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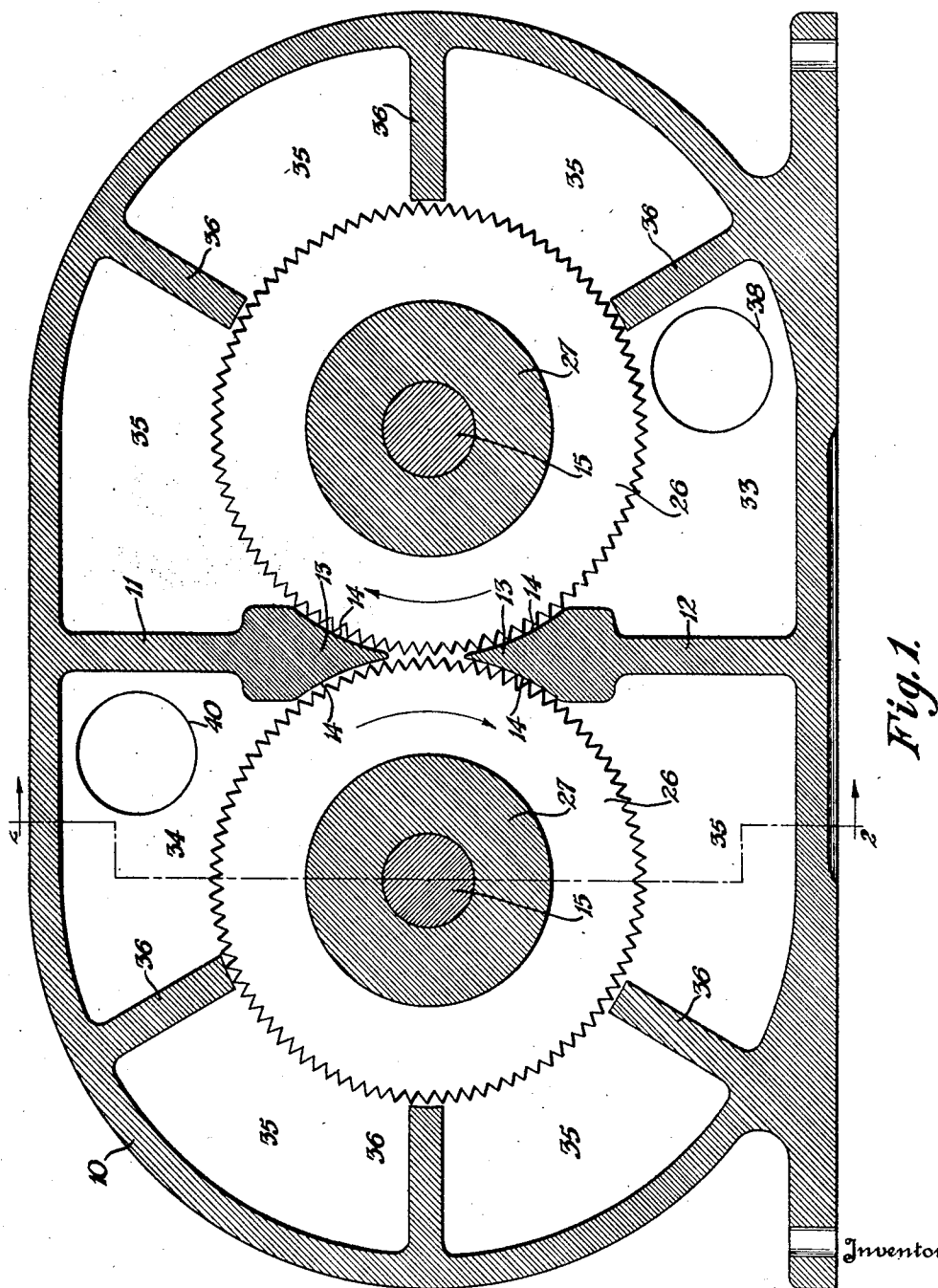
R. C. HOPKINS

1,796,104

OIL MILL

Filed May 28, 1930

2 Sheets-Sheet 1



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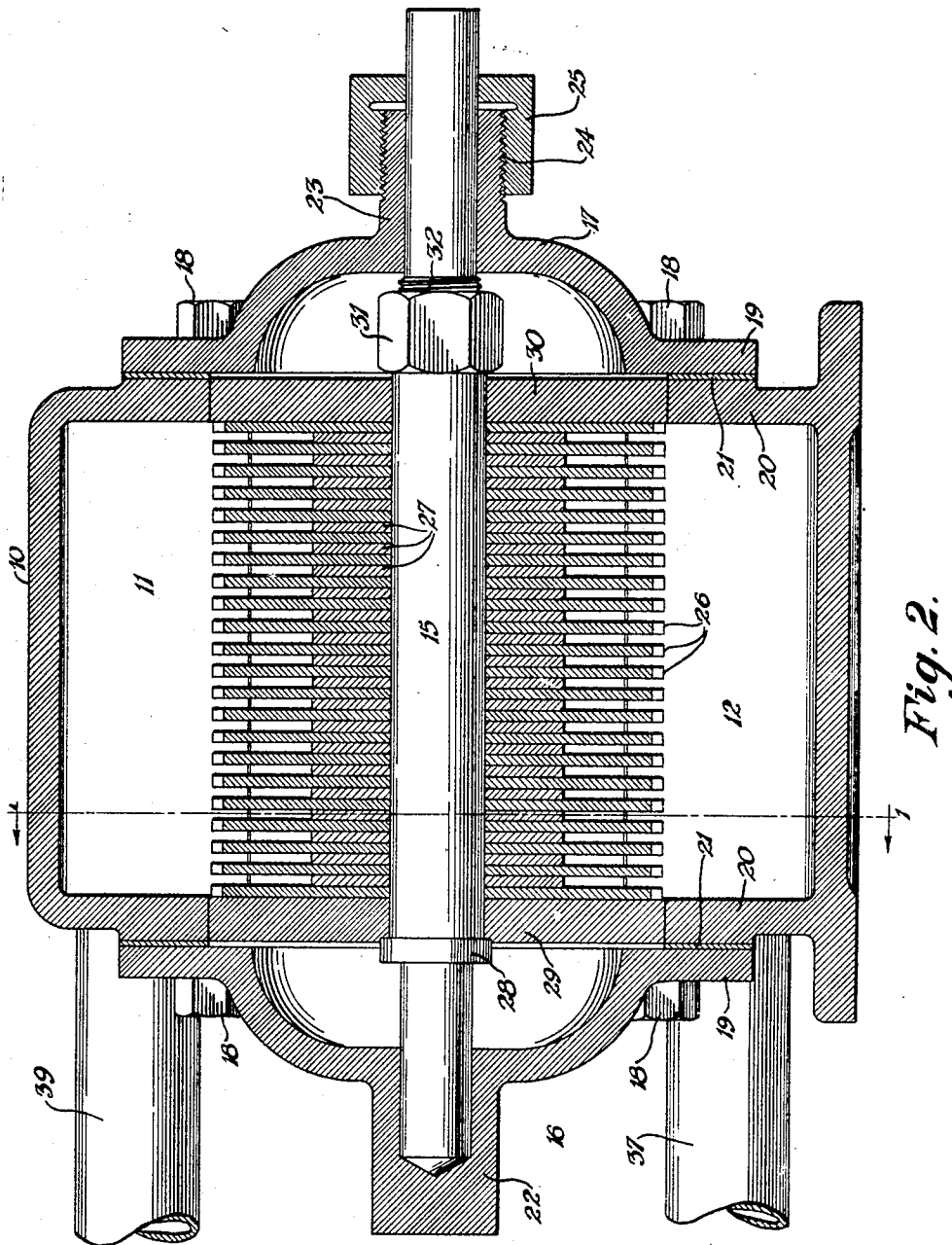
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UNITED STATES PATENT OFFICE

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OIL MILL

Application filed May 28, 1930. Serial No. 456,410.

The invention relates to rotary mills for cutting, mixing and attrition of the heavy particles of oil and the like; and the present invention is an improvement upon my co-
5 pending applications, Serial No. 260,863, filed March 12, 1928, now Patent No. 1,764,020; Serial No. 394,351, filed September 21, 1929; and Serial No. 407,616, filed November 16, 1929, now Patent No. 1,775,721.

10 It is well known that fuel oil, such as is commonly used for oil burners in furnaces and the like, comprises a considerable portion of sludge or heavy particles which will not freely flow through the circulating system, frequently clogging the system and
15 causing trouble and inconvenience.

The object of the improvement is to provide a mill adapted to cut, grind and mix the heavy particles of oil and other substances, to
20 such an extent that it is thoroughly mixed of the same consistency and in condition to flow freely through pipe lines, valves and other apparatus such as is ordinarily included in the circulating system to an oil
25 burner and the like.

Another object of the present improvement is to provide a mill adapted for entirely breaking up and pulverizing the heavy portions of the oil, or other substance, to such an
30 extent that it may freely pass through the circulating system and be burned in the burners.

The above and other objects may be attained by providing a housing within which
35 is located two sets of gangs of circular saws mounted upon parallel shafts rotated in the same direction, the peripheral portions of the saws being in close relation and arranged to cooperate to cut, grind and mix the heavy
40 particles of the oil arcuate dividing plates being located between the gangs of saws, the clearance between the saws and dividing plates being a running fit; the housing being preferably divided by partition walls extending
45 inward to points in close proximity to the peripheries of the saws, thus producing a plurality of attrition chambers through which the oil is moved progressively by centrifugal action of the saws, an oil inlet for receiving oil under pressure communicating
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with one of the attrition chambers at one side of the housing and an oil outlet communicating with another chamber at the other side of the housing.

A feature of the invention is the operation
55 of the two oppositely moving cooperating peripheral portions of the saws with the dividing plates adjacent thereto whereby the liquid is driven by one set of saws and impacted with the other set of saws, moving in the opposite
60 direction and at substantially the same speed as the liquid, resulting in an impact which substantially doubles the velocity of the moving oil as it changes the direction thereof.

An embodiment of the invention is illustrated in the accompanying drawings, in
65 which

Figure 1 is a vertical section through the improved oil mill taken substantially on the
70 line 1—1, Fig. 2; and

Fig. 2, a vertical section taken substantially on the line 2—2, Fig. 1.

Similar numerals refer to similar parts throughout the drawings.

The mill includes a housing 10, preferably
75 of greater width than its height, as best illustrated in Fig. 1, and being provided at its central portion with the aligned partition walls 11 and 12, the wall 11 depending from the upper wall of the housing, and the wall 12 extending
80 upward from the bottom wall thereof, these walls terminating in the tapered dividing plates or separators 13 each having the opposed arcuate faces 14.

A pair of parallel shafts 15 is located
85 through the housing 10, one of the shafts being located at each side of the central partition walls 11 and 12 from which the shafts are equally spaced.

These shafts are preferably journaled in
90 the caps 16 and 17 connected to opposite sides of the housing as by the cap screws 18 located through the flanges 19 of the caps and into the flange portions 20 of the housing, gaskets
95 21 being preferably located in the joints between the caps and housing to prevent leakage of the oil therethrough.

A bearing 22 is formed in each cap 16 within which is journaled one end of the corresponding shaft 15, and a bearing 23 is formed
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in each of the caps 17 through which is journaled the other end portion of the proper shaft 15. Each of the bearings 23 is preferably externally threaded as at 24 to receive a stuffing box 25 surrounding the shaft in order to provide an oil-tight joint.

A plurality of circular saw blades 26 is mounted upon each shaft 15, the blades being preferably spaced as by means of the disks 27 which may be of substantially the same thickness as the saw blades and are preferably of a diameter considerably less than the blades.

A collar 28 is fixed upon each shaft near one end thereof and a heavy disk 29 is mounted upon the shaft and abuts the collar, the saw blades and spacing disks being held between said heavy disk 29 and a similar heavy disk 30, near the other end of the shaft, as by a clamping nut 31 upon the threaded portion 32 of the shaft.

A pulley, sprocket or the like may be fixed upon the protruding end of each shaft, or the shafts may be otherwise connected to motors or the like for driving the shafts at a high speed and in the same direction as shown by the arrows in Fig. 1.

As best shown in Fig. 1, the saw blades upon the two shafts are so arranged that the teeth of each blade are almost in contact with the corresponding blade on the other shaft at the space between the tapered separating plates 13.

The housing is divided into an inlet chamber 33, an outlet chamber 34 and a plurality of attrition chambers 35 by means of the radially disposed partition walls 36 extending inward from the outer wall of the housing to points slightly spaced from the teeth of the saw blades 26.

An inlet pipe 37 communicates with the inlet opening 38 of the chamber 33 and an outlet pipe 39 communicates with an outlet opening 40 in the chamber 34, oil under pressure, as from a pump or the like, being continuously supplied to the pipe 37 during the operation of the mill.

If desired, the inlet and outlet chambers may be reversed to pass the oil through the mill in the opposite direction, in which event the saw blades should be rotated in a direction opposite to that shown in Fig. 1.

In the operation of the mill the oil under pressure is first admitted to the inlet chamber 33 and passes progressively through the attrition chambers 35, the oil being driven by the rotation of the right hand gang saws in Fig. 1 through the space between the separator plates 13 and against the gang saws on the other shaft, the oil being impacted against these saw blades moving in opposite direction to the oil, the effect being to change the direction and increase the speed of movement of oil as it passes from the right side to the left side of the housing.

The oil is then carried by the movement of the saw blades successively through the attrition chambers on the left side of the housing, finally reaching the outlet chamber 34 and being discharged through the pipe 39.

It will be seen that the oil or other liquid to be ground or milled is carried around in the housing, with its particles in suspension, and instead of being ground, milled or mashed against a solid surface, the motion of the liquid is used as its own grinding surface through the impact set up by the oppositely revolving saws.

It will be seen that if the separating plates 13 are shortened there will be less opposition from the action of the two saws while if these plates are increased in length and brought out to very fine edges, finer grinding or milling of the heavy particles of the oil may be obtained.

I claim:

1. A rotary mill including a housing, two parallel gangs of rotary saws within the housing having their peripheral portions in close relationship to each other, means for rotating both gangs of saws in the same direction, separator plates in the housing extended between the gangs of saws and separated from each other at their inner edges, and means for admitting oil under pressure to the housing on one side of the separator plates and discharging the oil from the housing on the other side of the separator plates.
2. A rotary mill including a housing, two parallel gangs of rotary saws within the housing having their peripheral portions in close relationship to each other, means for rotating both gangs of saws in the same direction, tapered separator plates in the housing extended between the gangs of saws and separated from each other at their inner edges, and means for admitting oil under pressure to the housing on one side of the separator plates and discharging the oil from the housing on the other side of the separator plates.
3. A rotary mill including a housing, two parallel gangs of rotary saws within the housing having their peripheral portions in close relationship to each other, means for rotating both gangs of saws in the same direction, separator plates in the housing extended between the gangs of saws and separated from each other at their inner edges, said separator plates having curved sides with which the saws have a running fit, and means for admitting oil under pressure to the housing on one side of the separator plates and discharging the oil from the housing on the other side of the separator plates.
4. A rotary mill including a housing, two parallel gangs of rotary saws within the housing having their peripheral portions in close relationship to each other, means for rotating both gangs of saws in the same direction, separator plates in the housing ex-

tended between the gangs of saws and separated from each other at their inner edges, means for admitting oil under pressure to the housing on one side of the separator plates and discharging the oil from the housing on the other side of the separator plates, and partition walls dividing the housing into a plurality of attrition chambers through which the oil is successively passed.

5 5. A rotary mill including a housing, two parallel gangs of rotary saws within the housing having their peripheral portions in close relationship to each other, means for rotating both gangs of saws in the same direction, separator plates in the housing extended between the gangs of saws and separated from each other at their inner edges, means for admitting oil under pressure to the housing on one side of the separator plates and discharging the oil from the housing on the other side of the separator plates, and radial partition walls extending inward from the outer walls of the housing to points adjacent to the saws and dividing the housing into a plurality of attrition chambers through which the oil is successively passed.

In testimony that I claim the above, I have hereunto subscribed my name.

ROBERT C. HOPKINS.

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