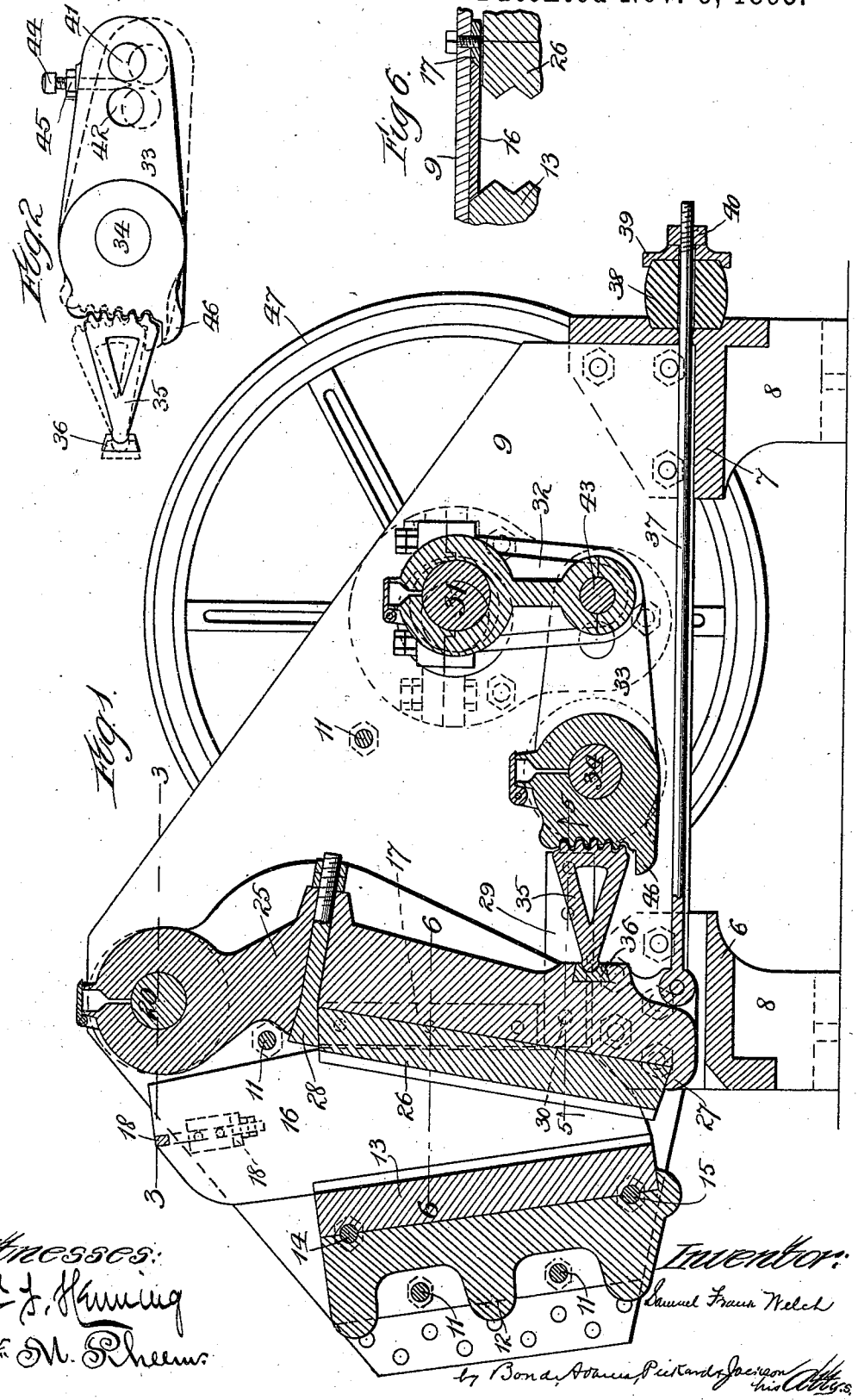
(No Model.)

2 Sheets—Sheet 1.

S. F. WELCH.

STONE CRUSHER.

No. 549,263. Patented Nov. 5, 1895.



Witnesses:
Wm. F. Fleming
Wm. N. Sheems.

Inventor:
Samuel Francis Welch
by Bond, Adams, Pickard & Jackson
his Attys.

(No Model.) 2 Sheets—Sheet 2.

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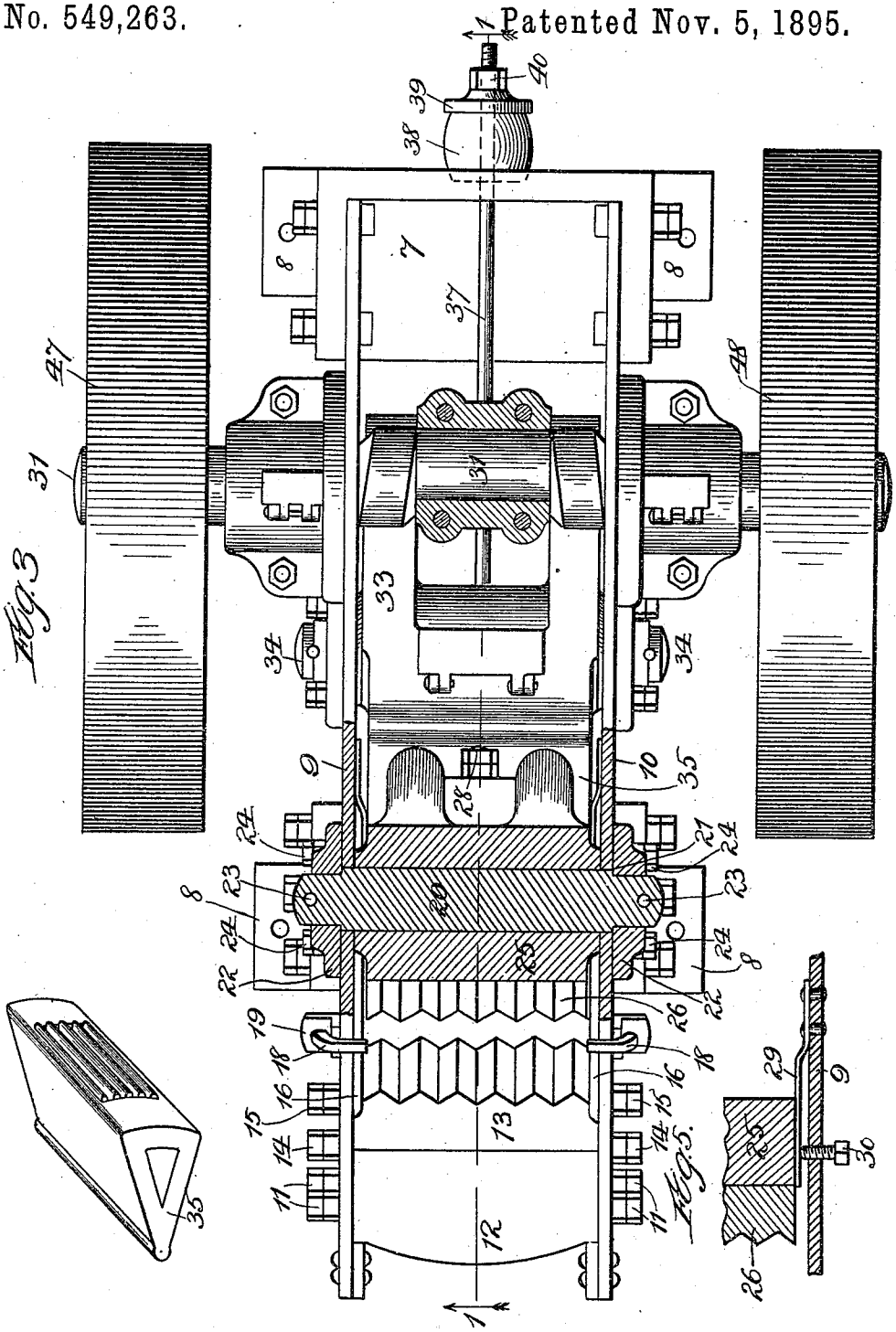

Fig. 3.

Fig. 4.

Fig. 5.

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UNITED STATES PATENT OFFICE.

SAMUEL FRANK WELCH, OF AURORA, ILLINOIS, ASSIGNOR TO THE WESTERN WHEELED SCRAPER COMPANY, OF SAME PLACE.

STONE-CRUSHER.

SPECIFICATION forming part of Letters Patent No. 549,263, dated November 5, 1895.

Application filed February 20, 1894. Serial No. 500,903. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL FRANK WELCH, a citizen of the United States, residing at Aurora, Kane county, Illinois, have invented certain new and useful Improvements in Stone-Crushers, of which the following is a specification, reference being had to the accompanying drawings, in which—

Figure 1 is a longitudinal vertical section on line 1 1 of Fig. 3. Fig. 2 is a detail, being a side elevation of the mechanism for operating the crusher. Fig. 3 is a plan view, part being in section. Fig. 4 is a perspective view of the thrust-block. Fig. 5 is an enlarged detail, being a partial horizontal section on line 5 5 of Fig. 1. Fig. 6 is an enlarged detail, being a section on line 6 6 of Fig. 1.

My invention relates to stone-crushers, and has for its object to provide an improved crusher which will be particularly adapted for heavy work and which will also have a great capacity.

Another object is to improve the construction of stone-crushers in general.

I accomplish these objects as hereinafter specified and as illustrated in the drawings. That which I regard as new will be set forth in the claims.

In the drawings, 6 7 indicate base-plates provided with legs 8, as shown in Fig. 1.

9 10 indicate side plates, which are supported by the base-plates 6 7, which side plates are adapted to support the working parts of the machine.

11 indicates a series of strengthening-rods which connect the side plates 9 10 at different points, as shown in Fig. 1.

12 indicates a fixed head or jaw which is secured between the side plates 9 10 at one end of the machine, and carries a face-plate or die 13, as shown in Fig. 1. The face-plate 13 is in part secured to the head 12 by rods 14 15, which are fitted in semicircular depressions in the head and face plate and are secured to the side plates 9 10, thereby preventing vertical movement of the face-plate 13. The face-plate 13 is further secured in place by side plates 16, one at each side, which side plates fit between the end portions of the face-plate and strips 17, which are secured to the side plates 9 10, as best shown in Fig. 6, and by dotted lines in Fig. 1. The edges of the strips 17, which are next to the plates 16, are beveled so as to form a groove which receives one edge of said side plates 16, thereby holding said side plates in place and preventing the face-plate 13 from becoming displaced, as best shown in Fig. 6. The side plates 16 are held down in position by bolts 18, having hooks at their upper ends, which are secured in brackets 19, secured to the side plates 9 10, as shown in Figs. 1 and 3. The curved upper ends of the bolts 18 fit over the upper ends of the plate 16, as shown in Figs. 1 and 3.

20 indicates a shaft, which is mounted between the side plates 9 10 at the upper portion thereof, as shown in Fig. 1. As shown in Fig. 3, the ends of the shaft 20 project beyond the side plates 9 10, which ends are turned down or reduced slightly, forming shoulders 21. Mounted upon the ends of the shaft 20 are plates or washers 22, which fit closely upon the shaft. 23 indicates pins passing through the shaft 20, as shown in Fig. 3. By this construction the shaft 20 serves to prevent the side plates 9 10 from spreading, and as the plates 22 are secured to the side plates 9 10 by bolts 24, they serve to prevent the side plates 9 10 from approaching each other, owing to the fact that they bear against the shoulders 21, as shown in Fig. 3.

25 indicates a swinging head or jaw, which is pivoted upon the shaft 20 and carries a face-plate or die 26, which is so placed as to be opposite the face-plate 13. The lower end of the face-plate 26 rests upon a lip 27, while its upper end is secured by wedge-bolts 28, as shown in Fig. 1. The shape of the head 25 is such that the face-plates 13 26 will lie at an angle to each other, forming a hopper. By this construction, by swinging the head 25 back and forth the material between the face-plates will be crushed, the greatest movement being secured at the lower portion or throat of the hopper. In order to prevent lateral movement of the jaw and to secure an easier and steadier movement I provide at each side

of the head 25 a spring-plate 29, one end of which is rigidly secured to the adjacent side plates 9 or 10, the other ends of said plates being offset and bearing against the adjacent side of the head 25, as shown in Fig. 5. A set-screw 30 is provided opposite each spring-plate 29, by means of which the action of such plates may be regulated.

31 indicates a crank-shaft, which is journaled between the opposite side plates 9 10, as shown in Fig. 1. 32 indicates a pitman, which is pivoted to the crank-shaft and is connected at its lower end to a rocking lever 33, pivoted upon a shaft 34, which is also mounted between the side plates 9 10. The arrangement is such that by rotating the crank-shaft the rocking lever 33 will be rocked.

By referring to Figs. 1 and 2 it will be noted that the face of the lever 33 is of the form of a double cam, being curved on the arc of a circle whose center lies beyond the extremity of the lever and is in line with the longitudinal axis thereof.

The numeral 35 indicates a substantially triangular or segmental thrust-block, which is arranged between the rocking lever 33 and the swinging head 25. As best shown in Fig. 1, the apex of the thrust-block 35 has a bearing in the head 25, a bearing-plate 36 being preferably provided, and the opposite face of said thrust-block bears against the cam-face of the rocking lever 33. In order to secure the best results a portion of the bearing-faces of the lever 33 and thrust-block 35 are ribbed, as best shown in Figs. 2 and 4.

When the crank 31 is rotated the lever 33 is rocked, bringing the upper and lower portions of the bearing-faces of the thrust-block 35 and lever 33 into operation alternately, thereby swinging the head 25 toward the stationary head twice for each complete rotation of said shaft. Furthermore, the use of a segmental thrust-block in connection with the cam-faced operating-lever greatly increases the efficiency of the machine, as the head is operated with much greater power than in any construction heretofore used, as the points of contact of the thrust-block and lever are at all times in a straight or nearly straight line with the point of resistance, and the greatest effect is thereby given to the operation of the driving mechanism, thereby largely reducing the expenditure of power necessary. Friction and wear between the lever and thrust-block are also greatly reduced.

A further advantage is that by my improved construction the greatest power is had when the jaws are farthest apart, and consequently when the stone is larger and harder to crush. This is due to the fact that when the jaws are farthest apart the point at which the lever acts upon the thrust-block is nearer the fulcrum of said lever than at any other time.

I do not limit myself to the mechanism shown for rocking the lever, as my invention includes, broadly, the use of a segmental thrust-block with cam-faced actuating mechanism for rocking the same to operate the crusher-jaw.

The head 25 is swung away from the stationary head by means of a rod 37, which is connected at one end to the head 25, its other end passing through the end of the machine and carrying a thick rubber washer 38, which bears against the end of the machine. A cap 39 is secured upon the rod 37 outside of the washer 38 by a nut 40. As the swinging head 25 is moved toward the stationary head, the washer 38 will be compressed and its elasticity will move the swinging head back as soon as the toggle mechanism permits it. I do not wish to limit myself to the use of this mechanism, however, for returning the head, as any other suitable mechanism may be employed.

As shown in Fig. 2, the lever 33 is provided with two holes 41 42, adapted to receive a pin 43 for the purpose of connecting the pitman 32 to said lever. By this means the point at which the pitman 32 is connected to said lever may be adjusted, thereby varying the stroke of said lever, as is desirable for crushing different kinds of material. In order that the pin 43 may be readily removed for the purpose of adjusting the lever 33, the holes 41 42 are made slightly larger than the diameter of said pin; but as this would be apt to interfere with the smooth working of the machine I bind the pin 43 tightly in place by means of a pin 44, which passes through a suitable hole in the lever 33 and projects between the holes 41 42, bearing against one side or the other of the pin 43 and firmly pressing it against the sides of the hole 41 or 42 in which it is placed, thereby securing smooth action. The pin 44 is held in place by a jam-nut 45.

If desired, the movement of the swinging head 25 may be varied by removing the thrust-block 35 and substituting another of larger or smaller size, and to support said thrust-block when being removed or put in place I provide the lever 33 with a lip or flange 46, which projects sufficiently so that it may be used for the purpose of supporting one edge of the thrust-block 35 when necessary.

47 48 indicate wheels which are mounted upon the ends of the crank-shaft 31 for the purpose of driving said shaft. A band may be placed around one of said wheels, the other serving as a balance-wheel.

I do not wish to limit myself to the use of thrust-block mechanism for operating the swinging jaw solely in connection with a stone-crusher in which one of the jaws is stationary and the other movable, as for certain purposes it might be found desirable to make both of the jaws movable.

That which I claim as my invention, and desire to secure by Letters Patent, is—

1. In a stone or ore crusher, the combination with a movable jaw, of a rocking lever having a concave face, a triangular thrust block operated thereby for moving said jaw, and an opposing jaw, substantially as described.

2. In a stone crusher, the combination with a movable jaw, of a lever having a double cam face, a segmental thrust block interposed between said lever and said jaw and operating to alternately engage the opposite cam portions of said double cam face, and an opposing jaw, substantially as described.

3. In a stone crusher, the combination with a stationary jaw, and a movable jaw, of a rotary shaft, a double cam faced rocking lever, and a segmental thrust block interposed between said rocking lever and said movable jaw whereby said mechanism will be adapted to effect two reciprocations of said jaw for each complete rotation of said shaft, substantially as described.

4. In a stone crusher, the combination with a movable jaw, of a lever having a double cam face, a segmental thrust block interposed between said lever and said jaw, whereby each cam portion of the double cam face of said lever operates to effect a reciprocation of the movable jaw, the adjacent faces of said lever and thrust block being partially ribbed, as shown and an opposing jaw, substantially as described.

5. In a stone crusher, the combination with a swinging jaw, of spring plates 29 arranged at each side thereof and adapted to bear against said jaw, substantially as described.

6. In a stone crusher, the combination with a swinging jaw, of spring plates 29 arranged at each side thereof and adapted to bear against said jaw, and means for adjusting said spring plates, substantially as described.

7. In a stone crusher, the combination with the side plates 9 and 10 and the stationary jaw 12 arranged between said plates and provided upon its face with semi-circular recesses, of a face plate 13, having semi-circular recesses upon its rear face adapted to register with the recesses on the stationary jaw, one or more rods, as 14 15, bolted to the side plates and disposed within the semi-circular recesses in the jaw and face plate and operating to hold said jaw and face plate in place and hold the side plates together, plates 17 secured to the inner faces of the side plates, and plates 16 arranged between the ends of said face plate 13 and the said plates 17, substantially as described.

8. In a stone crusher, the combination with the side plates 9 and 10 and the stationary jaw 12 arranged between said plates and provided upon its face with semi-circular recesses, of a face plate 13, having semi-circular recesses upon its rear face adapted to register with the recesses on the stationary jaw, one or more rods, as 14 15, bolted to the side plates and disposed within the semi-circular recesses in the jaw and face plate and operating to hold said jaw and face plate in place and hold side plates together, plates 17 secured to the inner faces of the side plates, plates 16 arranged between the ends of said face plate 13 and the plates 17, and hook bolts 18 for holding the plates 16 in place, substantially as described.

SAMUEL FRANK WELCH.

Witnesses:
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ALBERT H. ADAMS.