(No Model.) 4 Sheets—Sheet 1.

E. BARRATH.

DIE PRESS FOR FORMING COAL HODS.

No. 378,754. Patented Feb. 28, 1888.

Fig. 1.

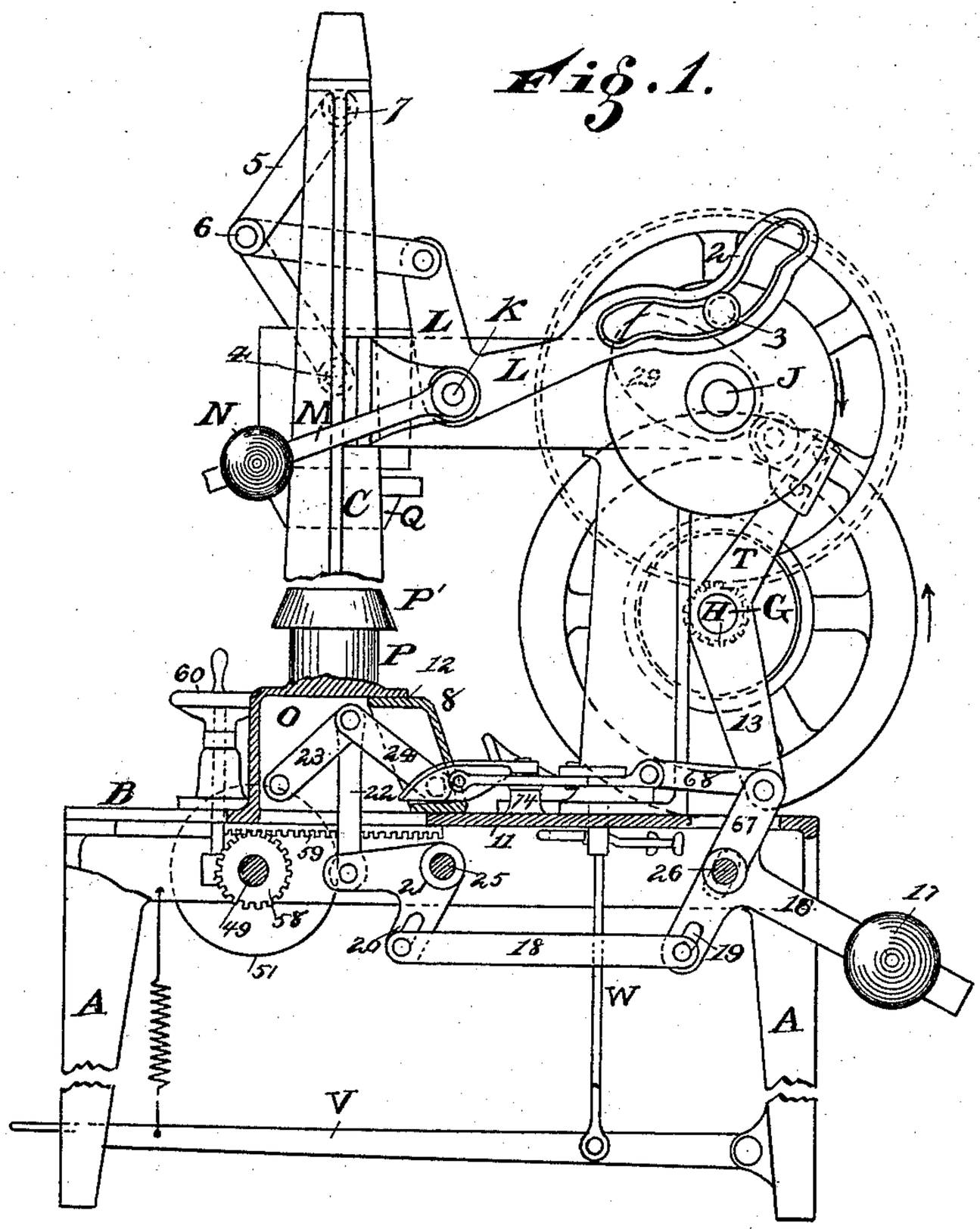
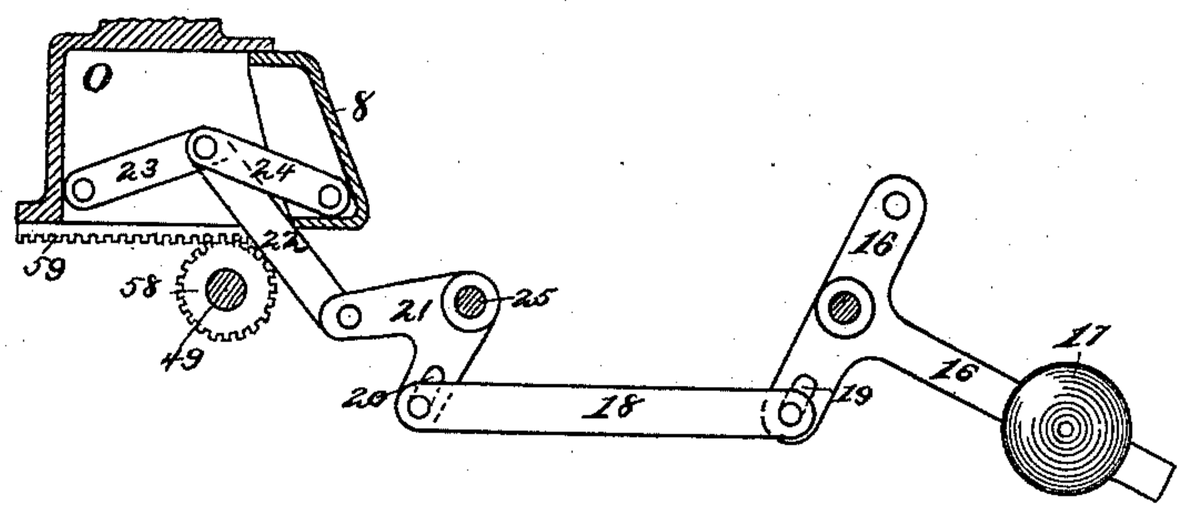


Fig. 9.



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M. E. Millikan

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his Attorneys &c.

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DIE PRESS FOR FORMING COAL HODS.

No. 378,754. Patented Feb. 28, 1888.

Fig. 2.

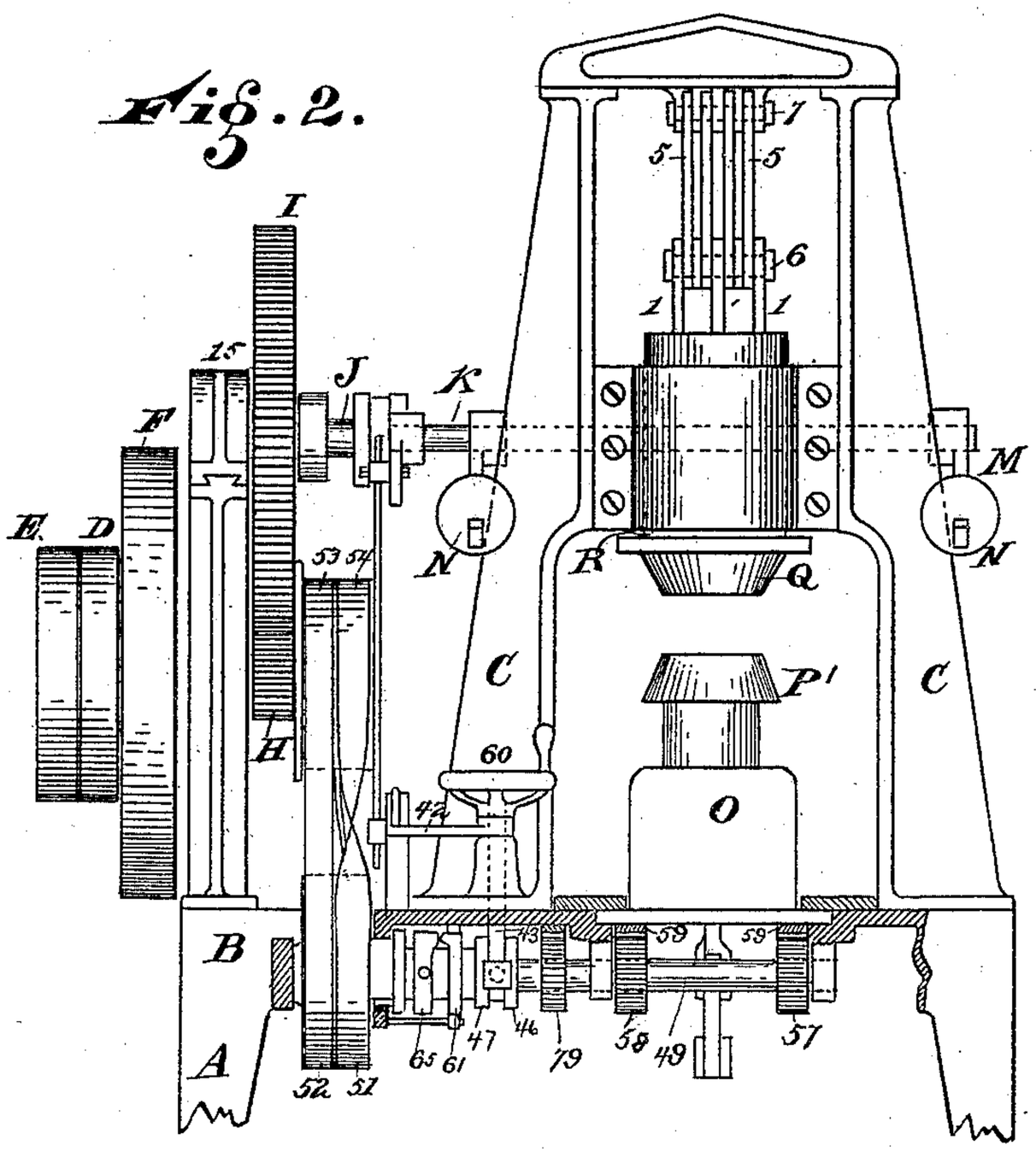
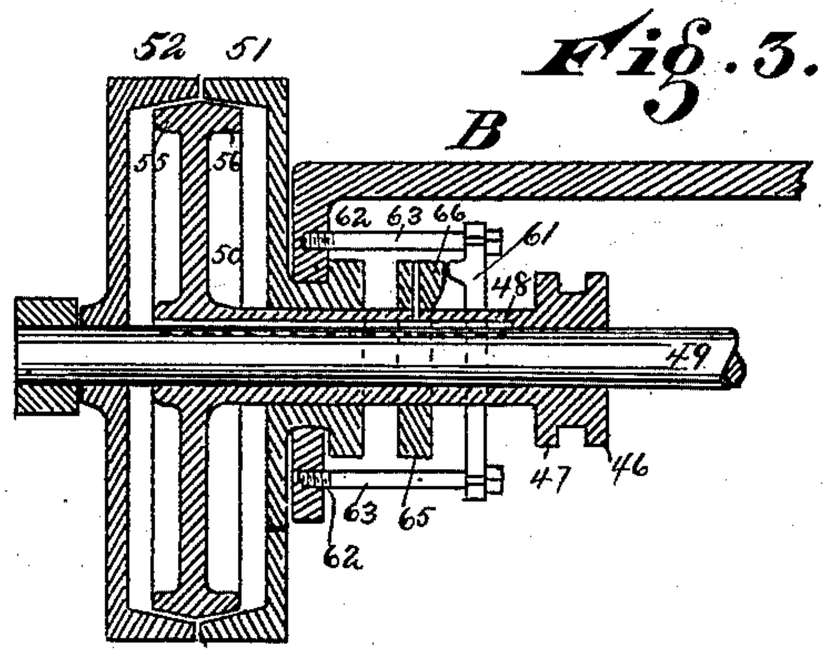


Fig. 3.



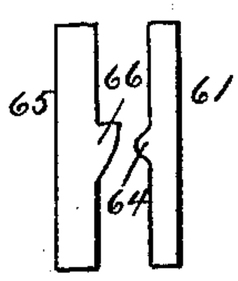


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Fig. 4.

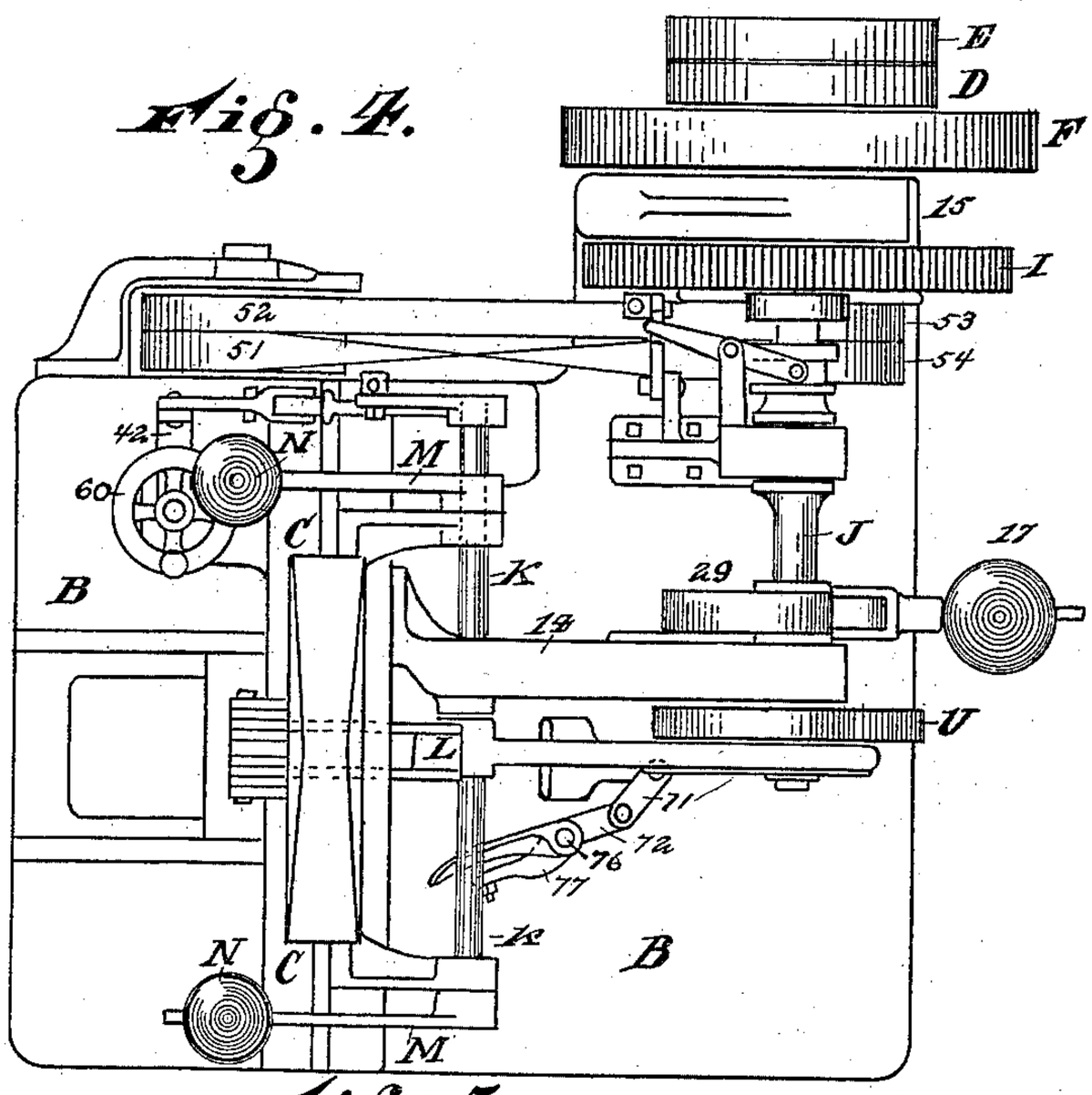
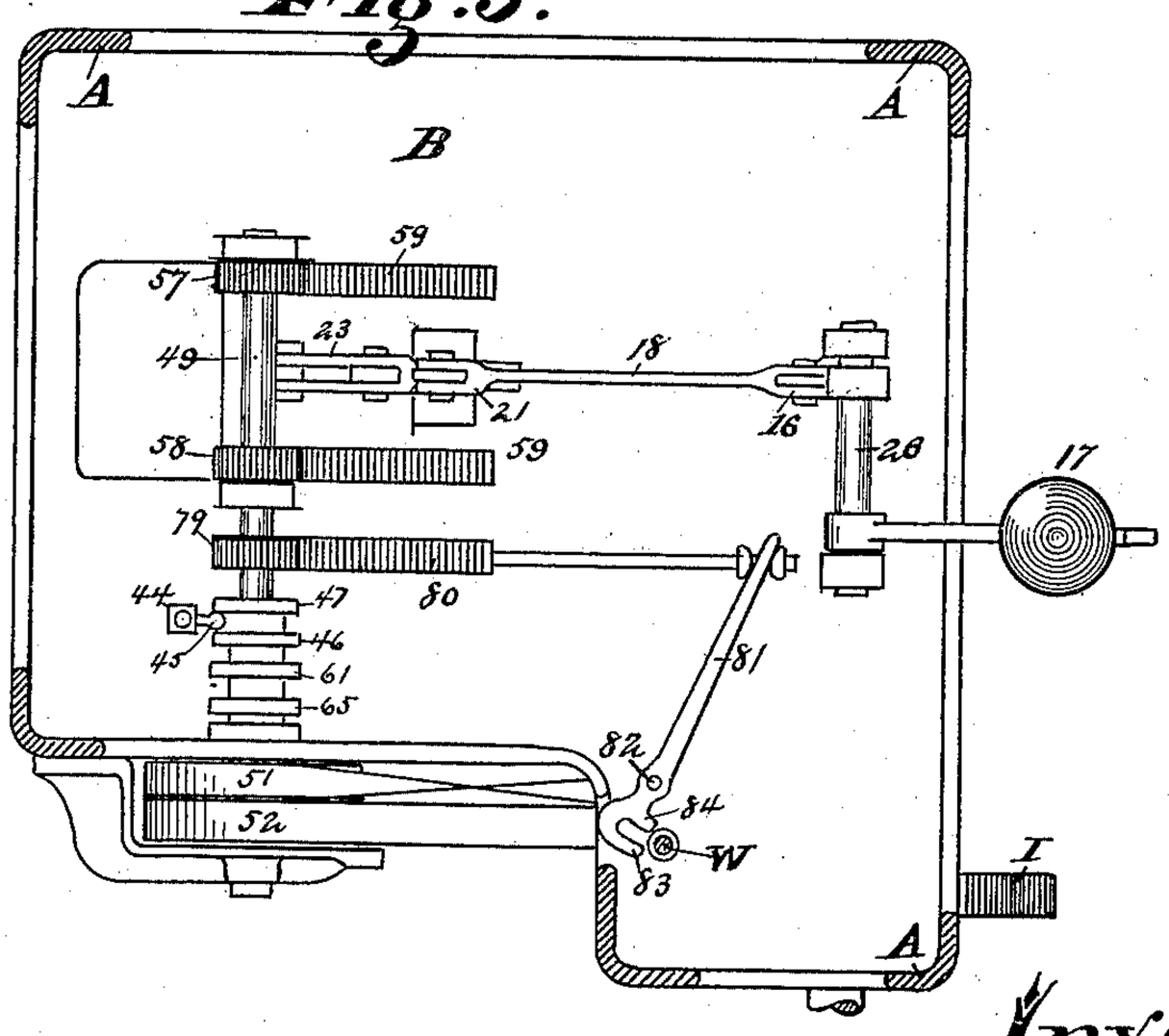


Fig. 5.



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DIE PRESS FOR FORMING COAL HODS.

No. 378,754. Patented Feb. 28, 1888.

Fig. 6.

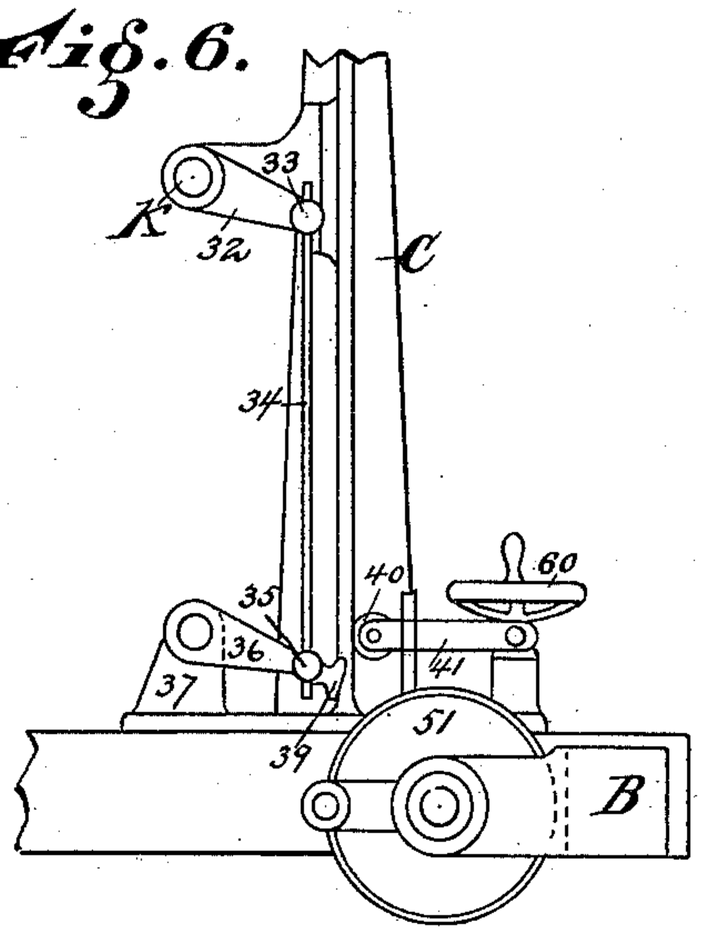


Fig. 7.

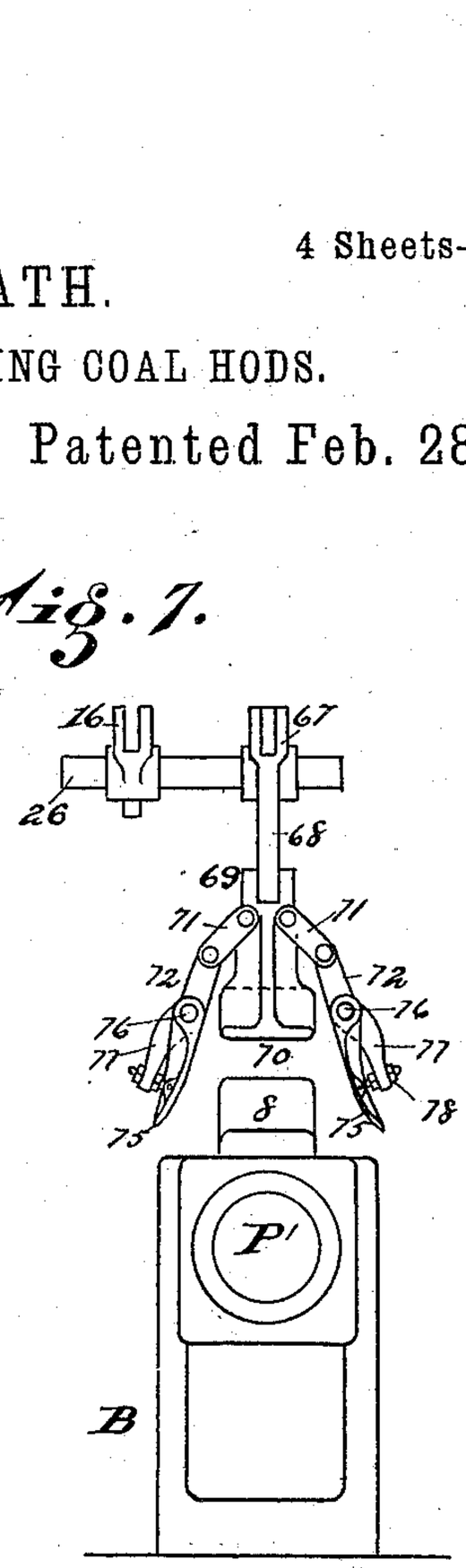


Fig. 8.

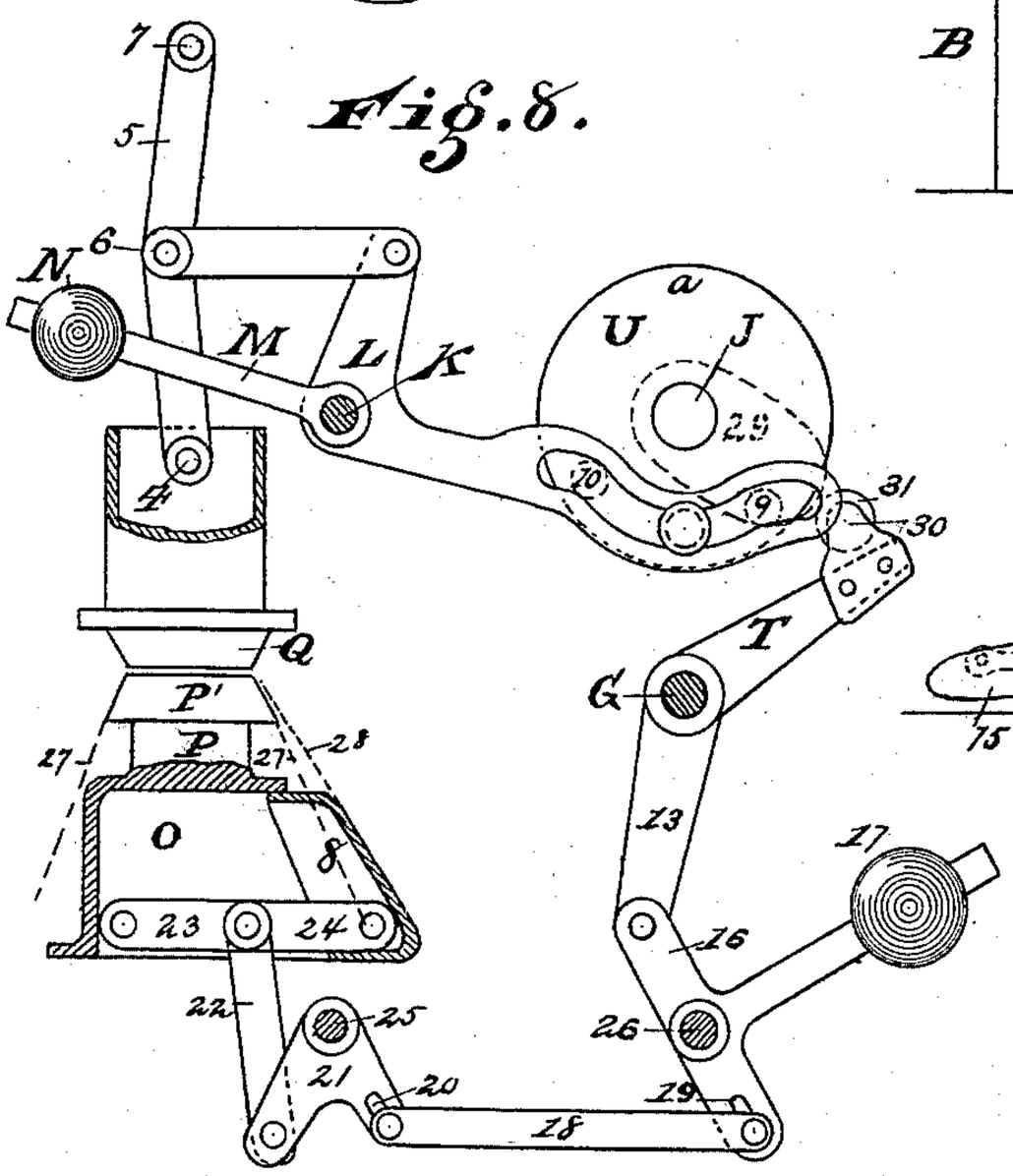
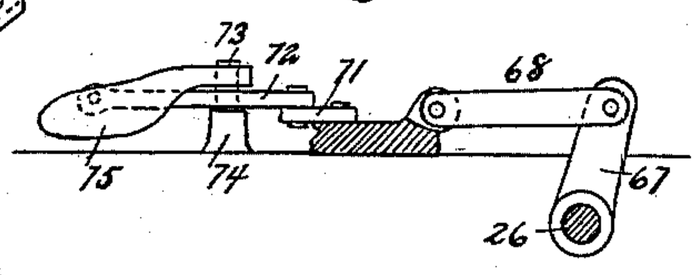


Fig. 10.



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UNITED STATES PATENT OFFICE.

EDWARD BARRATH, OF CINCINNATI, OHIO, ASSIGNOR TO VICTOR E. KNECHT, OF SAME PLACE.

DIE-PRESS FOR FORMING COAL-HODS.

SPECIFICATION forming part of Letters Patent No. 378,754, dated February 28, 1888.

Application filed December 19, 1887. Serial No. 258,327. (No model.)

To all whom it may concern:

Be it known that I, EDWARD BARRATH, a resident of Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Die-Presses for Coal-Hods, of which the following is a specification.

My invention relates to a machine for completing a coal-hod.

The object of the invention is to provide suitable mechanism to press the seam which unites the base to the shell of the hod and while in that position to change the shape of the shell from a cone to the scoop shape.

Another object of my invention is to provide mechanism which will perform these two steps successively, with the parts so constructed and arranged that the two steps will be performed by the machine itself when it is started in motion.

The various features of my invention will be fully set forth in the description of the accompanying drawings, making a part of this specification, in which—

Figure 1 is a side elevation of my improvement, partly in section. Fig. 2 is a front elevation. Fig. 3 is an enlarged view of the clutch mechanism. Fig. 4 is a top plan view of the machine. Fig. 5 is a bottom plan view of the same. Fig. 6 is a side elevation of the mechanism used for moving the bottom die laterally. Fig. 7 is a top plan view of the clamping mechanism and shaping-die. Fig. 8 is a diagram representing the changed position of the parts shown in elevation, Fig. 1. Fig. 9 is a diagram illustrating the position of the shell and its operating parts at the extreme lateral outward movement. Fig. 10 is a sectional elevation of the outside clamps.

A A represent legs of a suitable frame.

B represents the bed of the frame on which the operating mechanism is mounted; C, columns mounted upon the bed and sustaining the press-platen and the crank mechanism for operating the same; D, the main driving-pulley; E, a loose pulley journaled loosely on the main shaft for shifting the belt to stop and start the mechanism.

F represents the fly-wheel.

G represents the main shaft on which said fly-wheel and pulleys are mounted.

H represents the spur-gear keyed upon shaft G, engaging with and driving the transmitter I, that is mounted upon the crank-shaft J.

K represents the secondary shaft on which the bell-crank lever L is mounted.

M represents levers carrying weights N. Levers M are keyed to the shaft K. The weights N counterbalance the weight of the crank and upper moving die.

The dies for completing the seam of the bucket are constructed as follows:

O represents a shell-shaped base.

P represents a conical die which is mounted upon the base O. The cone part P′ is of the same taper as the hod to be formed.

r represents the stem of the die Q, which projects up through the cylindrical bearing S. The stem of this die is made hollow at its top, as shown in Fig. 8, and upon the inside is preferably attached one member of three pairs of toggles, by the pivot-bolt 4, secured to the inside of the die-stem.

5 represents the members of the upper set of toggle-arms. I have shown four sets of upper toggle-arms and three lower sets. The number is immaterial, provided it be enough to furnish sufficient strength and rigidity. These two sets of toggles 1 and 5 journal upon the center-pin 6.

7 represents the top journal of the links 5.

The downward movement of the die Q and the pressure imparted to the hod through said die are communicated by the opening and closing of the toggle-links through the bell-crank lever L, which is driven by the following instrumentalities:

2 represents a slot in the driving end of said bell-crank lever of peculiar shape. This slot has straight portions 3 at each end, the central portion being curved and concentric to the circle of the crank-pin 3. When said crank-pin 3 is traveling in the curved portion of the slot, when said arm is upon the upper side of the axle, as shown in Fig. 1, the bell-crank lever is moved and the toggles are straightened. The straight portion of the slot makes the toggles travel slower, and slows up at the last end of the movement, as the toggles are approaching their center line. As soon as the said crank-pin has arrived at the point indicated by dotted lines 9, (shown in Fig. 8,) the

motion of the bell-crank lever to strain the toggles has been completed. Then, as the crank-pin starts backward through the central curved portion of the slot, no motion is imparted to that lever until the crank-pin arrives at the point 10, thus holding the toggles and bell-crank lever stationary during this portion of the revolution for completing the secondary step, which will be hereinafter explained, of shaping the cone laterally. As the crank-pin travels forward around to complete its revolution from point 10, the toggles are moved out into the position shown in Fig. 1, thereby lifting the die Q back to its normal position ready for the second operation. During the time that the crank-pin is traveling from point 9 to 10 the second step of giving the scoop shape to the hod has been performed by the following instrumentalities:

8 represents a loosely-moving die, which rests upon the bed-piece 11 and is guided by said bed-piece and by the shell O, its top 12 bearing against the inner top side of said shell. This die is removed laterally to and from the shell O by the following instrumentalities:

13 represents a crank-arm journaling upon shaft G, which extends partially across the frame, journaled to the bed-pieces 14 15. Crank 13 is journaled to the T-shaped arm 16.

17 represents a counterbalance-weight mounted upon said T-shaped lever 16.

18 represents a connecting-rod, one end of which is journaled in slot 19 of the T-lever 16, and the other end is journaled in the slot 20 of the bell-crank lever 21.

22 represents a connecting-rod journaled in the upper arm of bell-crank lever 21 at one end and at the other end to the center of the toggles 23 24.

Bell-crank lever 21 is suitably journaled to a shaft, 25, which is mounted in the frame. The toggle-link 23 is journaled upon a center within and to the shell O. The toggle 24 is journaled upon a stud attached to and within the laterally-moving die 8. As the toggles 23 24 are straightened by the connecting-rod 22 and the connecting-lever mechanism, the die 8 is moved laterally out to give the scoop shape to the bucket. This extended lateral position and the position of the toggles and lever mechanism are shown in the diagram Fig. 8. The dotted lines 27 show the original shape of the cone-shell, and the dotted line 28 shows the lateral extension of the cone by means of the die 8, giving the hod its scoop shape. To perform this operation it is necessary that the dies P Q should be held firmly in position. The parts of the mechanism are so adjusted that this forward movement of the die 8 takes place when the crank-pin is traveling from the point 9 to 10. (Shown in dotted lines, Fig. 8.) The backward movement of die 8 takes place when the bell-crank lever L is completing the remaining portion of a single revolution.

In order to start and stop the movement of the crank 13, and the connecting-levers 16 18 21 22, and toggles 23 24, I have provided the following instrumentalities:

29 represents a cam, which is shown in dotted lines in Figs. 2 and 8, which is attached to the shaft J. As this cam 29 moves forward, it strikes a lug, 30. The forward end of this lug is preferably armed with a friction-roller, 31, so that the cam will travel smoothly over its face. This lug is attached to an upper arm, T, of arm 13. These parts are preferably cast in one piece, as illustrated in the diagram, Fig. 8. Cam 29 depresses the arm T, moving the lever 13 forward, and thereby operating the T-lever 16, connecting-rod 18, bell-crank 21, connecting-rod 22, and toggles 23 24. As soon as the cam 29 has passed off the lug-roller 31, the weight 17 retracts the movement of the toggles and their lever mechanism. The diagram Fig. 8 shows this weighted lever and its connecting parts in position, in which the die is moved to the extreme outward position, and the same parts are shown in Fig. 1 in their normal position, ready to proceed with their work. The cam 29 is upon the opposite side of the crank-disk U. This position is shown in Fig. 4, the shape of the cam being shown in dotted lines, Fig. 1.

In order that the cone-shell may be put upon the die P and taken off readily, I have provided the following mechanism for moving the shell O and its die P laterally outward during the latter portion of the movement of the crank-lever L. These parts are so adjusted that the die P occupies its extreme lateral position, as shown in Fig. 9, when the machine has completed one revolution, and is pushed back by the operator in place before the machine is started.

In order to move the die P laterally automatically toward the end of one revolution of the driving mechanism, I have provided the following instrumentalities:

Shaft K is keyed to the bell crank lever L. To this shaft is also keyed the weighted levers M. The shaft K extends across the machine, and the two weights N are upon either side thereof.

32 represents a secondary lever keyed upon the outer end of said shaft K. It is provided with a ball-wrist, 33, through which passes a connecting-rod, 34, and keyed thereto.

35 represents a second wrist-pin journaled within lever 36, which is in turn journaled to a stud in the bracket 37. The shaft K being pivoted to the crank-lever L, and the levers M being keyed also to said shaft, while the crank-pin is moving from its initial point *a*, (shown in Fig. 8,) until it arrives at the point 9, the shaft K and levers M are being moved so that the weights N are raised to their extreme position and held there by said curved slot in the crank-lever L until the crank-pin has arrived at the point 10, at which point the levers and weights commence to descend, and in the descending motion of said levers the crank-arm 32 moves downward, and by the connecting-rod 34 the crank-arm 36 is

thereby depressed. The front end of said arm 36 is armed with the cam-face 39, that presses against the friction-roller 40. This movement upon the arm 41, which is pivoted to a cross-lever, 42, is shown in the top plan view, Fig. 4. Lever-arm 42 is keyed upon the shaft 43, that projects down through the base of the machine, as shown in Fig. 2, and engages with the clutch mechanism by means of the coupling 44, which is shown in Fig. 5.

45 represents a finger shown on the coupling-block 44, which projects forward between the disks 46 47, that are mounted upon the sleeve 48. Sleeve 48 journals upon the shaft 49, to which is cast or keyed the clutch member 50. Shaft 49 is driven by means of pulleys 51 52, that are connected to said shaft by the clutch member 50.

53 54 represent conveying-pulleys mounted upon the main shaft G. Over pulleys 52 and 53 passes a straight belt for imparting motion in one direction, and over pulleys 51 and 54 a cross-belt passes to drive the shaft 49 in the reverse direction. The pulley 51 runs loosely upon the sleeve 48 and runs normally as an idler. Pulley 52 journals loosely on shaft 49 and runs normally as an idler. I prefer to use a double-cone clutch having the two faces 55 56, the cone-face 56 engaging with the inner peripheral face of the pulley 51 and the cone-face 55 engaging with the inner peripheral face of the pulley 52. This clutch is mounted rigidly on the sleeve 48. When the shifting-finger 45 engages in the slot between the disks 46 47 to move the sleeve 48 outward, it engages the cone-face 55 with the pulley 52 and locks it in position for use. The opposite movement of the finger 45 brings the face 56 in contact with the pulley 51 and drives it in the opposite direction, and when the parts are in the position shown in Fig. 3 it is out of engagement with either one of said pulleys 51 52 and they are running as idlers. Thus by engaging the pulley 51 with the clutch 50 motion is transmitted to shaft 49 for driving it in one direction. Upon this shaft 49 are mounted two spur-wheels, 57 58, under the bed of the shell O. To this shell are attached racks 59. The parts are so connected that when the pulley 52 is in engagement with the clutch 55 the sleeve and shaft 49 and the gears 57 58 driven thereby move the shell-base O and its superimposed die P outward into the position shown in Fig. 9. The shifting-finger 45, being operated by the rod 34 through the medium of arm 36 and the cam-face 39 only during the time that it is in engagement with the friction-roller 40, holds the engagement of the cone-faces 55 to the pulley 52. As soon as the pressure from the cam 39 and the pulley 40 has been relieved, the friction-clutch 50 will automatically move into its normal position. (Shown in Fig. 3.) The parts are so adjusted that this engagement of the cam 39 with the roller 40 takes place just before the machine stops, or during the last portion of its revolution, when the pulleys 51 52 will run as idlers.

In order that the shell O and its superimposed die P may be easily moved back into position, I have provided a hand-wheel, 60, mounted upon the shaft 43, which may be turned to move the shifting-finger 45 and the sleeve 48 into reverse position, bringing the clutch-face 56 in engagement with the pulley 51, when the cross-belt will move the parts back into position. This movement of the pulley 52 is preferably a little less than a whole revolution. The length of time that the pulley 52 is driving the shaft 49 depends upon the length of time the cam-face 39 is in engagement with the pulley 40. I consequently arrange the size of the spur-wheels 57 58 so that this portion of the revolution of shaft 49 will move the shell-base the desired distance, and a similar part revolution of shaft 49 in the reverse direction will return the shell-base to its normal position for work. In order that this inward movement of the shell may be limited and be automatically stopped at the desired point, I have provided the following instrumentalities:

61 represents a disk, which is sustained in position by bolts 63, passing into the frame at point 62. Upon the inner face of this disk I have provided a projection, 64.

65 represents a collar keyed to the sleeve 48. On one portion of this collar I provide a projection, 66, and these parts are adjusted so that at the end of the revolution of shaft 49, due to the engagement of the cone-friction 50 with the pulley 52, the projection 66 will be away from contact with the projection 64. Now, in this position the hand wheel 60 may be turned to move the sleeve 48, through the shifting-finger 45, to bring the clutch 50 into contact with the pulley 51, which locks the pulley 51 to the shaft through the medium of the clutch. A similar part revolution will then be made in the reverse direction by shaft 49, and this is stopped by the engagement of the projection 64 on the collar 61 with the projection 66 on the disk 65, which moves the sleeve 48 outward, bringing the cone clutch 50 into the normal position shown in Fig. 3, disengaging it from connection with the pulley 51. The sleeve 48 is splined upon the shaft 49 in the ordinary manner, so as to allow it to move laterally on said shaft. The adjustment of the projections 64 and 66 are such that they are brought in contact when pulley 51 is driving shaft 49 the moment that the shell-base O has been carried back into the normal position. (Shown in Fig. 1.)

The machine is designed to be started and stopped in the following manner:

V represents a foot-lever; W, a connecting-rod operating upon a clutch placed on shaft J to connect and disconnect it to lock and unlock it from engagement with the spur-gear 1. In order that the machine may be stopped automatically as soon as one revolution of the

shaft J has been made, any unshipping mechanism may be provided to disengage the clutch. I have not shown the main clutch mechanism and the means for unshipping it, as these are well-known devices, and are used for various machines for automatically stopping and starting them by clutch mechanism. I prefer, however, to use the form shown in Letters Patent No. 303,789, granted me August 19, 1884, for an improved clutch.

It will be seen that any desired amount of power can be obtained by means of the devices herein shown, and that each part of the machine will appropriately perform its own work. In order, however, that the scoop may be properly shaped, I design to employ, in connection with the laterally-moving die 8, an outside clamping device, which is shown in Fig. 7. Upon shaft 26 is mounted a crank, 67.

68 represents a pitman, one end of which is keyed to said crank 67 and the other to a plunger-block, 69. This plunger-block is provided with a face, 70, of a suitable form to suit the scoop shape to be given to the shell of the hod and in its forward position receive the side thrust due to the forcing downward of die 8 to complete the shape of the bucket.

In order to hold the bucket sidewise, I provide the following additional instrumentalities:

71 represents links pivoted upon the stem of shaping-block 70, the forward ends being pivoted to levers 72, which levers are pivoted upon stud-bolts 73 to a supporting-piece, 74, on the main frame. A similar supporting-piece is upon the opposite side of the plunger 70. As the plunger-block 70 is driven forward, it forces the inner ends of the links 71 outward, thereby moving the inner end of the lever 72 backward and bringing the faces 75 inward to press against the sides of the coal-hod.

In order that the faces 75 may be adjusted to the different-sized buckets, I construct them of a different piece from lever 72 and pivot them to said lever at the point 76, the lever projecting forward and outward in a terminal point, 77. From the faces 75, I project upward a threaded bolt, 78, which passes through an orifice in the projecting end 76 of the lever 72. Jam and tightening nuts are placed each side of the projecting end 76, so that these nuts may be slackened to move the face portion 75 to or from each other to any desired point. The jam-nuts are then tightened up and the faces 75 are rigidly connected to the lever portion 72, thereby forming an adjustable outside shaping-clamp.

It will be seen that the configuration of the faces 75 and the face 70 of the plunger give the outside configuration of the shell of the hod, while the die 8 moves laterally, pressing against the inner surface of the shell of the hod to drive it out against these outer faces. The crank 67 is adjusted upon the shaft 26, so that this movement of the plungers and shaping-faces will take place at the same time that the die 8 is moved laterally, the crank-arm 67 being keyed upon the same shaft, 26, that the T-lever 16 is keyed upon; consequently the shaft 26 operates both the mechanisms operating upon the outside and inside of the bucket-shell to give it the scoop shape.

In order that the die Q may not be accidentally operated, I have provided a lock for holding the treadle-rod from being depressed.

In order to automatically lock the treadle-rod to prevent the machine from being started, I have provided the following instrumentalities:

79 represents a spur-wheel mounted upon shaft 49. 80 represents a rack-bar engaging with said spur-wheel. It projects upward and engages with the end of lever 81, which is pivoted at point 82. The forward end of said lever is provided with a hook, 83, that engages with the treadle-rod W, passing under the collar 84. The collar resting on the jaws of the hook prevents the treadle-lever W from being depressed. This movement for engagement occurs when the table is moved laterally outward, the reverse movement bringing the table back and releasing it, when the machine is ready for operation.

I have shown the laterally-moving die 8 and outside clamping mechanism and the mechanism for operating them to be used in combination with the mechanism for moving the upper die to shape the bottom and compress the bottom seam of the coal-hod; but I do not wish to limit myself to the use of this laterally-shaping mechanism in this manner, as it is manifest it can be used in and of itself without reference to the latter.

Having described my invention, what I claim as new is—

1. In a shaping-machine, the combination of the die P with the die Q, operated by the bell-crank lever L, and the toggle mechanism, substantially as herein specified.

2. In combination with the vertically-moving die Q and the toggle mechanisms, the bell-crank lever L, provided with a curvilinear slot engaging the crank-pin 2 of the driving-disk, substantially as herein specified.

3. In combination with the driving-disk operating the bell-crank lever and plunger, the cam 29, operating the lever 13, and a secondary set of levers and toggle-joints for moving the die 8, substantially as specified.

4. The shaping-die 8, adapted to be moved laterally by means of toggle-joints and levers operated by the cam 29 of the driving-disks during a portion of its revolution, substantially as herein specified.

5. In combination with the die 8, operated by toggles and levers, substantially as specified, the lever 16 and weight 17, for automatically retracting the die 8 when the cam 29 is disengaged, substantially as specified.

6. In combination with the main driving-disk, the bell-crank lever L, toggle and mechanism for operating the die Q during one portion of its revolution, and the cam 29, for operating the levers 13 and 16, and the toggles

for moving the die 8 during another portion of the revolution of the driving-disk, substantially as specified.

7. In combination with the shell-base O and die 8, the mechanism for laterally moving said parts, consisting, essentially, of the shaft 49, the driving-pulleys 51 52, and the cone-clutch 50, and mechanism for automatically setting the shaft 49 in motion, substantially as specified.

8. In combination with the shell O, the rack-bars operated by means of pinions 57 58, mounted upon shaft 49, and intermittently operated by the automatic engagement and disengagement of the cone 50 with the pulley 51, substantially as specified.

9. In combination with the pulley 52, the cone-clutch 40, the sleeve 48, and shaft 49, with the automatic unshipping device, consisting of the disk 60 and the collar 61, provided with projections 64 66, substantially as herein specified.

10. In combination with the shell O, the laterally-moving mechanism consisting, substantially, of the racks and pinions, the shaft 49, the sleeve 48, and the two sets of driving-pulleys 51 52, and the cone-clutch 50, whereby the said shell is moved out and in by the reverse movement of the shaft 49, substantially as herein specified.

11. In a cone-shell-shaping machine, the combination of the die Q, operated by one set of mechanism, with the die P and the laterally-moving die 8, working within the base of die P while the dies Q and P are held in contact, substantially as herein specified.

12. In combination with the die P and the die 8, moving laterally, the outside clamping mechanism consisting of the plunger 70 and the clamping-faces 75, operated by means of the crank 67 on shaft 26, substantially as herein specified.

13. In combination with the pulley 51 and the cone-clutch 50, the automatic engaging mechanism consisting of the roller 40, the lever 41, intermediately connected to the cone 50, the tripping-arm 36, connecting-rod 34, operated by the arm 32, and shaft K, substantially as herein specified.

14. A coal-hod-shaping machine consisting of the dies P and Q and 8 and the outside clamping devices intermittently operated by the bell-crank L, the driving-disk, the cam 29, the levers 13, and the shafts K, 48, and 26 and their connecting mechanisms, substantially as herein specified.

15. In combination with the treadle-rod W, the driving-pinion 79, crank 80, and hook-lever 81, for automatically locking the treadle, substantially as specified.

16. The shaping mechanism consisting, substantially, of the laterally-moving die 8 and the outside clamping devices operated simultaneously by means of the shaft 26 and the mechanism connected thereto upon each side of the table, substantially as herein set forth.

17. In combination with the shell O, the laterally-moving die 8, operated by cranks and levers to move laterally and give the scoop shape to the cone-shell, substantially as specified.

In testimony whereof I have hereunto set my hand.

EDWARD BARRATH.

Witnesses:
ROBERT ZAHNER,
M. E. MILLIKAN.