July 4, 1944. H. C. POLLITZ 2,352,970

CRUSHER

Filed Oct. 16, 1942 3 Sheets-Sheet 1

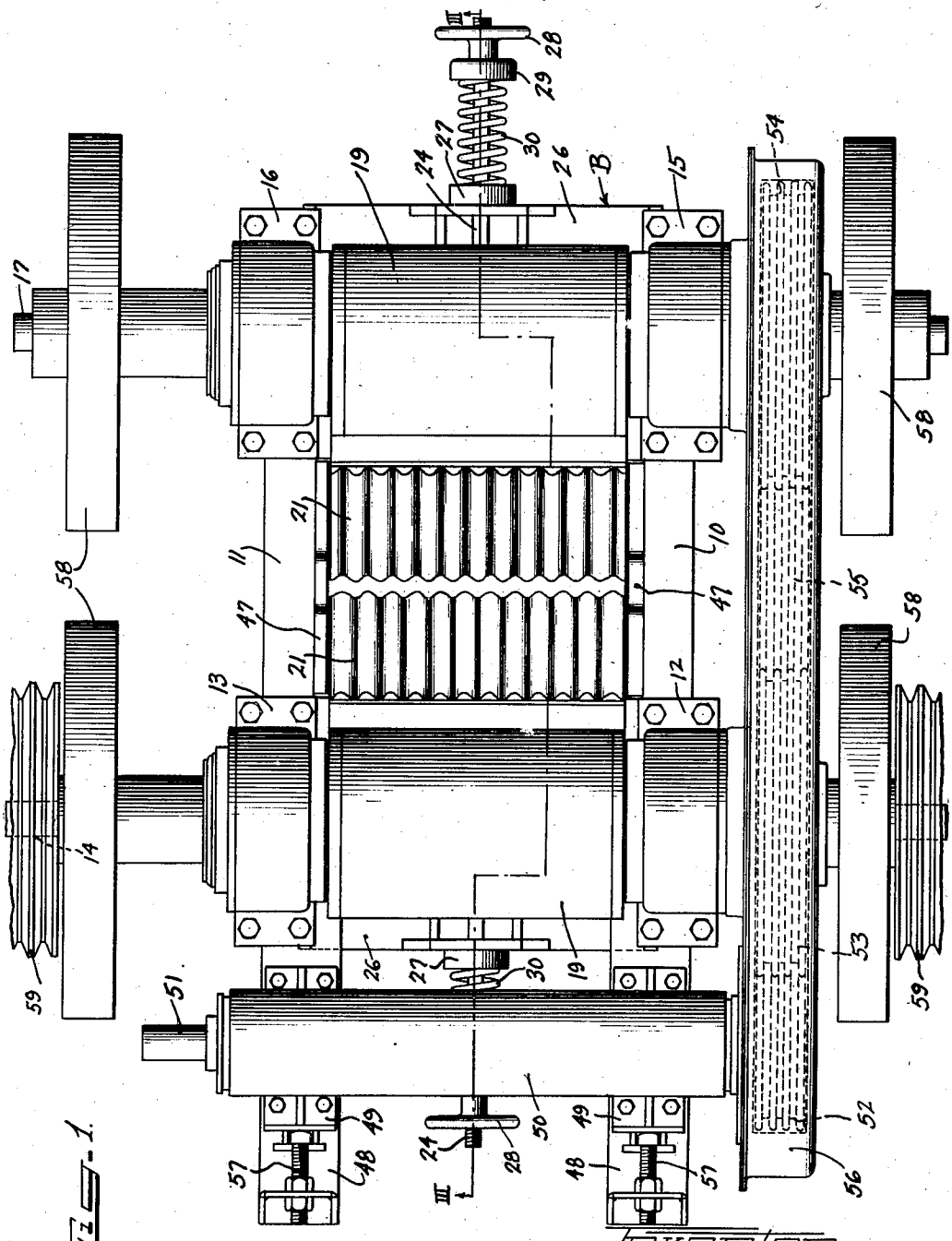


FIG. 1.

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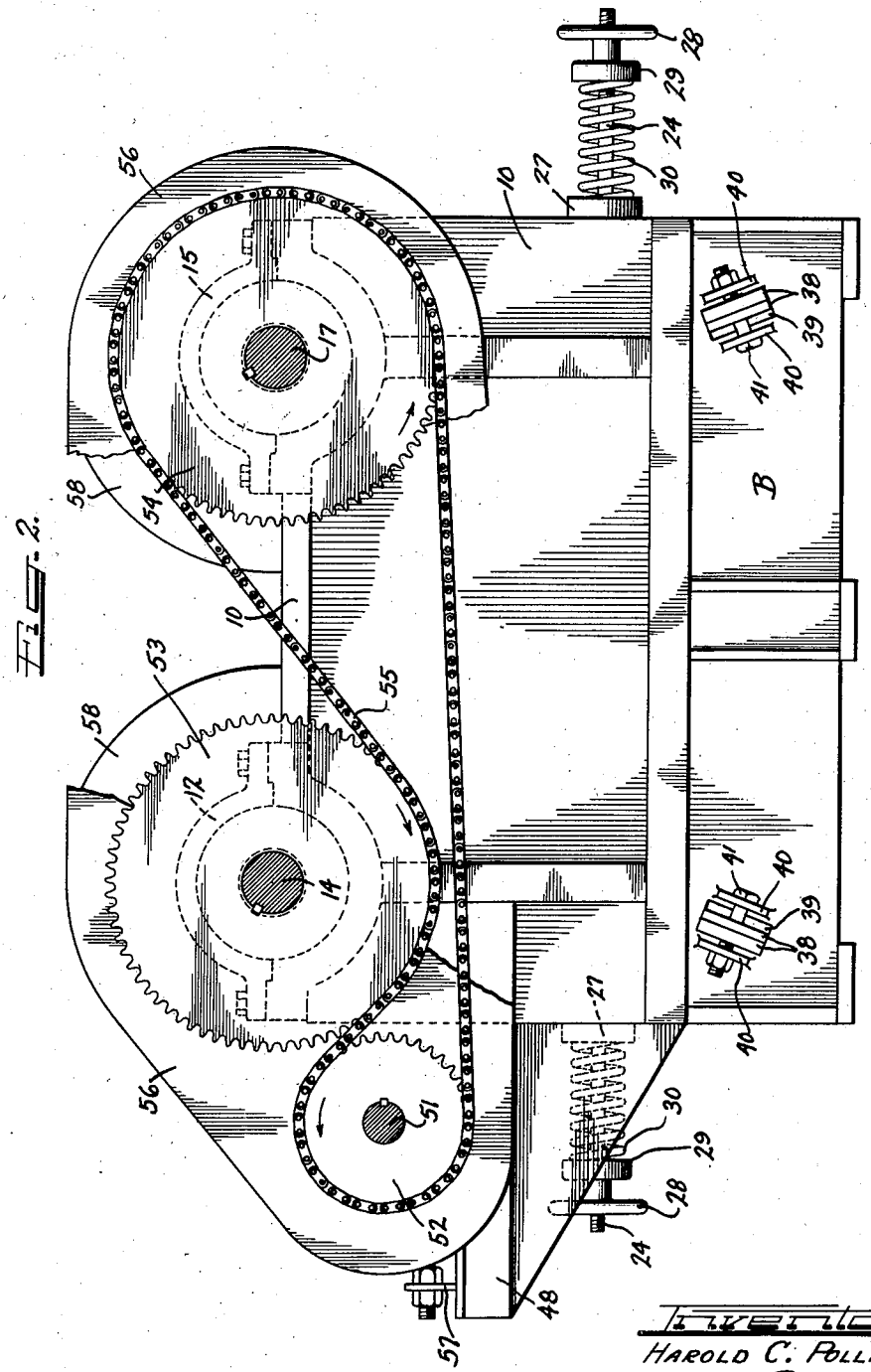


Fig. 2.

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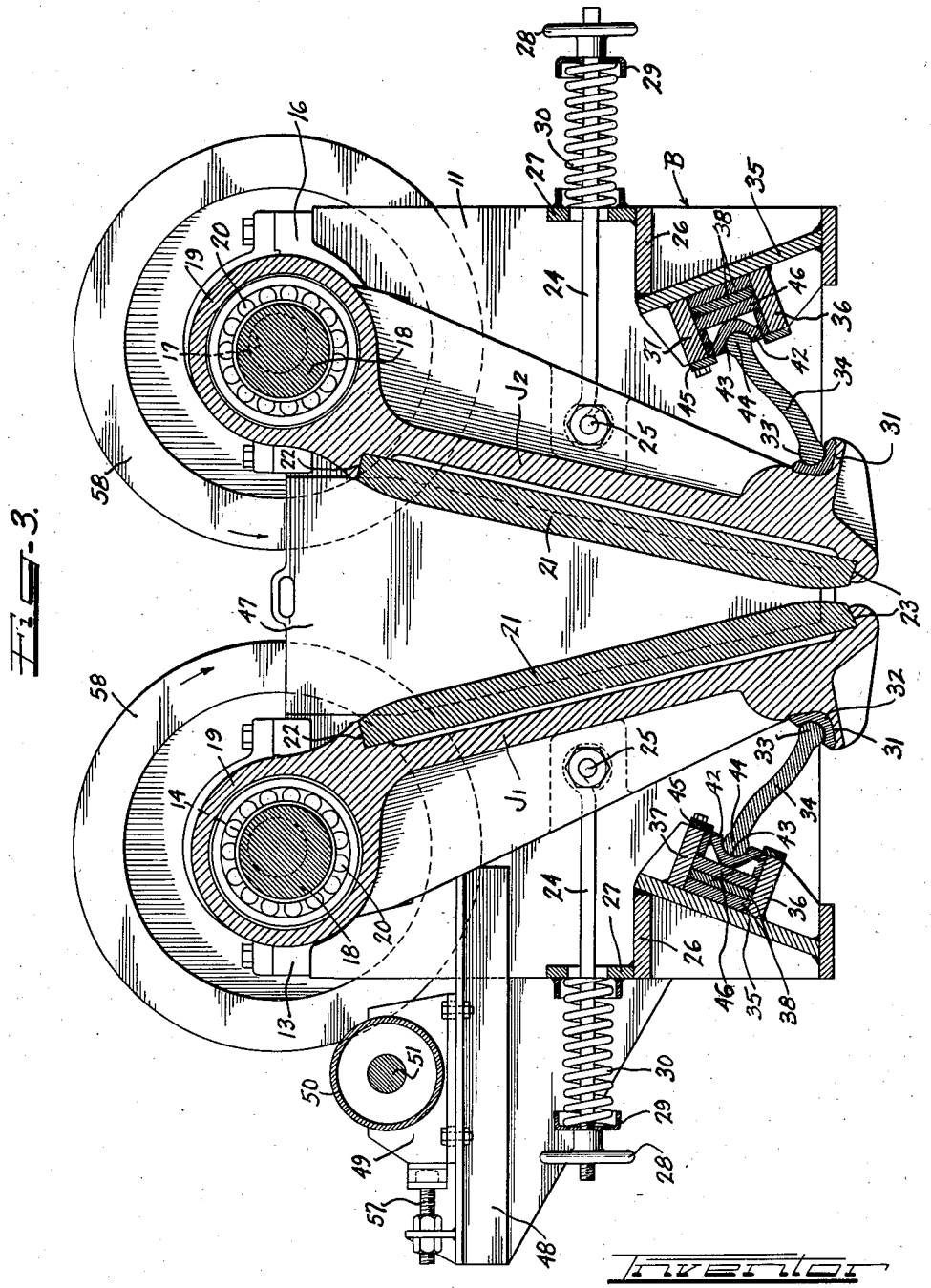


Fig. 3.

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UNITED STATES PATENT OFFICE

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CRUSHER

Harold C. Pollitz, Cedar Rapids, Iowa, assignor to Iowa Manufacturing Company, Cedar Rapids, Iowa, a corporation of Iowa

Application October 16, 1942, Serial No. 462,222

1 Claim. (Cl. 83—53)

My invention relates to crushers for crushing material such as rock and particularly crushers of the twin jaw type in which the jaw structures are supported from eccentric shafts to receive between them the material to be crushed.

An important object of the invention is to produce an improved crusher in which the twin jaw structures, their supporting shafts and controlling means are exactly alike and interchangeable, resulting in balanced operation, and material reduction in the cost of manufacture in proportion to capacity of production.

Another important object is to provide a simplified and more efficient drive for the eccentric operating shafts for the jaw structures, which drive is in the form of a single chain belt engaging driving sprockets on the shafts and operated by a sprocket wheel driven from a suitable source such as an electric motor.

A further object is to so arrange the chain drive that the eccentric shafts are driven in the proper relative direction for the desired operation of the jaw structures and so that the chain drive may be readily released from the shaft sprockets to free the shafts for timing setting.

Still another object is to provide improved supports for the toggle plates engaged by the jaw members so that in case of breakage of the plates quick replacement thereof may be readily accomplished.

The above referred to and other features of my invention are embodied in the structure shown on the drawings in which:

Figure 1 is a plan view of the crusher;

Figure 2 is a side elevation; and

Figure 3 is a section on plane III—III of Figure 1.

The supporting structure for the crusher comprises a base B from which side walls 10 and 11 extend upwardly. The walls 10 and 11 support bearing structures 12 and 13 for the shaft 14, and similar bearings 15 and 16 on the walls journal the shaft 17. Each shaft, between the bearings, has the eccentric portion 18, these eccentric portions of the shafts receiving the hubs 19 of the jaw frames J^1 and J^2, a ball bearing 20 being inserted between the eccentric portion of each shaft and the associated jaw frame hub.

The jaw frames J^1 and J^2 extend downwardly between the side walls 10 and 11 and each frame supports the crusher plate 21 whose outer face is longitudinally fluted or corrugated, as shown on Figure 1. Each crusher plate is held between upper and lower shoulders 22 and 23 on the corresponding jaw frame, and the plates as well as the jaw frames, are exactly alike and interchangeable.

Each jaw frame has a tension rod 24 anchored thereto at its inner end, as by a bolt 25, the upper wall portions 26 of the base at opposite ends thereof supporting brackets 27 through which the respective tension rods extend, the rods at their outer ends being threaded to receive adjusting nuts or handwheels 28. Between the respective bracket 27 and an abutment collar 29 on each rod, a tension spring 30 is interposed whose tension may be adjusted by engagement of the handwheel 28 with the collar 29, the tension rod structures tending to yieldably hold the jaw frames spread apart.

At their lower ends the jaw frames J^1 and J^2 have each a step 21 for a concave seat bar 32 for the inner rounded edge 33 of a toggle plate 34. Suitable abutment structure for the outer edges of the toggle plates is provided. As shown, the end wall portions 35 of the base are inclined inwardly and each has opposed walls 36 and 37 extending inwardly therefrom at right angles thereto. The walls 35, 36 and 37 form rectangular channels extending across the ends of the base, and extending along the bottoms of these channels are shim bars 38 which, at their outer ends, extend through rectangular passageways 39 in the side walls of the base. One of the side walls of the base adjacent to the passageways therethrough has wings 40 extending therefrom for receiving bolts 41 for extending through the projected ends of the corresponding bars 38 to hold them against longitudinal displacement in their channels.

Seated between the inner ends of the walls 36 and 37 of each of the channels is a seat bar 42 which has the concave seating groove 43 for the outer rounded end 44 of the corresponding toggle plate, the seat bar structure being held in place by strips 45 secured to the inner ends of the walls 36 and 37. Between each seat bar structure 42 and the corresponding shim bars 38, a backing bar 46 may be inserted for the seat bar. The tension rods 24 tend to hold the jaw frames swung outwardly, and to hold the toggle plates clamped between their seat bars 32 and 42. If it is desired to make adjustment for greater or less clearance passageway between the lower ends of the crusher plates 21, shim bars 38 of different thickness may be inserted in the channels behind the backing bars 46.

Cheek plates 47 are supported by the side walls 10 and 11 for extending along the side edges of the crusher plates 21 so as to confine the ma-

terial to be crushed on its travel between the crusher plates.

Describing now the driving mechanism, on brackets 48 extending laterally from the side walls 10 and 11 are mounted supports 49 for a cylindrical housing 50 in the ends of which a transmission shaft 51 is journalled, which shaft at one end has keyed thereto a chain sprocket wheel 52. The shafts 14 and 17 have keyed thereto sprocket wheels 53 and 54 which are in alignment with the sprocket wheel 52. Meshing the sprocket wheel 52 and the shaft sprocket wheels is a chain belt 55, the meshing of the belt with the sprocket wheels being such that the shafts 14 and 17 will be rotated in opposite directions. A housing 56 surrounds the sprocket wheels and the chain belt to afford protection therefor. Adjusting means 57 are provided for the supports 49 so that the housing 50 with the shaft 51 may be adjusted for proper tensioning of the chain belt. Each shaft 14 and 17 mounts at each end thereof a flywheel 58, these flywheels being all of the same diameter and weight and equally spaced from the longitudinal center line of the crusher.

A drive pulley 59 is preferably secured to each end of the shaft 14 to be driven by suitable belts from a power source (not shown). The drive is such that the shafts 14 and 17 are rotated by the chain belt 55 in the direction indicated by the arrows. The chain belt will also drive the shaft 51, and from this shaft power may be taken to drive auxiliary equipment such as conveyor mechanism (not shown) for removing the crusher material discharged from the crusher. It is evident that, instead of driving the shafts 14 and 17 by the pulleys 59, a driving source could be connected to the shaft 51 for driving the chain belt and thereby the shafts.

Owing to the eccentric connection of the jaw members J^1 and J^2 with the shafts 14 and 17, the jaw members will be swung toward and away from each other on the fulcrums provided by the toggle plates 34 to apply crushing action on the material fed between the jaw plates. By proper setting or timing of the eccentric connection with the shafts, the jaw frames may also be given any desired longitudinal movement during swinging movement thereof for further crushing exertion of the jaw plates on the material. The use of a single drive chain for the crusher shafts materially simplifies and reduces the cost of manufacture of the crusher and enables timing setting of the shafts to be readily and quickly accomplished. When it is desired to make such timing adjustment, the chain belt may be readily opened, by withdrawing one of its link pins, and the belt unmeshed from one of the driving sprockets so that the corresponding shaft may be rotated relative to the other shaft for the desired timing, the chain being then remeshed and closed.

I have thus produced an efficient crusher in which two identical crusher halves are synchronously driven in proper timing relation by a single chain belt having extended meshing engagement with the respective sprocket wheels of the two supporting shafts, the various cooperating parts being interchangeable and readily accessible for adjustment or repairs.

Although I have shown a practical embodiment of the various features of my invention I do not desire to be limited to the exact construction, arrangement and operation shown and described, as changes and modifications are possible which would still come within the scope of my invention.

I claim as follows:

A rock crusher comprising a supporting frame, a pair of shafts journaled on said frame, twin crushing structures at opposite sides of said frame below the respective shafts, each structure comprising a jaw member having an eccentric connection at its upper end with the respective shaft, said jaw members being directly opposed to each other, a toggle plate for each jaw member fulcrumed at its outer end on said supporting frame and at its inner end on the lower end of the jaw member, said toggle plates diverging upwardly at the same angle from their fulcrum engagement with the jaw members, tensioning means above said toggle plates holding said jaw members outwardly against said toggle plates, a balance wheel on each end of each of said shafts, opposed sprocket wheels on said shafts, a drive chain meshing said sprocket wheels for rotation of said shafts in opposite direction, and a driving shaft and a sprocket wheel thereon meshing said drive chain for driving thereof, the arrangement of all the operating parts assembled at opposite sides of the vertical center line of the crusher being exactly alike whereby the crusher is perfectly balanced and with the chain drive can be operated safely at very high speeds with correspondingly large capacity.

HAROLD C. POLLITZ.