

No. 690,534.

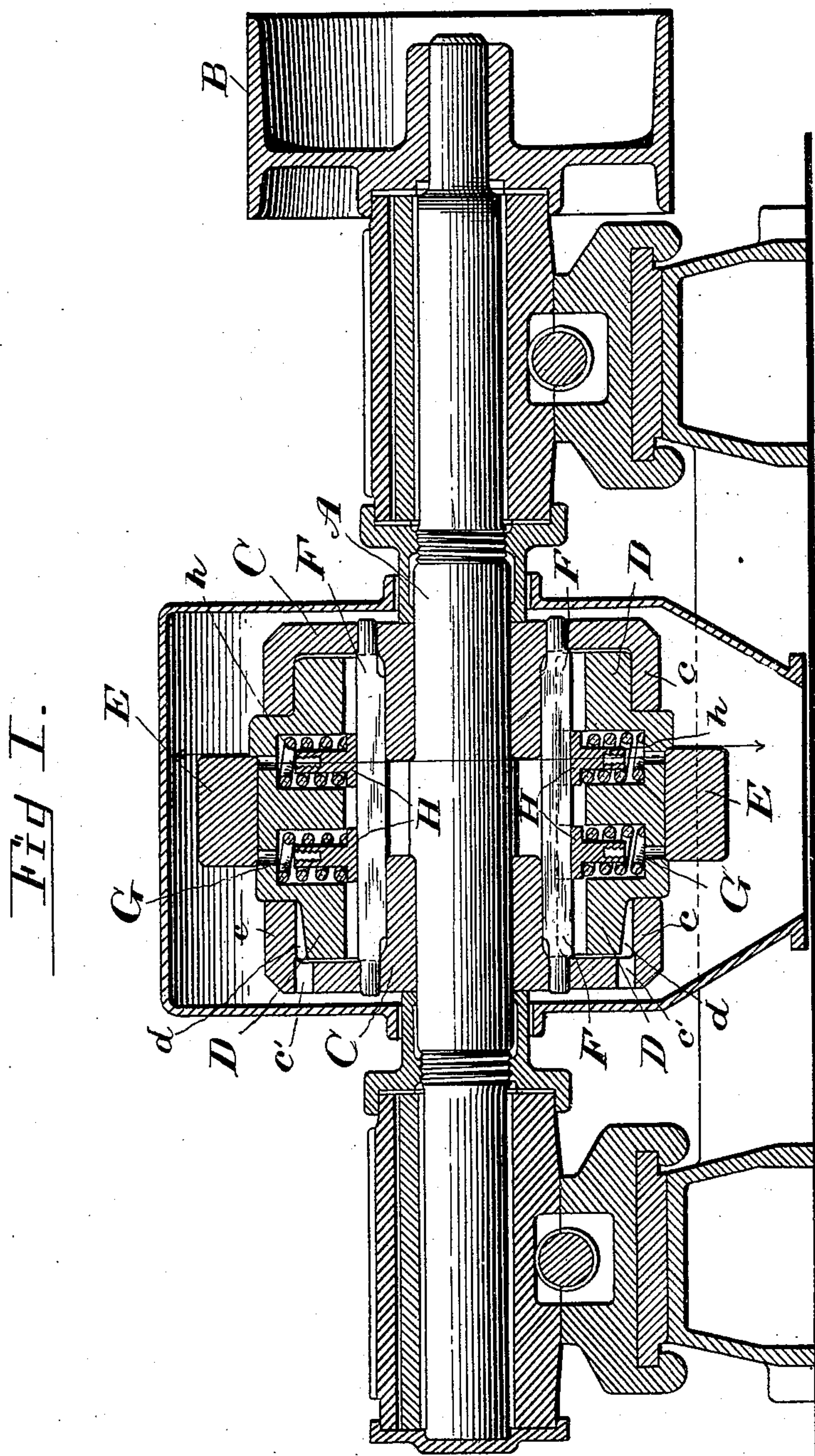
Patented Jan. 7, 1902.

T. L. & T. J. STURTEVANT.  
CRUSHING MILL.

(Application filed Dec. 28, 1900.)

(No Model.)

3 Sheets—Sheet 1.



Witnesses:

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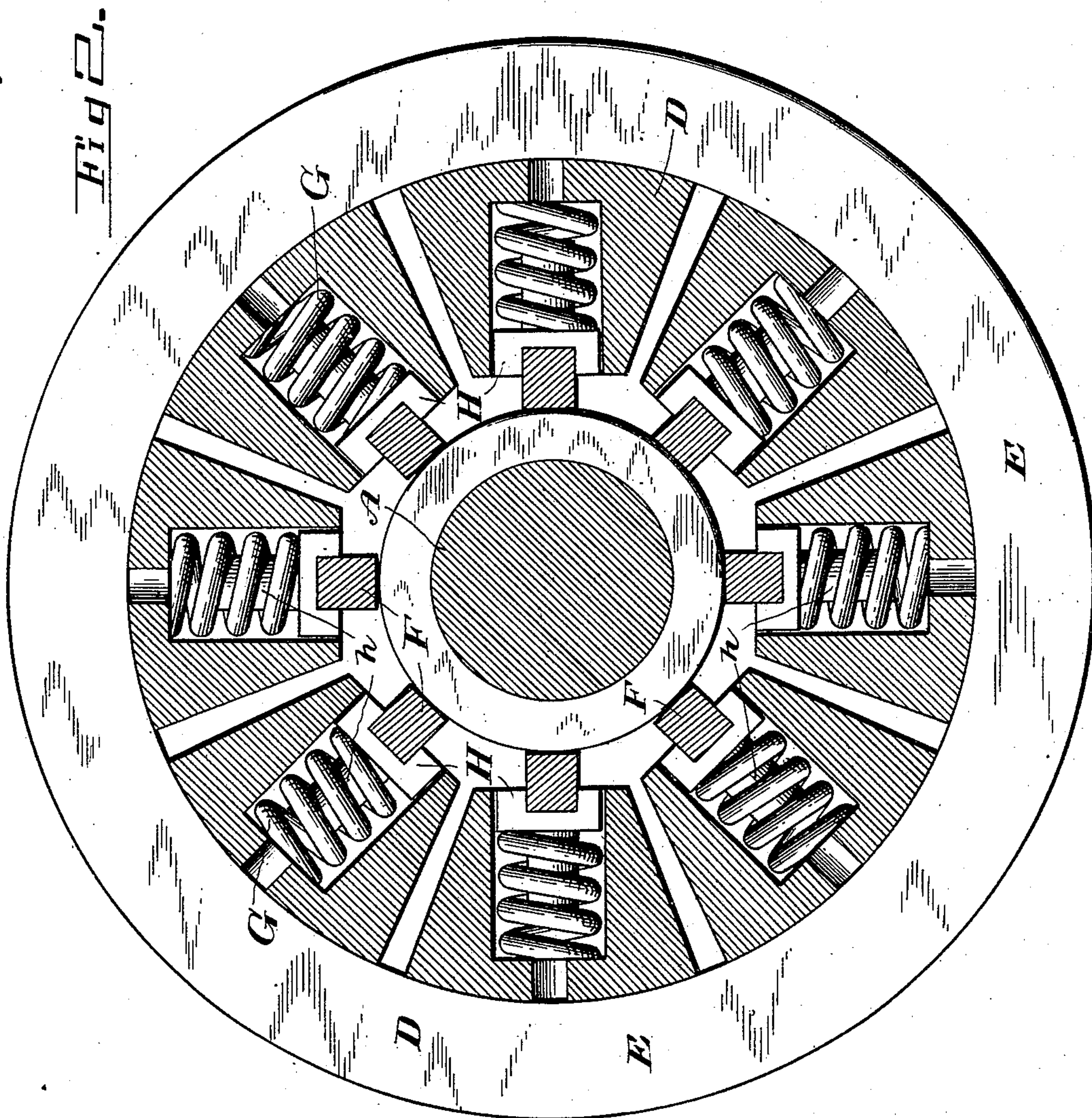
Patented Jan. 7, 1902.

T. L. & T. J. STURTEVANT.  
CRUSHING MILL.

(Application filed Dec. 26, 1900.)

(No Model.)

3 Sheets—Sheet 2.



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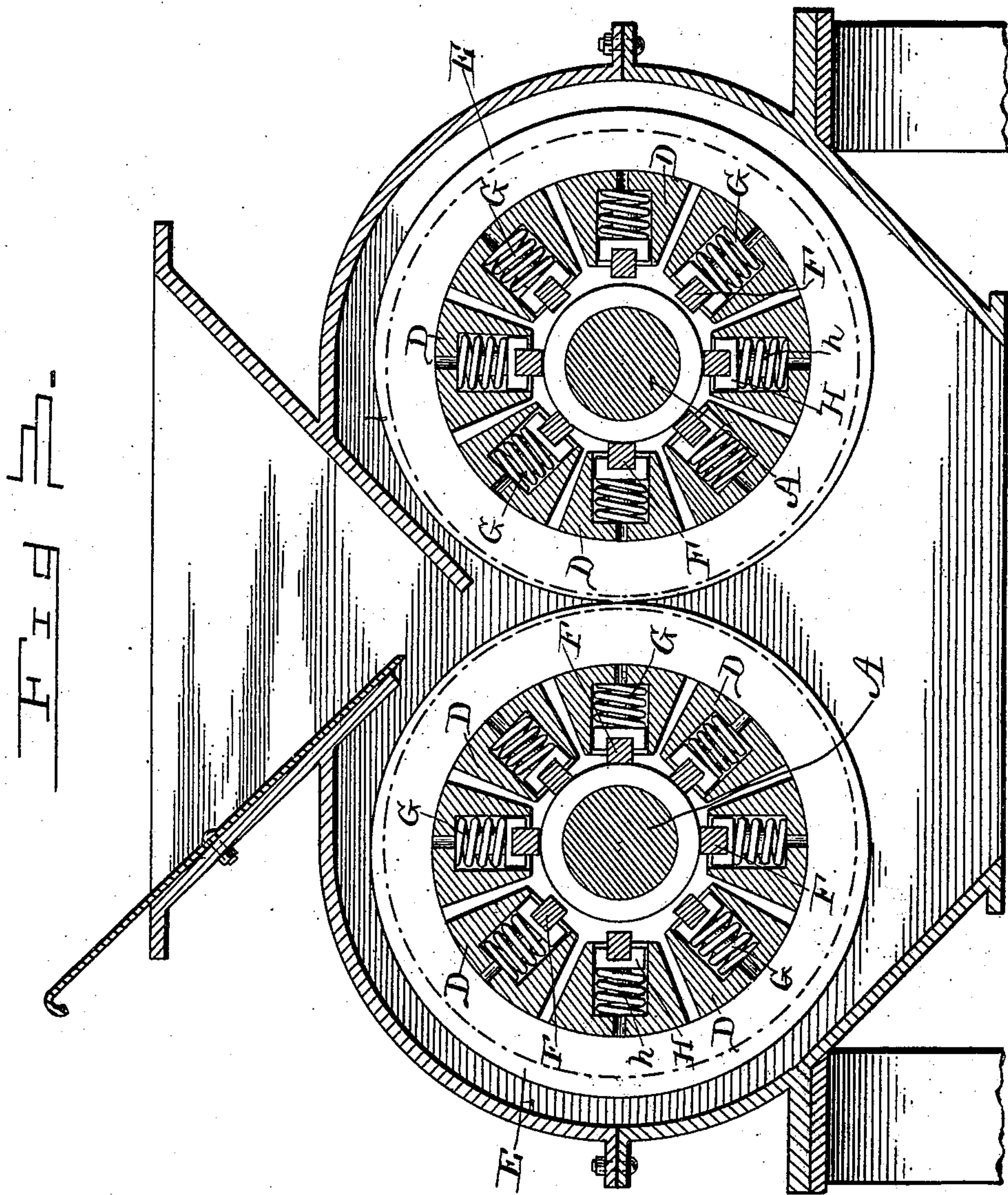
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3 Sheets—Sheet 3.



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# UNITED STATES PATENT OFFICE.

THOMAS L. STURTEVANT, OF QUINCY, AND THOMAS J. STURTEVANT, OF  
NEWTON CENTER, MASSACHUSETTS.

## CRUSHING-MILL.

SPECIFICATION forming part of Letters Patent No. 690,534, dated January 7, 1902.

Application filed December 26, 1900. Serial No. 41,026. (No model.)

*To all whom it may concern:*

Be it known that we, THOMAS L. STURTEVANT, residing at Quincy, in the county of Norfolk, and THOMAS J. STURTEVANT, residing at Newton Center, in the county of Middlesex, State of Massachusetts, citizens of the United States, have invented certain new and useful Improvements in Crushing-Mills, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to an improvement upon the form of crushing-mill shown and described in our Patent No. 642,017, dated January 23, 1900, and in which the crushing operation is effected between tires loosely mounted relative to the shafts by which they are carried and which tires are pressed outward or toward each other by the centrifugal action of loosely-mounted weights encircled by the tires, so that the crushing effect is due mainly to the pressure resulting from such centrifugal action. We have found in practice that while our improved crushing-mill referred to works admirably and without strain or excessive wear when in operation it is somewhat difficult to start the mill, owing to the fact that when the mill stops the centrifugal weights drop by gravity, so that the crushing-rolls are very much out of balance, and as the unbalanced weight of the rolls must be overcome in starting the mill considerable power is necessarily employed in the starting operation. In our improved mill we have provided springs, which serve to force the centrifugal weights yieldingly outward against the inner surface of the loose tires in such a manner that when the mill is stopped these springs will serve to retain the weights in their outward positions, being stiff enough for this purpose, and when the mill is running the weights will be pressed outward against the loose crushing-tires not only by centrifugal force, but also by the added pressure of the springs, which force the weights yieldingly against the inner faces of the tires. Thus these springs, combined with the centrifugal weights and loose tires, serve not only to keep the crushing-rolls balanced when the mill is stopped and to add to

the crushing centrifugal action of the weights, but owing to the fact that they are sufficiently stiff to afford a crushing pressure in themselves the mill may be run either fast or slow, as may be desired, as there will be for some classes of material sufficient crushing power resulting from the pressure of the springs when there is but little crushing power resulting from the centrifugal action of the weights, and it will even be possible to build a practical mill in which the weights are altogether omitted.

In the accompanying drawings, Figure 1 is a longitudinal section of our improved crushing-mill. Fig. 2 is a cross-sectional view of one of the improved crushing-rolls, and Fig. 3 is a longitudinal sectional view of a mill embodying our invention.

In the drawings, A denotes one of the mill-shafts, (two being employed in practice, as in our Patent No. 642,017 referred to,) said shaft being mounted in suitable bearings and being provided with a driving-pulley B.

Each of the improved crushing-rolls of the mill preferably comprises two heads C C, suitably attached to the shaft A and having inwardly-projecting peripheral flanges c, a circular series of centrifugal weights D, overlapped by the said flanges c, and a crushing-tire E, encircling the said weights and loosely mounted relative to the shaft A. The weights are apertured or grooved at their inner ends for the reception of pins or bars F, which serve to retain the said weights in properly-spaced positions, the ends of said pins or bars entering suitable holes in the heads C, so that said heads hold them in place. The weights D are also recessed for the reception of springs G, which are interposed between the pins F and the outer walls of the cavities or recesses in which said springs are located, so that said springs have a tendency to press the weights outward at all times against the loose tire E, and thereby keep the roll cylindrical and in a properly-balanced condition. In the form of the invention herein shown washers or blocks H, having pins or projections h, the ends of which are bored and tapped, are interposed between the springs G and the pins or bars F, these pins



or projections *h* serving to support and steady the springs and their recessed and threaded outer ends being adapted for the reception of screw-bolts, the heads of which will be outside of the weights and by means of which the springs may be somewhat compressed to enable the weights to be placed in position. The weights are also preferably provided at one or both sides with tapering recesses *d*, opposite to which are openings *c'* in the heads C, these openings and tapering recesses being for the reception of wedges to be driven through said openings and against the weights for the purpose of compressing the springs and forcing the weights slightly inward when the loose tire E is to be placed in position on the roll.

A crushing-roll constructed as above described may be used either in connection with a similarly-constructed crushing-roll or with a plain cooperating crushing-roll. Fig. 3 illustrates in sectional view a mill provided with two of our improved crushing-rolls and showing their operative relation to each other, with the tires E forced to positions somewhat eccentric to the shafts A, with which said tires are loosely connected, the springs G on the sides of the rolls adjacent to each other being somewhat compressed, thereby adding to the centrifugal crushing pressure of the weights.

From the foregoing it will be understood that in the operation of a mill embodying our improved crushing-rolls the loose crushing-tires will be forced yieldingly outward toward each other and against the material to be crushed between them not only by the centrifugal action of the weights D, but also by the added pressure of the springs G, which latter will also serve when the mill is stopped to keep the crushing-rolls in balanced condition by holding the weights at all times outward against the tires, so that the mill may be started without requiring excessive power to overcome the inertia of what would otherwise be the unbalanced crushing-rolls, in which the weights would fall out of balanced condition by gravity when the mill is stopped.

We do not wish to be understood as limiting our invention to the details herein shown and described, as these details may be varied widely without departing from the spirit of our invention. Also the invention is not necessarily limited to the use of the centrifugal weights, as for some kinds of work loose-tire crushing-rolls from which the weights are omitted and in which the tires are held in place only by stiff springs might be employed.

The term "loose" as used in this specification and the claims thereof and referring to the tire E will be understood to mean a tire which is loose relative to the shaft by which it is carried in that it has no rigid connection with said shaft, but only a frictional connection therewith through the springs and centrifugal weights or through the springs alone if the centrifugal weights be omitted, although

the springs will be sufficiently stiff so that the said tire may not be so loose as are the tires of the mill shown and described in our Patent No. 642,017, hereinbefore referred to.

Having thus described our invention, we claim and desire to secure by Letters Patent—

1. A centrifugal crushing-roll comprising the combination with a circular series of centrifugal weights, of a loose tire encircling said weights, and springs for yieldingly forcing said weights outward against the inner face of said tire and thereby serving, in cooperation with said tire, to normally hold said weights concentric with the shaft of the roll when the latter is at rest as well as when it is in rotation.

2. A centrifugal crushing-roll comprising the combination with two end heads having inwardly-projecting flanges, of a circular series of centrifugal weights overlapped by said flanges, a loose tire encircling said weights, and springs for forcing said weights outward against the inner face of said tire and against said flanges, to normally hold the weights concentric with the roll to balance the latter.

3. A centrifugal crushing-roll comprising the combination with two end heads, of a circular series of centrifugal weights, a series of pins or bars held in place by said heads and engaging said weights to retain them in their proper positions, a loose tire encircling said weights, and springs for yieldingly forcing said weights outward against the inner face of said tire and against said flanges, to normally hold the weights concentric with the roll and thus balance the latter when at rest.

4. A centrifugal crushing-roll comprising the combination with two end heads C, C, having inwardly-projecting peripheral flanges *c*, *c*, of a circular series of weights overlapped by the said flanges, a series of pins or bars held in place by said heads and engaging said weights to retain them in proper position, a tire encircling said weights and which tire is loose relative to the roll-shaft, and springs for yieldingly forcing said weights outward against the inner face of said tire to maintain the weights normally in position to balance the roll.

5. In a centrifugal crushing-mill, the combination with a roll the acting face or part of which consists of a single tire which is loose relative to the shaft by which said roll is carried, a circular series of weights within said tire, and a series of springs interposed between said weights and the roll-shaft and exerting their pressure to hold said weights against the inner face of said tire to keep the latter and said weights in proper position, of an opposing roll outside of said tire and between which and the yieldingly-mounted tire of the first-named roll the material is to be crushed.

6. A centrifugal crushing-mill comprising two cooperating crushing-rolls both of which have tires which are loose relative to the shafts by which said rolls are carried, combined with centrifugal weights within said



5 tires, springs interposed between said weights and the roll-shafts and exerting their pressure to hold said weights outward against the inner faces of said tires, to keep the latter in proper position and also to keep the said rolls balanced when at rest as well as when running.

In testimony whereof we affix our signatures in presence of two witnesses.

THOS. L. STURTEVANT.

THOMAS J. STURTEVANT.

Witnesses:

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