggle-links comes upon the concave surfaces against which the round heads of the links bear and no serious strain comes upon the pins in either movement. The arm of the toggle has a forked rear end, through the ears of which passes a pin 15, which fits into a bushing 16, adjustably secured in an oblique slot 17 in the upper end of an arm 18, secured between the forward arms of two forked rock-arms 19, pivoted at the bottom of the bed-frame. Two adjusting-screws 20 pass through the ends of the slot and bear against the bushing to adjust the same and the pin in the slot. The slotted arm is pivoted at its lower end between the rock-arms upon a pin 21, and a break-pin 22, of cast-iron or other brittle or breakable material, is inserted through the rock-arms and the slotted arm, so as to break or be sheared off under undue strain. Four rollers 82 are journaled in the branches of the forked rock-arms and bear against two cams 24, formed upon the main shaft 25, which is journaled in the bearings 2 of the bed-frame. Said cams form the cheeks of a crank upon the main shaft.

The two rock-arms are hollow and open at their upper edges, so that the cams may pass into the space between their sides, as is indicated by a dotted line in Fig. IX. The rock-arms are secured at such distance from each

other that the pitman-head upon the crank-pin 26 may freely rotate between them. A heading-slide 27 slides in horizontal guides 28 in the bed-frame and has a heading-die 29 secured in its forward end and a pitman 30 pivoted to its rear end. This pitman is pivoted upon the crank, so that the heading-slide and die are reciprocated by rotating the crank-shaft. The joint of the pitman in the rear end of the heading-slide is a knuckle-joint, so that the thrust on the forward movement of the pitman against the slide does not come upon the pin 31, but upon a semicylindrical bushing 32 in a correspondingly-shaped recess in the slide and held in place by the annular ends of the bushing fitting in corresponding openings in the sides of the recess. The heading-slide has an upwardly-projecting web 33 on one side and near the rear end, which web has an oblique groove 34 in its face inclined downward from front to rear and with two short horizontal ends. A rock-shaft 35 is journaled upon the frame in bearings 36, parallel with the slide, and the rear end of this shaft has a radial arm 37 with a roller 38 upon it, which roller projects into and follows the inclined groove. An arm 39 is adjustably secured upon the forward screw-threaded end of the rock-shaft by means of nuts 40, so that it may be longitudinally and radially adjusted. A curved stop or gage 41 projects from this arm to swing in back of the clamping-dies when the heading-die is drawn back and swing out and away from the path of said die when the die is forced forward, thus forming an adjustable and movable stop or gage against which the end of the blank or stock may be placed to gage the amount of stock to be upset by the die on its forward throw. A bar 42 slides transversely in the lower portion of the forward end of the bed-frame and has one end cut off obliquely and with two oblique grooves 43 in its upper and under side near to and parallel to the oblique end. A bar 44 slides longitudinally in the bed-frame and has a wedge-shaped forward end 45, one side of which bears against the oblique end of the transverse bar. Two flanged and wedge-shaped cheek-pieces 46 are secured to the upper and under side of the wedge and have their flanges engaging the oblique grooves, so that reciprocation of the longitudinally-sliding bar will impart transverse reciprocation of the other bar. The transverse bar has a cutter 47 at its end, which cooperates with a rigid cutter 48 at one side of an opening in the front of the frame to form shears for cutting off the headed or forged pieces from the heated stock-bar. Near the rear end of the longitudinal bar are formed two flat recesses 49, into which two prongs 50 fit and slide, straddling the recessed bar, and another prong 51 bears against the rear end of the rod. These prongs are formed upon the lower end of an arm 52, projecting downward from the heading-slide. The two straddling prongs may slide in the recesses, so that the heading-slide may move backward a short distance before the prongs strike the rear shoulders of the recesses and draw the bar back with them opening the shears, and the straddling prongs may move forward to the length of the recesses before the rear prong strikes the rear end of the bar and moves it forward closing the shears. A belt-pulley 53 is secured upon the end of a shaft 54, transversely journaled in the bed-frame, and said shaft has a pinion 55 at its other end which meshes with a large cog-wheel 56 upon the end of the main shaft or crank-shaft. Power is applied to the belt-pulley and the cog-wheel and crank-shaft are rotated from the same. A cam-disk 57 is secured upon one end of the crank-shaft and has a concentric brake-surface 58, against which a strap 59, yieldingly stretched over a concave brake-shoe 60, may act when the shoe is raised to engage the surface of the brake-disk 57. This brake-shoe is pivoted at one end upon the side of the bed-frame and has a link 61 pivoted to its under side, which link is also pivoted to the upper arm of a lever 62, fulcrumed upon the side of the bed-frame. A rock-shaft 63 is journaled upon the front of the bed-frame and has a treadle 64 for rocking it and a weighted lever 65 upon one end for raising the treadle when it has been depressed, and a rod 66 is pivoted to the lower arm of the brake-lever and to an arm upon the rock-shaft, so that the lever and link may be straightened and the brake-shoe applied by depressing the treadle. The large cog-wheel is loose upon the crank-shaft and has two diametrically opposite segmental rabbets 67 in the inner side of its hub, around an enlargement in the bore of the same, and each extending about one-fourth of the circumference of the bore. A block 68 is secured at one end of each of these rabbets and serves as a stop. The crank-shaft has an annular enlargement 69, which fits within the enlarged bore of the hub, and said enlarged portion of the shaft has a diametrical opening consisting of a large bore 70, extending more than one-half the diameter, and a small bore 71, which extends nearly to the outside of the enlargement. A bolt 72 fits to slide in the large bore, and a coiled spring 73 in the small bore bears against the bolt and forces the same outward. A rib 74 projects from one side of the bolt and slides in a recess 75 in the side of the large bore. A curved shoe 76 is fulcrumed at one end upon a stud upon the side of the bed-frame and has a link 77 pivoted to its under side. The lower end of this link is pivoted to a lever 78, fulcrumed upon a stud 79 upon the

side of the bed-frame, and a rod 80 is pivoted to the lower end of this lever and to an arm 81, depending from the end of the treadle rock-shaft, so that the shoe may be raised to bear against the enlargement of the shaft when the treadle is depressed to apply the brake. The bolt engages either stop in the segmental rabbets when the cog-wheel is rotated, so that the crank-shaft is rotated with the wheel. When it is desired to stop the crank-shaft, and consequently the machine, the treadle is depressed. This raises the brake-shoe into the path of the brake-surface of the brake-disk and the shoe on the other side into bearing against the enlargement of the crank-shaft. As the latter revolves the rib upon the bolt comes in contact with the curved surface of the shoe, and the rib and bolt are pushed in out of engagement with the stop in the cog-wheel hub, permitting the wheel to continue to revolve upon the crank-shaft and the latter to be stopped by the brake acting upon the brake-disk. The brake-surface of the brake-disk is so arranged in its relation to the crank and cams upon the crank-shaft that the shaft will be stopped when the dies are open and the heading-slide and die withdrawn and the stop or gage is raised into the path of the stock fed into the machine.

When the machine is suitably connected to a source of power and the pulley is revolved, the large cog-wheel and the crank-shaft will be revolved, the bolt in the shaft engaging one of the stops in the wheel-hub and wheel and shaft revolving together. The stock, whether a heated blank or the end of a heated rod, is fed in between the clamping-dies as the latter are opened, the cams engaging the rollers upon the rock-arms tilting the latter back, drawing upon the toggle-flexing arm, and thus flexing the toggle and raising the movable die. The weighted lever assists in this raising of the die and slide, as already described. The crank has at the same time drawn the heading-slide and die rearward, which motion tilts the stop or gage down across the pass or opening in the dies, stopping the stock so as to have the required amount of stock for the head or upset project to the rear of the dies and in the way of the advancing heading-die. The further revolution of the crank-shaft causes the cams upon the same to rock the rock-arms forward to straighten the toggle-links and depress the clamping-die upon the stationary die and the stock or blank thereon, so as to clamp the latter. As the heading-die advances while the dies are closing said die will strike the projecting stock after the clamping-dies are closed and head or upset the stock in said dies. The advancing heading-die will tilt the stop or gage out of its way by the cam-groove and roller-arm connection, as described. The opening or closing of the movable clamping-die in its relation to the stationary die is adjusted by the set-screws in the oblique slot upon the arm in the forward ends of the rock-arms, and the time of opening or closing the clamping-dies in relation to the heading movement of the heading-slide and die is controlled by the shape of the eccentric and concentric bulges upon the cams on the crank-cheeks, a long large diameter and concentric bulge giving long-time closure and opening of the dies with quick motion between the extremes of the movement and varied lengths of the large bulge giving different time in the closure and opening of the dies. After the stock in the dies has been headed or upset and the dies have again opened the finished article may be cut off from the bar in the shears. When it is desired to stop the machine with the dies open, the treadle is depressed, which straightens the levers and links on both sides of the bed-frame and raises the shoes. The bolt in the shaft will be pressed into the same by the clutch-shoe and the cog-wheel will continue to revolve, while the crank-shaft will be stopped by the brake-disk engaging the raised brake-shoe.

By arranging the clamping-dies so that the movable die slides in a vertical plane the stationary die has its face in a horizontal plane, and blanks to be forged may thus be placed upon said die without any other support. This is not possible in a machine in which the movable die slides in a horizontal plane and the faces of the dies are vertical. In the present form of machine bar-stock may be fed in between the dies from the front or from the side, according to whether the heading or upsetting is to be endwise or from the side, and no further support for the part to be forged is needed, as this part rests upon the stationary die. In the case any object, by accident or otherwise, comes between the die-faces, or too great thickness of stock comes between the dies, preventing the dies from tightly closing, a safety device is provided by the brittle break-pin between the two members of the rock-arm, which break-pin will be broken or sheared off under undue strain, while capable of sustaining ordinary strain, and will thus allow the cams to rotate without further straightening the toggle-links, thereby preventing breakage of other parts of the machine and possible marring of the dies. By arranging the parts of the machine so as to have the movable die sliding in a vertical plane the machine may be made narrower than a machine of the same capacity, but having the movable die moving in a horizontal plane, and the machine will thus occupy less floor-space than such other machine, which may in many instances be of great advantage.

Other modes of applying the principle of my invention may be employed for the mode herein explained.

Change may therefore be made as regards the mechanism thus disclosed, provided the principles of construction set forth, respectively, in the following claims are employed.

I therefore particularly point out and distinctly claim as my invention—

1. In a heading-machine, the combination of a bed-frame having an overhanging upright front forming a feed-opening open at three sides, a stationary clamping-die supported in the bottom of said feed-opening with its die-face in a horizontal plane, a vertically-movable clamping-die guided in the overhanging front of the frame to act against the stationary die and having means for moving it, and a heading slide and die having means for reciprocating it and guided to slide in the plane of the die-face of the stationary clamping-die.

2. In a heading-machine, the combination of a bed-frame having a horizontal guide and an upright frame portion at its front formed with a vertical guide and a feed-opening beneath said guide and open at three sides, a heading slide and die in the horizontal guide, means for reciprocating such slide, a stationary clamping-die horizontally supported to have its upwardly-facing die-face in the plane of motion of the heading-die and beneath the vertical guide of the upright front portion of the frame, a movable clamping-die having its downwardly-facing die-face opposed to the face of the stationary die and vertically movable in the guide in the upright front portion toward and from the stationary die, and means for reciprocating said movable die.

3. In a heading-machine, the combination with a clamping-slide and die guided to reciprocate, an arm connected to said slide to reciprocate the same, and a rock-arm having means for rocking it, of an arm pivoted to said rock-arm and having the slide-operating arm pivoted to its end, and a break-pin inserted through the rock-arm and the pivoted arm to normally keep the latter rigid to the former and to part when subjected to undue strain.

4. In a heading-machine, the combination with a clamping slide and die guided to reciprocate, an arm connected to said slide to reciprocate the same, two rock-arms, and means actuating said rock-arms, of an arm pivoted between said rock-arms and having the slide-operating arm pivoted to it, and a break-pin inserted through the arm and the rock-arms.

5. In a heading-machine, the combination with a heading-slide guided to reciprocate, a clamping slide and die guided to reciprocate, toggles connected to said slide, and an arm pivoted to said toggle to flex and straighten the same, of forked rock-arms having said toggle-arm pivotally connected to them and having rollers in their branches, a main shaft having means for rotating it and having a crank the cheeks of which are straddled by the forked rock-arms and are formed into cams against which the rollers bear, and a pitman connected to the crank and to the heading-die.

6. In a heading-machine, the combination with a pair of clamping-dies and a reciprocating heading slide and die, of a shaft journaled to rock parallel with said slide and provided with an adjustable gage at one end to swing into the path of the heading-die when the latter recedes and with a radial arm, and a web upon the heading-die and formed with an inclined groove engaging the radial arm and rocking the shaft as the slide is reciprocated.

In testimony that I claim the foregoing to be my invention I have hereunto set my hand this 19th day of December, A. D. 1903.

ERNEST C. MEYER.

Witnesses:

WM. SECHER,

C. E. JOHNSON, Jr.