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Patented Nov. 15, 1898.

E. S. COBB.
FUEL COMPRESSING MACHINE.

(Application filed Nov. 2, 1897.)

(No Model.)

2 Sheets—Sheet 1.

Fig. II.

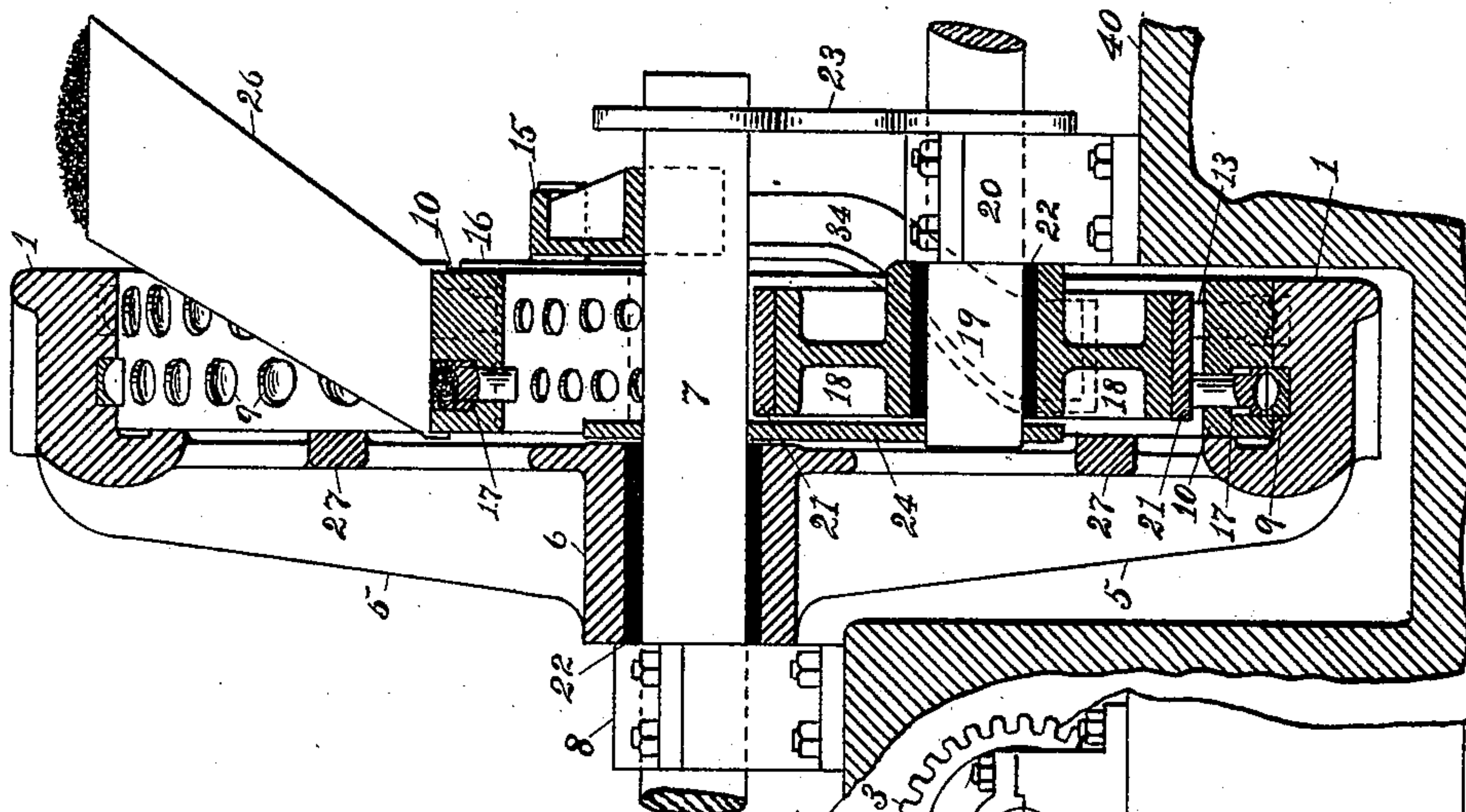
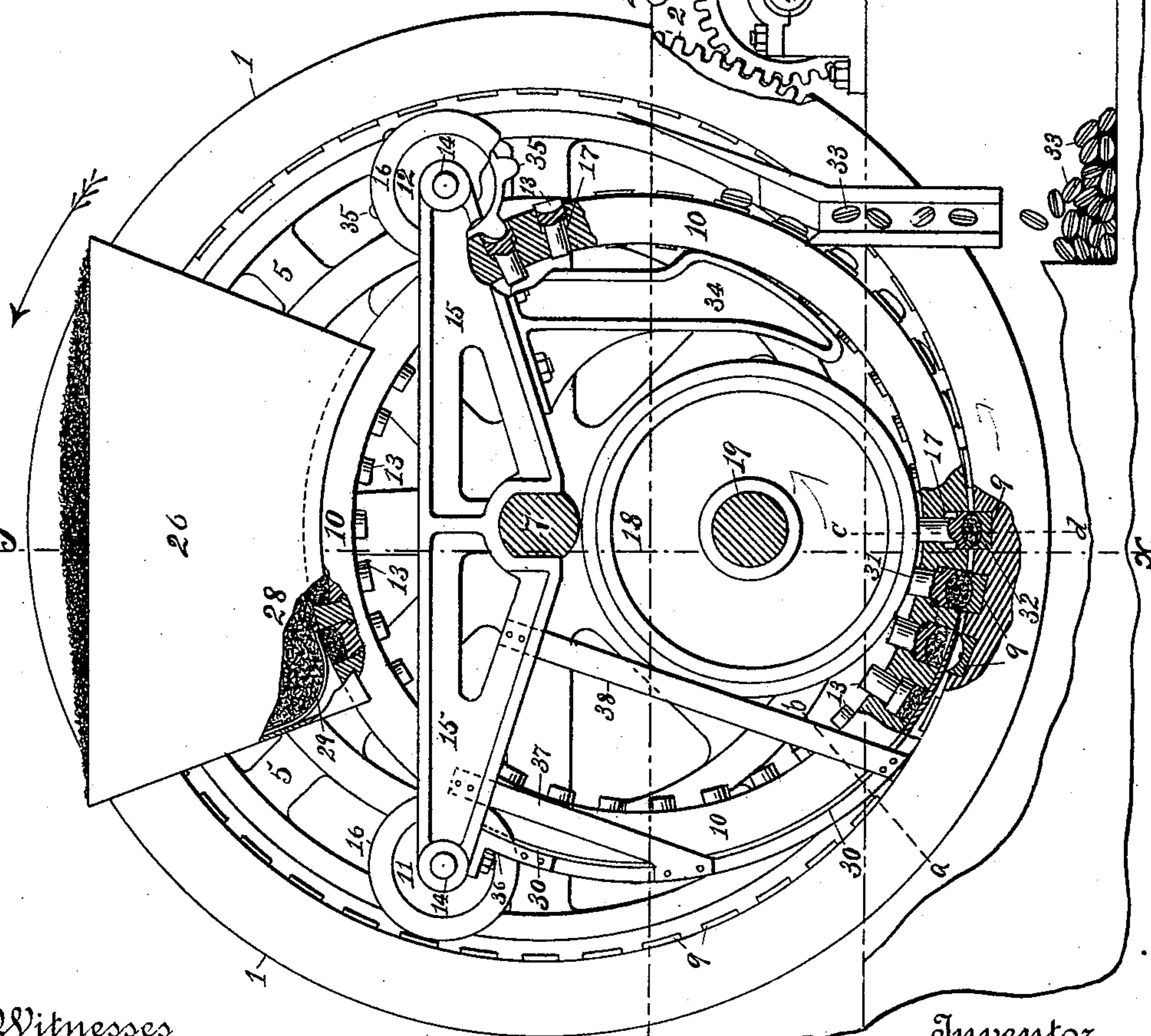


Fig. I.



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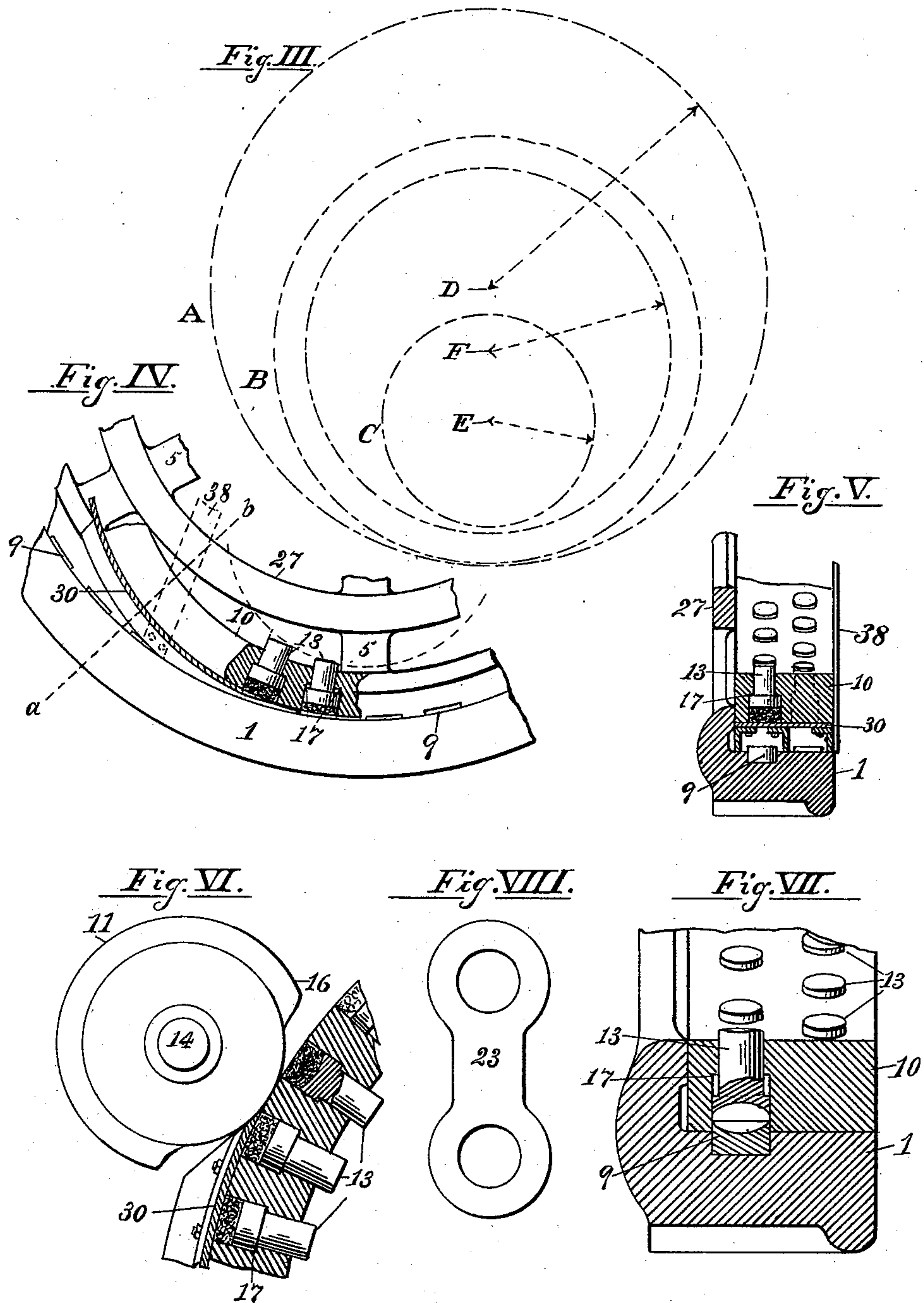
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UNITED STATES PATENT OFFICE.

EDWARD S. COBB, OF SAN FRANCISCO, CALIFORNIA.

FUEL-COMPRESSING MACHINE.

SPECIFICATION forming part of Letters Patent No. 614,200, dated November 15, 1898.

Application filed November 2, 1897. Serial No. 657,195. (No model.)

To all whom it may concern:

Be it known that I, EDWARD S. COBB, a citizen of the United States, residing at San Francisco, county of San Francisco, and State of California, have invented certain new and useful Improvements in Fuel-Compressing Machines; and I hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to compacting, pressing, and molding into convenient forms, commonly called "briquets," culm or comminuted coal, preferably when mixed with some adhesive substance to bind or cement the material together, and also relates to compressing and molding by the same means any other suitable substance.

My improvement consists in a novel and effectual means of securing the required pressure by a rolling action and in such manner that the strains are inherent in the operating parts and not communicated to a supporting-frame, as is common in machines of this class, the essential elements being three revolving parts moving in one plane, but eccentric to each other, the outer and inner members receiving the strains caused by the compression, and an intermediate member rolling or turning between these, supporting and guiding movable plungers or pistons that act upon the material; also, in so arranging the parts that the maximum pressure is effected by opposing forces acting in the same straight line, radial to both the outer and inner members above mentioned.

My improvements further consist of various accessories and devices of a constructive and operative nature, in combination with the revoluble members before named, as will be particularly pointed out in connection with the description to follow, and by illustration in the drawings herewith and forming a part of this specification.

The objects of my invention are to provide a machine that will rapidly and effectually compress and mold fuel-briquets of comminuted material, the required pressure being cumulative by means of rolling action, to dispense with the usual framing required to resist and absorb the compressing strains, to

reduce the machine to a few simple elements or parts, to avoid reciprocating motion in the pressure-producing mechanism, and to attain rapid and continuous performance of the process.

In machinery for compressing and molding plastic or other substances the main or supporting members of the machinery are commonly fixed and the movable or operating parts interposed between the fixed supports and the material operated upon. By my improved method the main members are also the operating parts performing the function of abutment or support integrally between each other.

The principle or method of operating is illustrated in Figure III of the drawings, the circles A, B, and C representing the three essential parts. The outer circle A and the inner circle C represent the compressing members, the strains tending to force the axes D and E together, and B represents the intermediate or neutral member that sustains the movable part of the molds through which force is applied to the material, the member B being annular without axial support and in effect a continuous carriage interposed between the members A and C.

Referring to the drawings, Fig. I is a front elevation, partially in section, of a compressing and molding machine constructed according to my invention, some of the parts being omitted to render the illustration more clear. Fig. II is a vertical section of the same machine, taken on the line *xx* in Fig. I and at a right angle thereto. Fig. III is a diagram illustrating the principle or mode of the machine's operation. Fig. IV is an enlarged detail of Fig. I, showing the parts where the compressing operation begins. Fig. V is a section on the line *ab* in Fig. IV. Fig. VI is an enlarged detail of Fig. I, showing the method of retaining the loose charges of material before being compressed. Fig. VII is an enlarged section on the line *cd* in Fig. I. Fig. VIII is a flat or side view of one of the struts between the axes of the compressing-wheels.

Similar letters and numerals of reference are applied to corresponding parts in the different figures of the drawings.

Referring first to the constructive features

of the machine, and especially to Figs. I and II, the main member is the external revolving wheel 1, representing the element A in the diagram Fig. III. This wheel is made with
 5 a rim of strong section, having in its periphery teeth 2, engaged and driven by a pinion 3 on a shaft 4, to which the driving power is applied. The rim of the main wheel 1 is overhung, as seen in Fig. II, and is supported
 10 by the spokes 5 and a nave or boss 6, that turns loosely on a fixed shaft 7, the latter supported and keyed fast in strong bearings 8, only one of which is shown in the drawings. On the interior of the rim of this main
 15 wheel 1 are set one or more rows of dies 9, accurately spaced circumferentially and staggered transversely, as seen in Figs. IV and V. Two rows of the dies 9 are shown in the present machine; but it will be obvious that
 20 a greater or less number of rows can be employed, according to the required capacity of a machine.

Referring next to the second main operating part of the machine, the annular wheel
 25 or ring 10 represents the element B in the diagram Fig. III. This member rests at the bottom upon and is supported by the rim of the main wheel 1 and is held in its relative position by means of the two bearing-wheels
 30 11 and 12, so as to revolve about its geometric center F. Through the rim of this annular wheel or ring 10, moving in properly-made holes or chambers, are placed rows of movable pistons or plungers 13, accurately spaced
 35 so as to coincide with the dies 9 in the rim of the main wheel 1, as seen at the bottom in Fig. I. The bearing and guiding wheels 11 and 12 revolve loosely on studs 14, fixed in a strong frame 15, attached at the center to
 40 the stationary shaft 7, as seen in Fig. I.

The bearing-wheels 11 and 12 are provided with flanges 16 to guide the ring-wheel 10 in a true plane at the top and against a face
 45 formed by the supplementary rim 27 on the wheel 1, as seen in Fig. II. The wheel 12, besides acting as a guide for the annular ring 10, also performs the office of moving the pistons or plungers 13, as will be explained farther on.

50 The wheel 18, corresponding to the element C in the diagram Fig. III, revolves about the axis E on a strong shaft 19, supported in standards 20, of which one is shown in Fig. II. This wheel 18, which receives the thrust
 55 in compressing the briquets, is of a strong section covered by a band or tire 21 and turns loosely on the shaft 19. Both this wheel and the main wheel 1 have removable bushings 22, that can be replaced in case of wear.

60 The shafts 7 and 19, it will be seen, are subjected to the strains of compression, falling first on the outer wheel 1 and the inner wheel 18, tending to press these shafts together or toward each other. To withstand such strain,
 65 I employ two struts 23 24, one on each side of the wheel 18, that receive all the operating strains, so the supports 8 and 20 and the

foundations 40 25 do no more than support the weight of the structure, all the other strains being integral, and the usual framing of such
 70 machines, commonly the main part, is thus dispensed with.

Having now described the main operating parts of the machine, I will proceed to explain the manner of its operation and the remain-
 75 ing details in connection therewith.

A hopper 26, which is open at the bottom, fits closely around the periphery of the ring-wheel 10 at its top and is kept filled with prepared material. The main wheel 1 is set in
 80 motion, moving the wheel 10 therewith positively, because of the engagement of the dies 9 at the bottom, which enter slightly the rim of the ring-wheel 10, as seen in Fig. VII, and act like teeth of a spur gear-wheel. The pis-
 85 tons 13 being at the top of the ring-wheel 10 and pushed inward so as to rest on the shoulders 17 leave above each a chamber large enough to receive a charge of the material while passing beneath the hopper 26. A
 90 scraper 29 strikes off the charges flush with the periphery of the ring-wheel 10, as seen at 28 in Fig. I. From 28 the charges pass on beneath the guiding-wheel 11, at which point begins a segmental plate or guide 30, (shown
 95 more clearly in Figs. IV and VI,) that confines the charges and prevents the material from falling out as it passes downward to the point where the outward or compressing movement of the pistons 13 begins. This guide-
 100 plate 30 is supported by angle-irons, as shown in the section Fig. V, and is attached to the frame 15 by brackets or braces 36, 37, and 38, as seen in Fig. I. At the point 31 the inner ends of the pistons 13 come in contact with
 105 the wheel 18, which is given a rolling action thereby, forcing the pistons 13 outward and compressing the charges 32, compacting them into briquets 33. The pistons then move on until their inner ends come in contact with a
 110 strong cam-faced guide 34, attached to the frame 15, which presses the pistons 13 outward, discharging the completed briquets 33, as seen in Fig. I. The wheel 10 then moves on until the pistons 13 come in contact with
 115 the teeth or projections 35 on the guiding-wheel 12, which being accurately spaced fit into and press inward the pistons 13, ready to receive a new charge while passing beneath or through the hopper 26. Thus, it may be
 120 seen, the operation of the machine is automatic, each revolution of the main wheel 1 producing as many molded briquets as it contains dies 9.

Having thus explained the nature and ob-
 125 jects of my invention and the manner of its application and operation, what I claim as new, and desire to secure by Letters Patent, is—

1. In a briquet-machine, an outer main wheel having an overhung rim, means for ro-
 130 tating the same, a ring-wheel mounted within said overhung rim, resting upon the same, plungers set at intervals in said ring-wheel, and an inner wheel mounted within said ring-

wheel near enough to the latter to compress the said plungers as they are carried in succession between said inner wheel and said outer-wheel rim, substantially as specified.

5 2. In a briquet-machine, a fixed shaft, an outer main wheel thereon, having an overhung rim, means for rotating said wheel, a ring-wheel mounted within said overhung rim, resting upon the same, plungers set at
10 intervals in said ring-wheel, an inner wheel mounted on a fixed shaft within said ring-wheel, said inner wheel near enough to the latter to compress the said plungers as they are carried in succession between said inner
15 wheel and said outer-wheel rim, and struts between the shafts of said outer and inner wheels, maintaining the same at a fixed distance apart under strains, substantially as specified.

20 3. In a briquet-machine, an outer main wheel having an overhung rim with dies at intervals on the inner periphery thereof, means for rotating the same, an inner wheel mounted within said overhung rim and eccentrically thereto, and a series of plungers
25 matching said dies, with means for supporting said plungers in a continuous circuit, whereby they may come in succession between said main-wheel rim and said inner wheel at their narrowest point of approach
30 and be compressed thereby during the revolution of said wheels, substantially as specified.

4. In a briquet-machine, an outer main
35 wheel having an overhung rim, with dies at intervals on the inner periphery thereof, means for rotating the same, a ring-wheel mounted within said overhung rim, resting upon the same, plungers set at intervals in
40 said ring-wheel matching said dies, and an inner wheel mounted within said ring-wheel near enough to the latter to compress the said plungers as they are carried in succession between said inner wheel and said outer-wheel
45 rim, substantially as specified.

5. In a briquet-machine, a fixed shaft, an outer main wheel thereon having an overhung rim with dies at intervals on the inner periphery thereof, means for rotating said
50 wheel, an inner wheel mounted on a fixed shaft eccentrically to said outer wheel, within said overhung rim, struts 23, 24 between said shafts, and a ring-wheel carrying plungers, mounted within said overhung rim, and
55 encompassing said inner wheel, so as to pass between the inner and outer wheels, whereby the said plungers are operated during the said passage, substantially as specified.

6. In combination, an outer main wheel,
60 having an overhung rim with a series of equally-spaced dies on the inner periphery thereof, means for rotating the same, an inner wheel mounted eccentrically within said overhung rim, a ring-wheel eccentric to said
65 main wheel and said inner wheel, passing between the same, and having plungers spaced so as to coincide with the dies in the overhung

rim, the said ring-wheel being driven positively by the movement of said main wheel, substantially as specified.

7. In combination, an outer main wheel on a fixed shaft, said wheel having an overhung rim with dies on the inner periphery thereof, means for rotating the same, an inner wheel
70 mounted eccentrically to said outer wheel within said overhung rim, a ring-wheel bearing plungers at intervals matching said dies, and arranged to rotate eccentrically to said main-wheel rim and said inner wheel and pass
75 between the same, fixed frame 15 borne on said fixed shaft and guiding-wheels 11, 12, sustained on said fixed frame, whereby the said ring-wheel is sustained so as to rotate in one plane, substantially as specified.

8. In combination, an outer main wheel
85 having an overhung rim, with dies on the inner periphery thereof, means for rotating the same, an inner wheel mounted within said rim eccentrically thereto, a ring-wheel mounted eccentrically to said main and inner wheels,
90 passing between them, guiding-wheels 11, 12, for sustaining said ring-wheel, means for supporting said guiding-wheels, equidistantly-spaced plungers in said ring-wheel, and projections 35 on said guiding-wheel 12, spaced
95 so as to intermesh with said plungers as the ring-wheel revolves, and thereby force them inward, substantially as specified.

9. In combination, an outer main wheel
100 having an overhung rim, with dies on the inner periphery thereof, means for rotating the same, an inner wheel mounted within the said rim eccentrically thereto, a ring-wheel mounted eccentrically to said main-wheel rim and said inner wheel and passing between them,
105 equidistantly-spaced chambers in said ring-wheel, plungers in said chambers, and means for supplying comminuted material to said spaced chambers in the ring-wheel at the upper part of its rotation, substantially as specified.

10. In combination, an outer main wheel
115 having an overhung rim, with dies on the inner periphery thereof, means for rotating the same, an inner wheel mounted within the said rim eccentrically thereto, a ring-wheel mounted eccentrically to said main wheel and said inner wheel and passing between them, equidistantly-spaced chambers in said ring-wheel, plungers in said chambers, a charging-hopper
120 26, and a scraper 29 to scrape and level the charges, substantially as specified.

11. In combination, an outer main wheel
125 having an overhung rim with dies on the inner periphery thereof, means for rotating the same, an inner wheel mounted within the said rim eccentrically thereto, a ring-wheel mounted eccentrically to said main-wheel rim and said inner wheel and passing between them, equidistantly-spaced chambers in said ring-wheel, plungers in said chambers, means for
130 charging said chambers with material to be compressed, and a curved guard-plate 30 for preventing said material from falling out on

the downward-moving side of the ring-wheel, substantially as specified.

12. In combination, the outer main wheel having an overhung rim with dies in the inner periphery thereof, means for rotating the same, an inner wheel mounted eccentrically thereto, an intermediate ring-wheel provided with equidistantly-spaced chambers, plungers in said chambers, and a fixed cam 34, cooperating with said plungers to press them outward as the said ring-wheel revolves, substantially as specified.

13. In combination, the outer main wheel on a fixed shaft, having an overhung rim, means for rotating the same, an inner wheel mounted on a fixed shaft eccentrically to said

main wheel and within its overhung rim, a ring-wheel passing between said main-wheel rim and said inner wheel, struts 23, 24, extending between said fixed shafts 7, 19, to resist the strain and fixed bearings for said fixed shafts respectively, sustaining the whole apparatus, whereby the strains are all internal, substantially as specified.

In testimony whereof I have hereunto affixed my signature in the presence of two witnesses.

EDW. S. COBB.

Witnesses:

K. LOCKWOOD-NEVINS,
H. SANDERSON.