E. S. SMITH.

COMPRESSING MACHINE.

APPLICATION FILED MAY 13, 1909.

991,035.

Patented May 2, 1911.

6 SHEETS—SHEET 1.

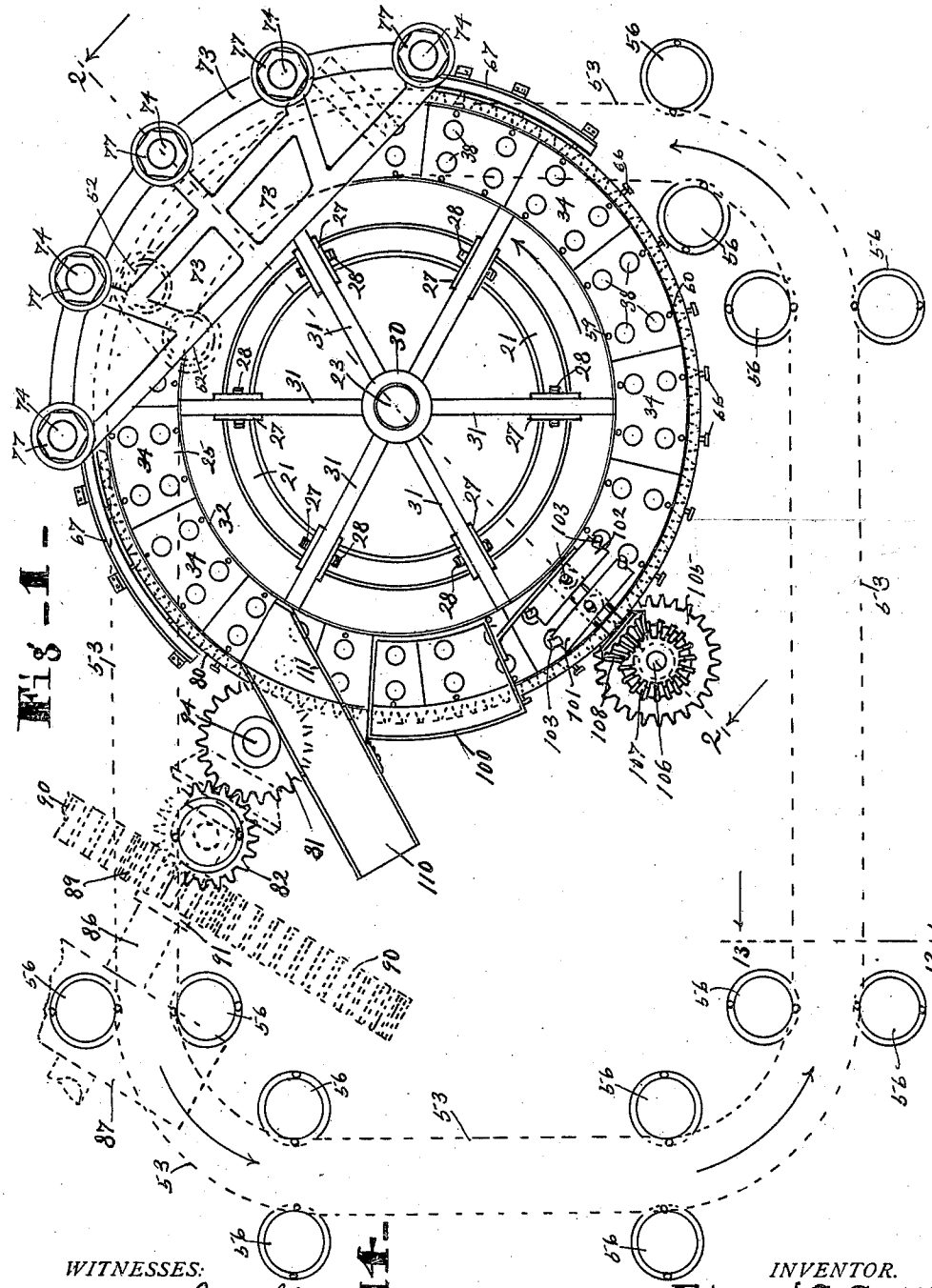

Fig. 1.

Fig. 14.

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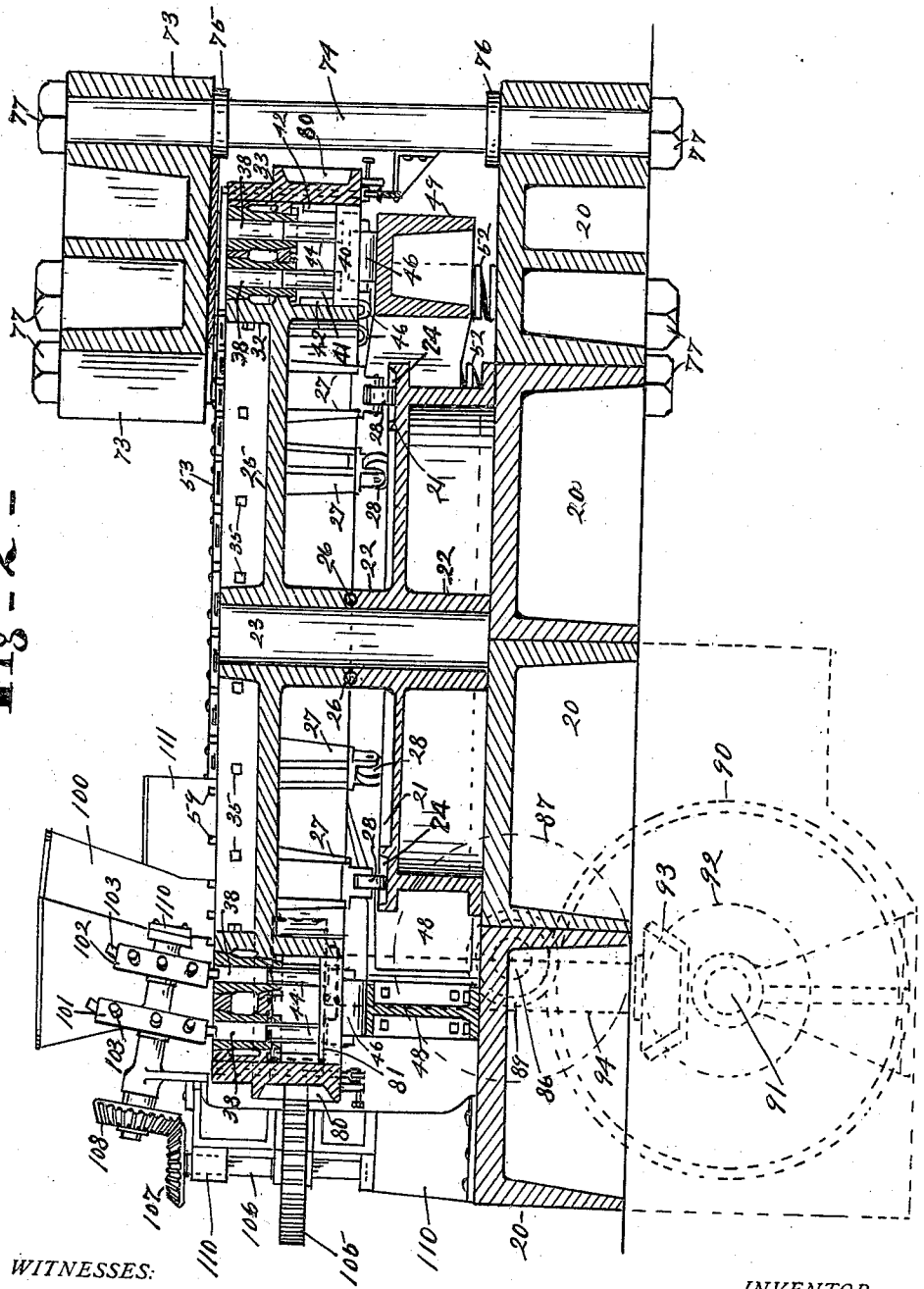
6 SHEETS—SHEET 2.

Fig. 2.



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6 SHEETS—SHEET 3.

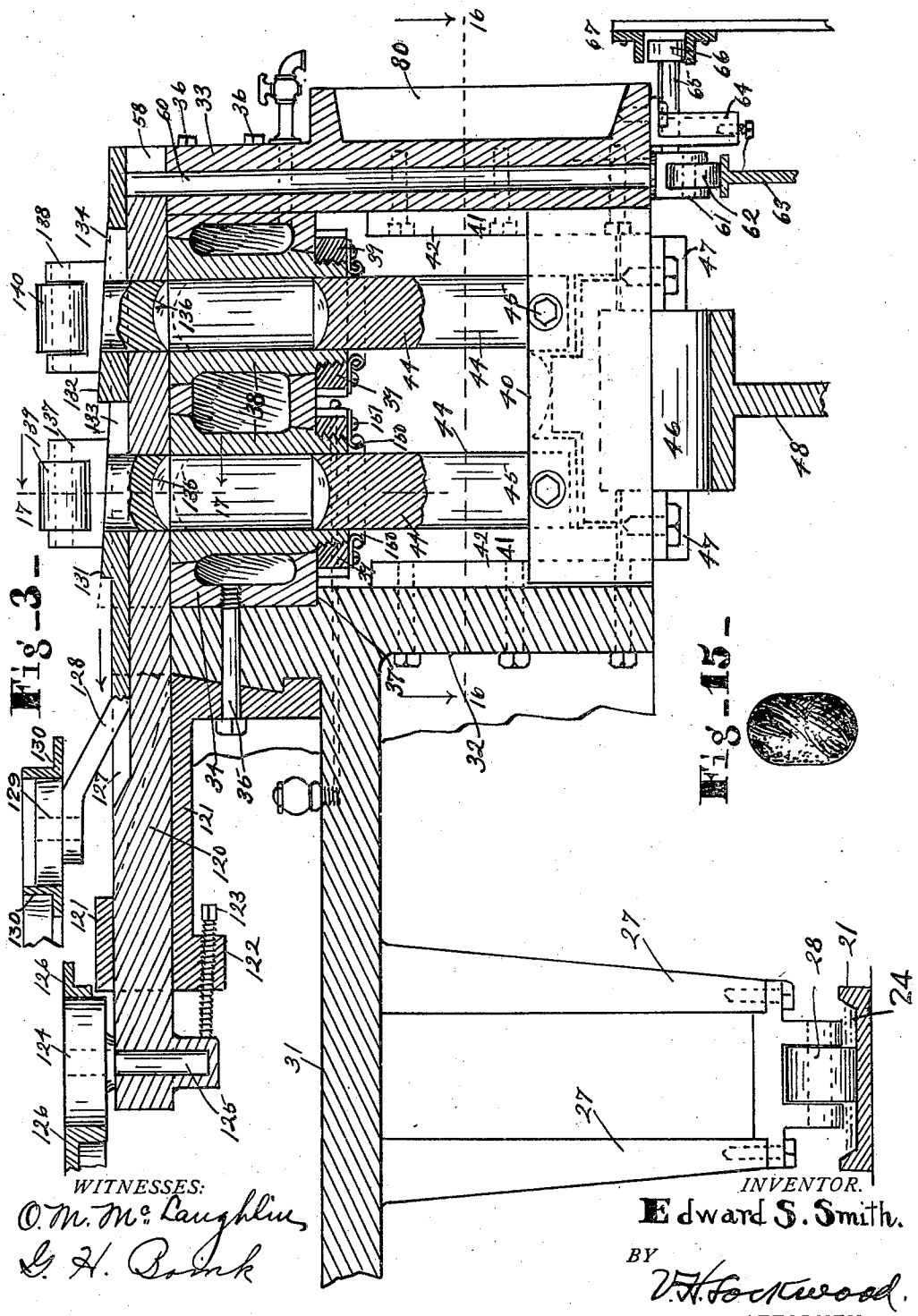

Fig. 3.

Fig. 15.

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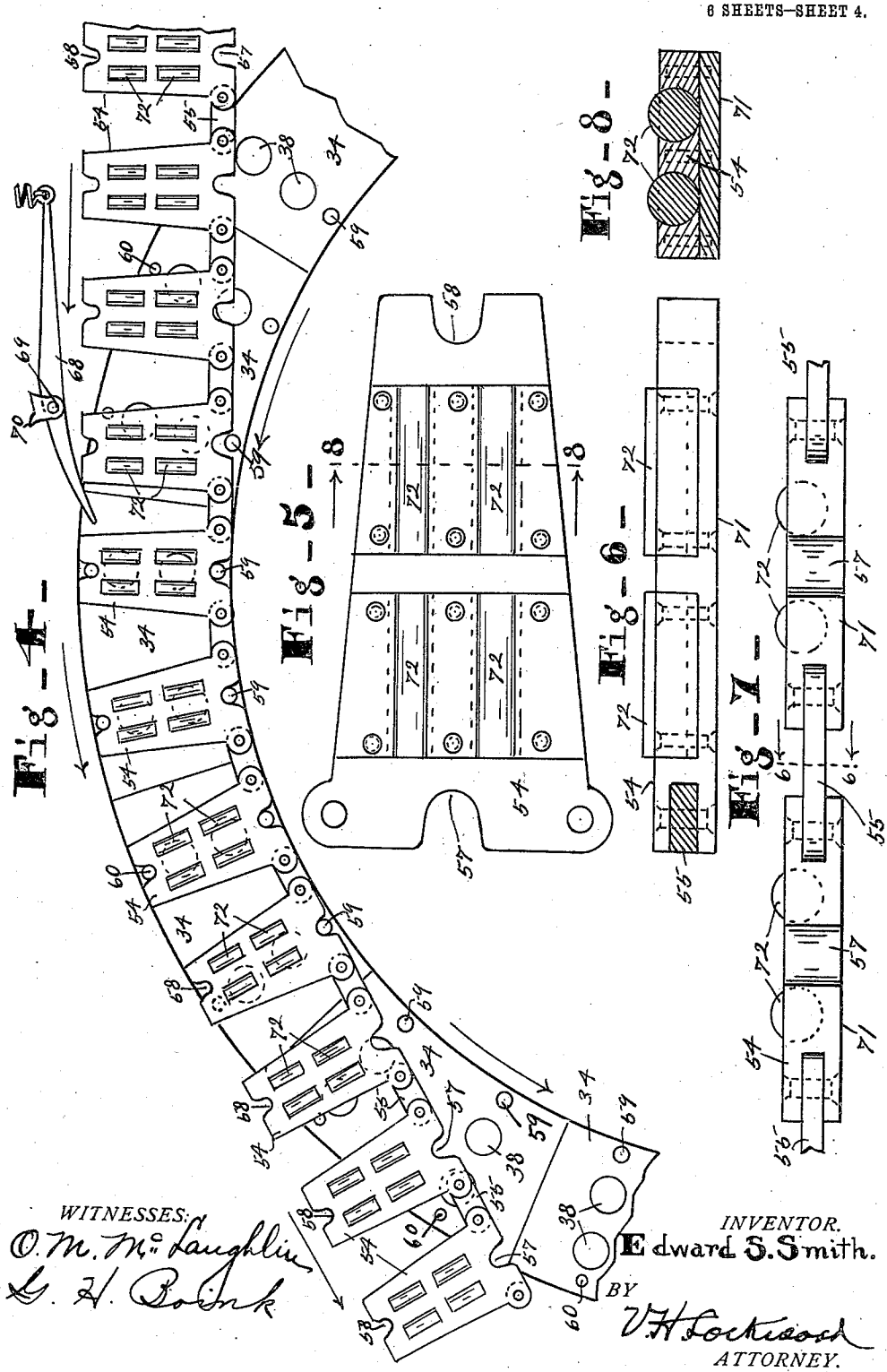

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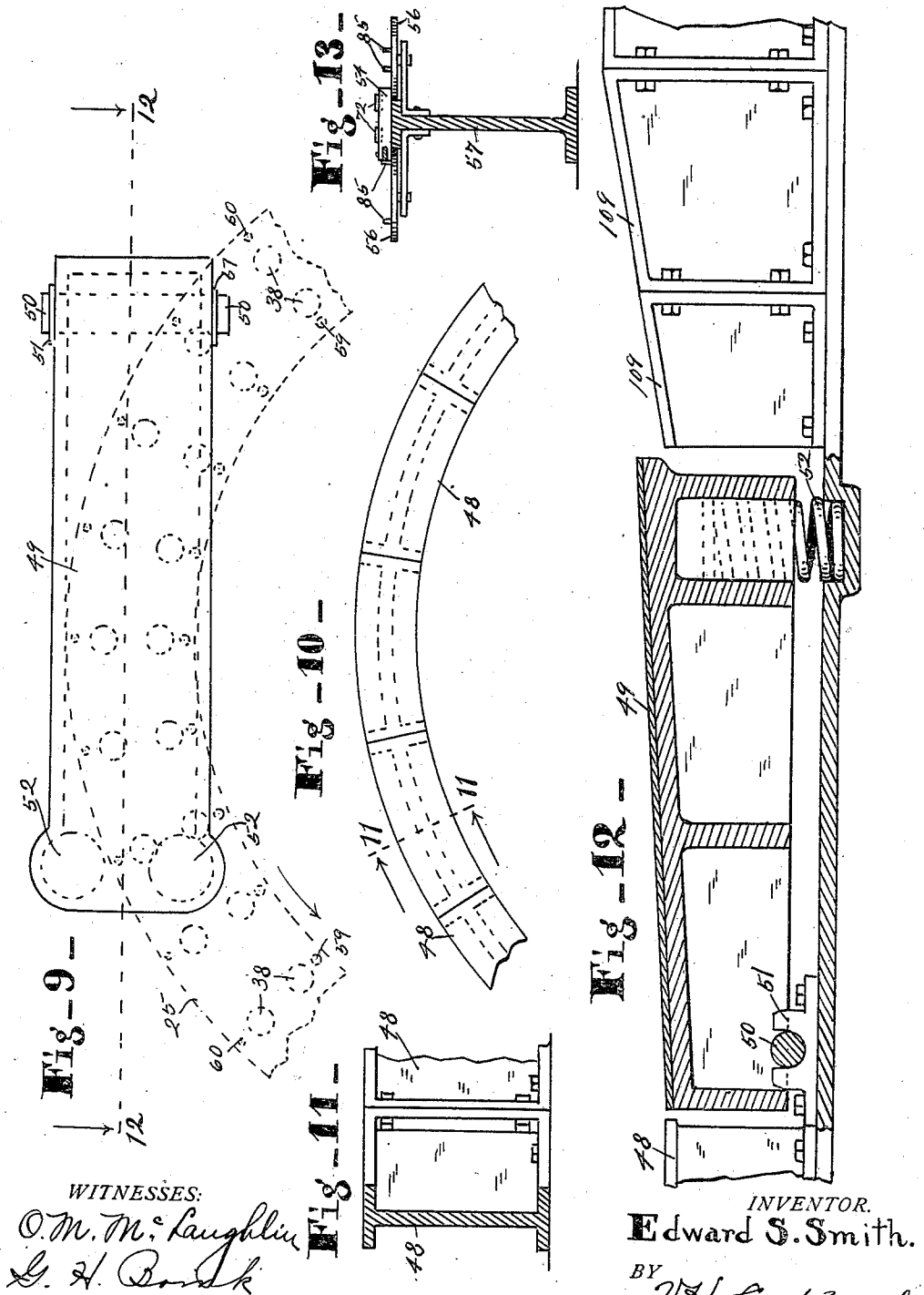
6 SHEETS—SHEET 5.



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6 SHEETS—SHEET 6.

Fig. 16.

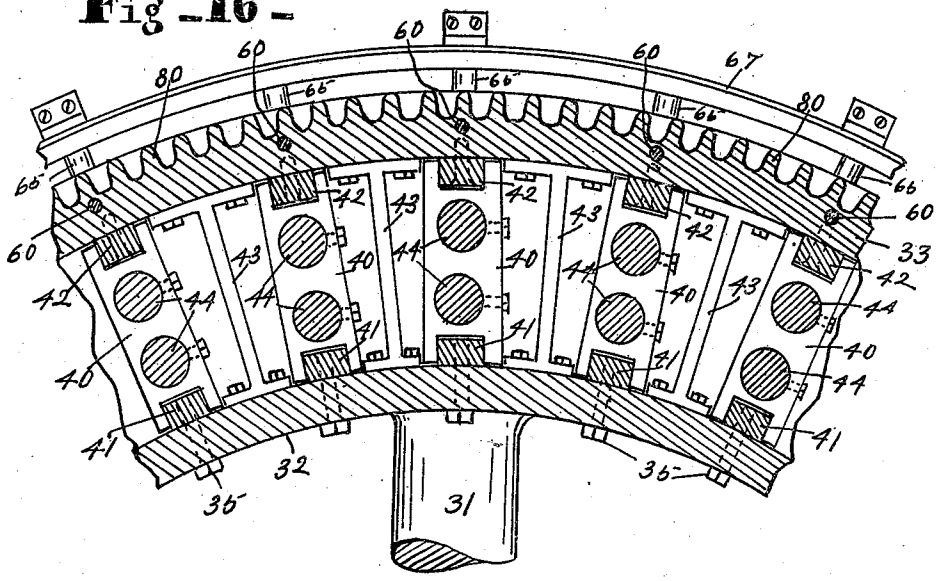


Fig. 17.

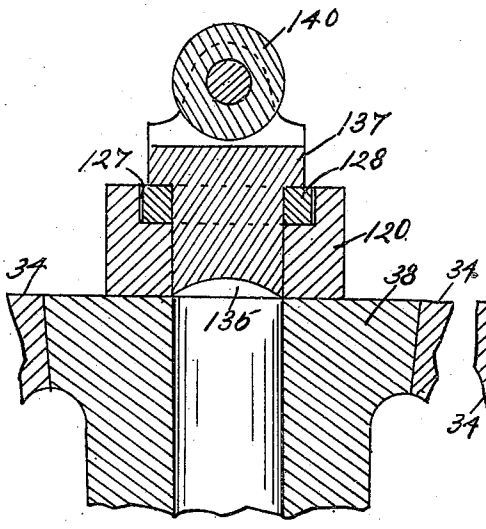
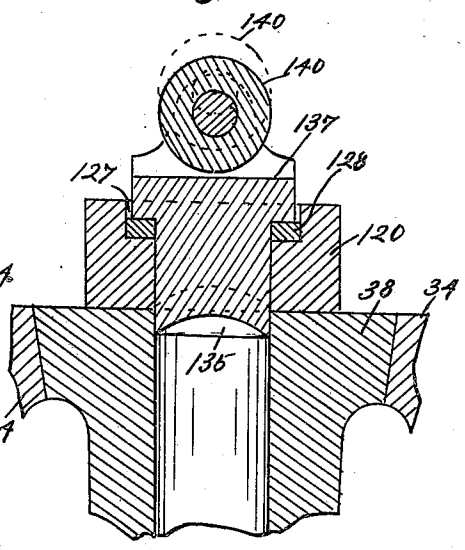


Fig. 18.



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UNITED STATES PATENT OFFICE.

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COMPRESSING-MACHINE.

991,035. Specification of Letters Patent. Patented May 2, 1911.

Application filed May 13, 1909. Serial No. 495,591.

To all whom it may concern:

Be it known that I, EDWARD S. SMITH, of Indianapolis, county of Marion, and State of Indiana, have invented a certain new and useful Compressing-Machine; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which like letters refer to like parts.

The object of this invention is to provide a new and useful means for compressing pliable or semi-plastic material into a compact unit. This type of machine is especially adapted for converting slacked or crushed coal into briquets; but I do not wish to be limited to any special use, for there are many compositions, other than coal, that can be converted into briquets, tablets and the like.

As one feature of the invention the press lies flat, which has been much desired by men conversant with the handling of large quantities of heavy material. By this construction, all the mechanism is within easy reach of the workman, so that all parts are accessible and convenient.

A second feature of this invention, is the novel construction and support of the mold carrying wheel. The wheel is so constructed that any set, or series of molds, may be removed or replaced without affecting the other parts of the wheel; or any section carrying the molds, may be removed or replaced; or the gear ring surrounding the mold section may be removed or replaced, without affecting the other mechanism.

The great weight of the mold wheel is sustained by a novel means. The mold wheel, as is usual, is mounted upon a suitable spindle. But the weight is maintained upon several downwardly extending flanges that are provided with rollers which travel in an oil trough suitably mounted beneath the wheel.

Another feature of the invention is the means for closing the outer ends of the molds, while the material is under compression, and the means for ejecting the material, after it has been compressed.

Another novel feature of the invention, is the means for maintaining the compressing plungers in a vertical position.

Another feature of the invention, is the means for centering the mold closing plate over the face of the mold, and maintaining it in that position, while the material is under compression; and also the means for removing the plate from the face of the wheel, after the compression is completed.

Another novel feature of the invention is the means for closing the outer end of the mold, shown in the modified form, whereby the outer end of the mold is closed by a secondary or removable plunger, which is permitted to slightly enter the mold and compress the outer end of the briquet. By this means, a slightly oval briquet can be made.

The invention will be understood from the accompanying drawings and the following description and claims:

Figure 1 is a plan view of the machine, the driving means, being old, is partly shown by dotted lines and partly broken away; and the mold closing means is indicated by dotted line, the scale being too small to show it in detail. Fig. 2 is a section on the line 2—2 of Fig. 1, the driving means being shown by dotted line. Fig. 3 is a section of part of the mold carrying wheel, a modified means for closing and compressing the outer end of the briquets being shown. Fig. 4 is a detail of the mold closing means. Fig. 5 is a plan view of one of the mold closing plates. Fig. 6 is a section on the line 6—6 of Fig. 7. Fig. 7 is an end elevation of two of the mold closing plates, linked together. Fig. 8 is a section on the line 8—8 of Fig. 5. Fig. 9 is a plan view of the compressing plane, the mold wheel being shown in relation to it, by dotted line, the travel of the mold wheel being indicated by an arrow. Fig. 10 is a plan view of a fragment of the track, which underlies the molds of the mold wheel; and upon which the compressing plungers ride, except when the briquets are under compression or ejectment. Fig. 11 is a section on the line 11—11 of Fig. 10, showing sections of the track bolted together. Fig. 12 is a section on the line 12—12 of Fig. 9. For the purpose of demonstration a side elevation of the circular track shown in Figs. 11 and 12, is added at one end of this section, and at the other end the stationary inclined plane for ejecting the briquets is shown. Fig. 13 is a section on the line 13—13 of Fig. 1, showing the track upon which the mold closing plate chain is carried. Figs. 14 and 15 are perspective views of different formed

briquets. Fig. 16 is a section on the line 16—16 of Fig. 3. Fig. 17 is a section on the line 17—17 of Fig. 3, and Fig. 18 is an altered position of the Fig. 17, showing the secondary plunger entering the mold box.

In detail, I have mounted upon a suitable base 20 a secondary base 21 which has an upward and downwardly extending sleeve 22, which surrounds a spindle 23. The secondary base 21 is circular, having at its outer edge a trough track 24, the object of which will be hereafter explained. Surrounding the spindle 23 and resting upon the sleeve 22 is the hub of the mold wheel 25. Between the sleeve 22 and the hub of the mold wheel 25 there is a suitable ball bearing 26. The mold wheel 25 has a plurality of supports in addition to the spindle 23, and the ball bearing 26, consisting of a number of downwardly extending legs 27, carrying the rollers 28, that travel in the trough 29. The trough is filled with oil so that a very easy travel of the mold wheel is attained in addition to holding it in a horizontal position. By this construction, the great weight of the wheel is maintained at a plurality of evenly distributed points. This distribution of weight is absolutely essential, in the construction of a machine for briqueting coal, or other material of like nature; for the wheel must be maintained in a perfect plane, free from lateral vibration.

The mold wheel consists of the hub 30; spokes 31, and an inner rim 32; and an outer rim 33. The inner and outer rims are spaced apart by the mold holding sections, which are in the upper half of the space between the rims 32 and 33, and are securely held there by bolts 35 and 36. The inner rim 32 has a shoulder 37 upon which the inner bottom edge of the mold sections rest. This construction makes the assembled wheel more rigid and secure.

The mold holding sections, are hollow cast and have tapering holes in which molds 38, are secured. The molds 38 are threaded at their lower end, and are held in place by the nuts 39. The lower part of the space between the rims 32 and 33 is adapted to receive the plunger frames 40. There are a plurality of these frames, corresponding to the number of mold boxes in the wheel, which lie in pairs, radially from the center. The plunger frames 40 are grooved at each end to overlie the guide bars 41 and 42, which are rigidly secured to the rims 32 and 33. Between the plunger frame 40 there are flanged plates 43, that are bolted to the rims 32 and 33 to add additional strength to the structure.

The plunger frames 40 are bored on their upper side to form suitable seats for a set of plungers 44. The plungers are held in their sockets by the set screws 45. The upper end of the plungers 44 enter the mold boxes 38, and ride there continually. The position of the plungers in relation to the mold box is governed by a track and two inclined planes that will now be described. The plunger frame 40 has a roller 46 mounted in suitable bearings 47, and travels on a circular track 48. This track is continuous and in the same plane except at two points in the circuit. First, during the period when the material is under compression, and, secondly, after the compression is made and the briquet is ejected. As seen in Fig. 12, there is provided an inclined plane 49, that is pivotally mounted on the pin 50 in bearings 51. The other end of the inclined plane 49 is supported by a pair of powerful springs 52. As the rollers 46 climb this inclined plane 49 the plungers 44 are forced upward through the molds 38, whereby the material in the mold will be compressed. After the compression is made the rollers 46 pass onto the stationary inclined plane 109, whereby their travel upward will force the plungers up through the mold, consequently ejecting the briquet. The other end of the mold 38 is closed by means that will now be described. An endless chain 53, which consists of a series of plates 54, connected by links 55, rides upon part of the upper surface of the mold wheel, and by a mechanism herein shown, the upper end of the wheel is securely closed.

As seen in Figs. 1 and 13, the chain 53 is supported by a series of revolving disks 56, that are mounted upon the endless track 57. This track 57 is so arranged that the chain 53 enters upon the upper surface of the mold wheel and leaves it free, whereby only about one-fourth of the molds 38 will be closed at one time. The plates 54 have notches 57 and 58 which are adapted to receive the pins 59 and 60, which are located in the mold wheel. The pin 59 is stationary in the mold wheel, but the pin 60 is slidably mounted. On the lower end of the pin 60 there is a head 61 in which a roller 62 is mounted. The roller 62 travels upon a track 63. The plane of the track varies to suit the necessary action of the pin 60. The track 63 is not continuous, so that it is necessary to control the pin 60 when the track ends. For that reason a bracket 64 is mounted under the outer rim 33, through which the secondary pin 65 extends. It carries the roller 66 in the circular guide frame 67 mounted on a substantial base, not here shown. It is necessary for the pin 60 to be depressed as the chain 53 comes onto and leaves the surface of the mold wheel, and the means herein shown accomplishes that purpose. As the molds approach the point of compression the inner pin 59 engages the notch 57 and carries the chain forward; at the same time the outer pin 60 is lowered so that the outer notch 58 may pass on and register with the hole in which the pin 60

operates, when the pin 60 will be elevated to engage the notch 58. To do this, it is necessary that the outer end of the plate 57 be slightly retarded.

As seen in Fig. 4, a retarding means is provided, which consists of a curved pointed lever 68 pivoted to 69 in a suitable mounting 70. The outer end of the lever 68 has a spring attached so that it holds the inner end normally against the outer end of the plates 54. The plate 54 has a flat surface 71 that rests upon the wheel and covers a pair of molds, as shown in Fig. 4. The upper side of the plate 54 is provided with a plurality of rollers 72 that are adapted to engage the under surface of the pressure table 73, which is shown in Figs. 1 and 2. The table 73 is supported by a plurality of posts 74 which are secured in base 20. The posts 74 have shoulders 75 and 76 that space the table 73 from the base 20. The posts 74 are threaded at each end and nuts 77 bind the entire structure together. As the chain 53 revolves in time with the mold wheel 25 the rollers 72 engage the under side of the table 73 and hold the mold closing plates securely in place. After the compression has been made, the chain 53 diverges tangentially from the surface of the mold wheel 25 by the following means: The pin 60 is depressed by the mechanism heretofore explained, thereby releasing the outer end of the mold closing plate 54; so that the chain is free to travel away from the mold wheel. The outer rim 33 of the mold wheel is provided with a webbed gear 80. This meshes with a gear 81, that in turn meshes with a gear 82, which is integral with one of the revolving disks 56. The disks 56 are provided with upwardly extending pins 85, that as the disk 56 revolves, engages the notches 57 and 58 in the mold closing plate 54 of the chain 53, whereby the chain will be controlled and actuated in time with the mold wheel.

The driving means will now be explained: As seen in Figs. 1 and 2, there is provided a driving shaft 86, driving pulley 87 and gear 89 driven from some suitable source of power. The gear 89 meshes with the gear 90 mounted on the shaft 91. The other end of the shaft 91 has a bevel gear 92 meshing with the bevel gear 93 on the vertical shaft 94. The upper end of the shaft 94 carries the gear 81 that meshes with the webbed gear 80 of the mold wheel. This driving means is old and is principally shown by dotted lines. As seen in Figs. 1 and 2, there is provided a hopper 100. Also a revolving tamping means, which consists of the revolving drums 101 and 102, mounted upon the same shaft and extending over the mold wheel and so mounted and driven that the short plungers 103 of the drums will enter the mold boxes 38, whereby the material in the mold will be tamped. This tamping means is driven by the gear 105 which meshes with the gear 80 of the mold wheel. A vertical shaft 106 carries the bevel gear 107 that drives the bevel gear 108 on the outer end of the drum shaft. These gears and shafts are suitably mounted in the brackets and frames 110 mounted upon the main frame 20. Assuming now that the hopper 100 is charged with material and that the mold wheel is moving in the direction of the arrow, the molds will be charged and as they pass under the revolving drums the material will be tamped. A plurality of these tampers may be used. As the charged molds approach the stationary table 73 the mold closing chain 53 comes onto and is locked on the face of the mold wheel 25 during the period of compression. The method of compression has heretofore been explained. The rollers 46 ride up the face of the inclined plane, thereby forcing the plungers 44 up against the material. After the compression is made the chain 53 is unlocked and leaves the mold wheel, thereby leaving open the upper part of the molds so that the briquets may be ejected. This is accomplished by the rollers 46 traveling up the stationary inclined plane 109 which constitutes part of the circular track 48, as shown in Fig. 12. After the briquets are forced out upon the surface of the mold wheel they are deflected into a chute 110 by a deflector arm 111.

As seen in Figs. 3, 17 and 18, a modified form of compressing and of closing the outer end of the mold box is shown. As seen in the drawings, a slidable plate 120 is mounted in a bracket 121 which is securely fastened to the inner rim of the mold wheel 25. This bracket 121 has at its inner end a downwardly extending flange 122 which contains the stop-screw 123. This stop is for adjusting the outward movement of the plate 120. The inner end of the plate 120 has a roller 124 mounted on the pin 125 that travels in a cam track 126. The mounting of this cam track is not shown. The principle is old, and no claim is made on the method of sliding the plate 120 in and out as desired. The mounting is upon the stationary part of the frame and is preferably made of angle iron. The plate 120 is grooved at 127 and in this groove is mounted a secondary plate 128. The inner end of this plate is turned upward and carries a roller 129 controlled by the cam 130. The mounting and principle of this cam track is the same as in the other. The plate 128 has two surfaces, 131 and 132, through which slots 133 and 134 are cut. The plate 120 has two holes through its outer end, corresponding and substantially the same size as the mold holes in the

molds 38. There are mounted in the holes of the plate 120 a pair of secondary plungers 135 and 136, which pass through the slots 133 and 134 of the secondary plate 125 and are integral with the heads 137 and 138. The shoulders of the heads are inclined to correspond with the inclined surfaces 131 and 132 of the plate 128. When the plate 128 is actuated toward the center of the mold wheel, the higher part of the inclined surfaces of 131 and 132 will be moved out from under the heads 137 and 138, thereby allowing the plungers 135 and 136 to be lowered into the mold boxes 38. The heads 137 and 138 carry rollers 139 and 140 that engage the under side of the stationary table 73, whereby the plungers are forced downward. The plate 120 is slotted at its outer end to receive the pin 60. The action of the pin 60 is identical with that heretofore described.

The plungers 44 are kept clean by a method that will now be described: A felt roll 150, with a wire center, is attached to the nuts 39 by set screws 151. The felt entirely surrounds the plungers and at each actuation they are wiped entirely clean.

What I claim as my invention and desire to secure by Letters Patent is:

1. A compressing machine including a horizontal frame, a mold wheel mounted horizontally on said frame, a circular trackway on said frame with a depressed channel adapted to hold oil and concentric to the axis of said mold wheel, arms disposed at intervals and extending downwardly from said mold wheel, rollers on the lower ends of said arms adapted to travel in the channel of said trackway for maintaining the horizontal position of the mold wheel, means for revolving the mold wheel, molds in the rim of said wheel arranged at right angles to a radial plane through the wheel, plungers for said molds carried by said wheel, means over which said plungers move during the revolution of the wheel for operating the plungers, and means for closing the upper ends of the molds during the pressing action of the plungers.

2. A compressing machine including a horizontally disposed mold wheel having two rims, one rim of less radius and within the other, bars secured between and to said rims, molds mounted between said rims so as to be vertically movable, plungers for said molds carried by said wheel, means over which said plungers move during the revolution of the wheel for operating the plungers, and means for closing the upper ends of the molds during the pressing action of the plungers.

3. A compressing machine including a horizontally disposed mold wheel, means for causing it to revolve, molds in the rims of said wheel arranged at right angles to a radial plane through the wheel, plungers for said mold carried by said wheel, means over which said plungers move during the revolution of the wheel for operating the plungers, stationary means under which said mold wheel moves, a handle and endless chain provided with a series of mold closing plates and movable between said mold wheel and said stationary means, and rollers in the upper surface of said plates adapted to engage said stationary means as each plate passes under said means.

4. A compressing machine including a horizontally disposed mold wheel, means for causing it to revolve, molds in the rims of said wheel arranged at right angles to a radial plane through the wheel, plungers for said mold carried by said wheel, means over which said plungers move during the revolution of the wheel for operating the plungers, stationary means under which said mold wheel moves, an endless chain provided with a series of mold closing plates and movable between said mold wheel and said stationary means, and a yieldingly acting retarding means for controlling the position of said plates as they approach the mold closing position.

5. A compressing machine including a horizontally disposed mold wheel, means for causing it to revolve, molds in the rims of said wheel arranged at right angles to a radial plane through the wheel, plungers for said mold carried by said wheel, means over which said plungers move during the revolution of the wheel for operating the plungers, stationary means under which said mold wheel moves, an endless chain provided with a series of mold closing plates and movable between said mold wheel and said stationary means, rollers in the upper surface of said plates adapted to engage said stationary means as each plate passes under said means, and means for guiding said chain so that it pursues a path with a greater degree of curvature than said mold wheel, whereby it will uncover said molds excepting at the compressing position.

6. A compressing machine including a horizontally disposed mold wheel, means for causing it to revolve, molds in the rims of said wheel arranged at right angles to a radial plane through the wheel, plungers for said mold carried by said wheel, means over which said plungers move during the revolution of the wheel for operating the plungers, stationary means under which said mold wheel moves, a handle, an endless chain provided with a series of mold closing plates and movable between said mold wheel and said stationary means, rollers in the upper surface of said plates adapted to engage said stationary means as each plate passes under said means, said plates being fastened at one end of said chain and being

provided with notches in opposite ends thereof, fixed pins in said mold wheel away from the outer periphery thereof in position to enter the inner notches in said plates as the wheel revolves, depressible pins near the outer periphery of said mold wheel in position to spring up into the notches in the outer ends of said plates, and a spring controlled means for engaging the outer ends of said plates and moving the outer ends into position to be engaged by said depressible pins, and means for elevating said depressible pins as they approach the compressing position.

In witness whereof, I have hereunto affixed my signature in the presence of the witnesses herein named.

EDWARD S. SMITH.

Witnesses:
G. H. BOINK,
O. M. MCLAUGHLIN.