March 10, 1953 W. HORTH 2,630,975

VARIABLE PRESSURE MULLER

Filed Nov. 22, 1949 2 SHEETS—SHEET 1

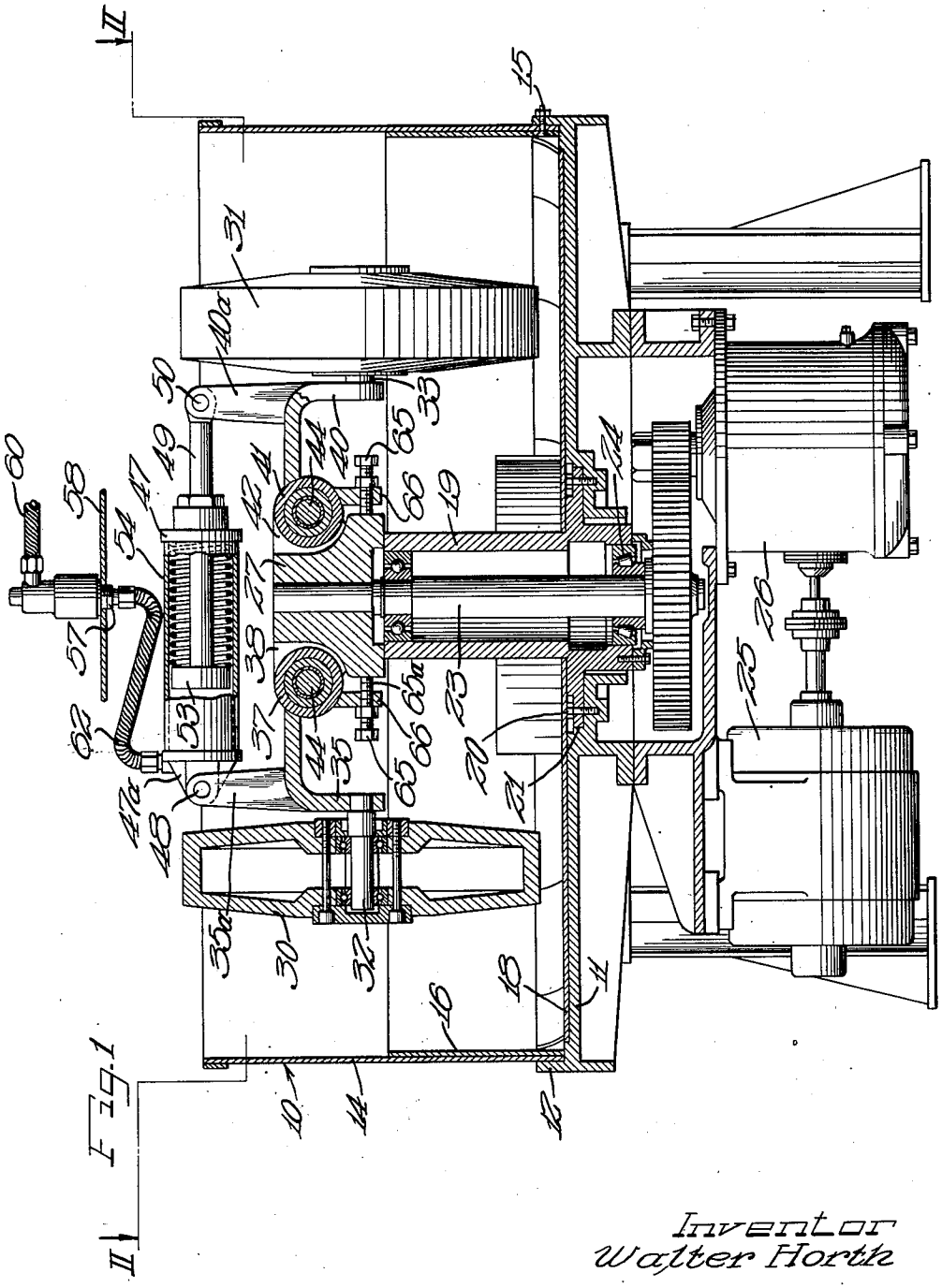


Fig. 1

Inventor
Walter Horth

By The Firm of Charles A. Hill Attys

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Fig. 2

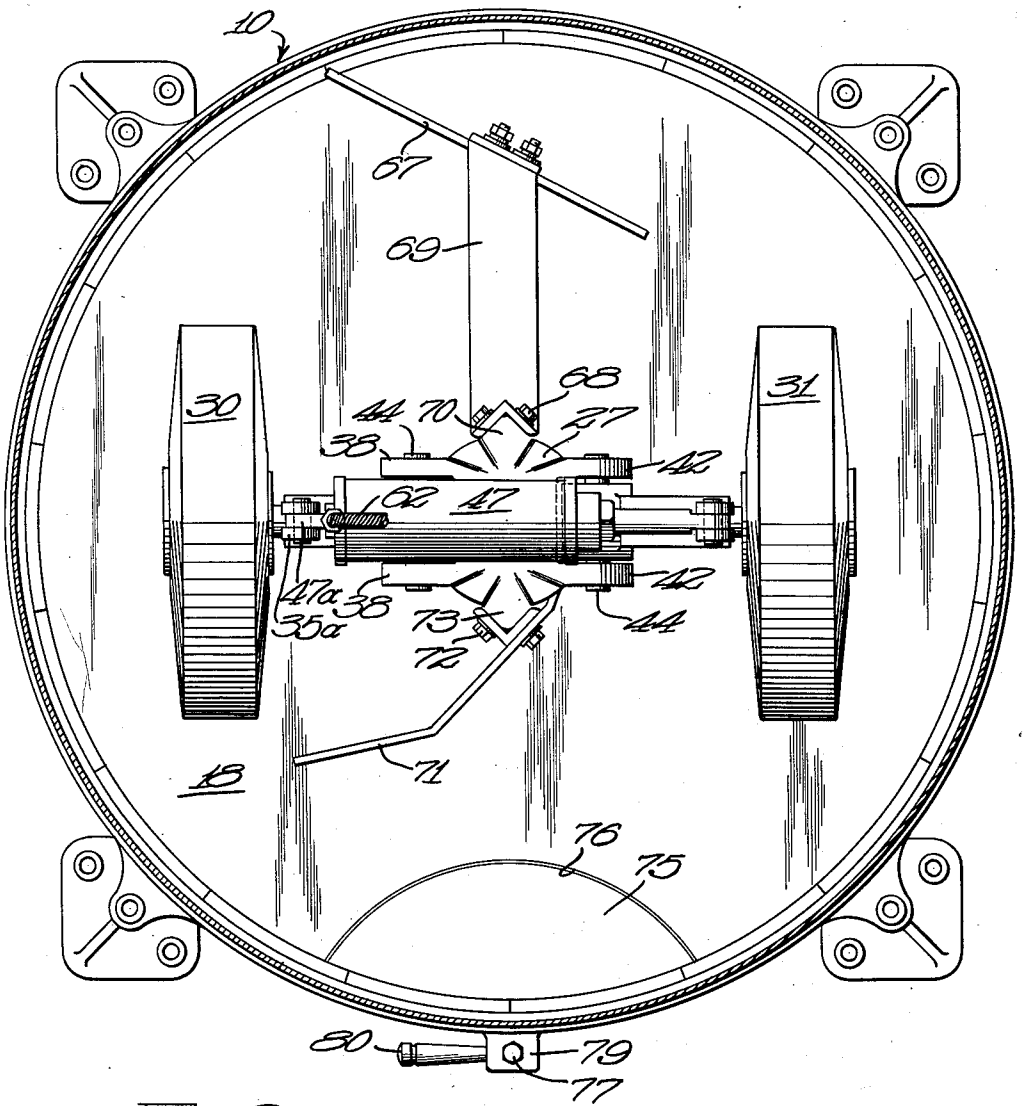
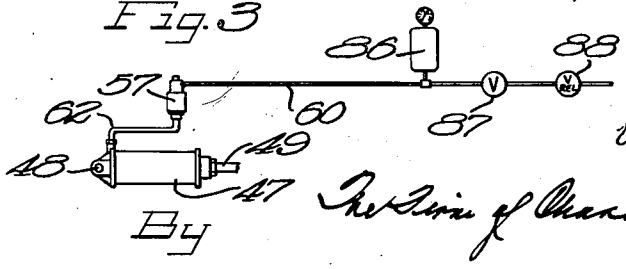


Fig. 3



Inventor
Walter Horth

By The Firm of Charles W. Hoffman Attys

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VARIABLE PRESSURE MULLER

Walter Horth, Wilmette, Ill., assignor, by mesne assignments, to Herbert Simpson Corporation, Chicago, Ill., a corporation of Illinois

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5 Claims. (Cl. 241—132)

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This invention relates to improvements in mulling machines.

More particularly, this invention has to do with mechanism for controlling the pressure exerted by the muller wheels on material disposed in the crib of a mulling machine.

It is an important object of this invention to provide means, operable externally of the mulling machine, for controlling the pressure exerted by the muller wheels on the material in the crib of the mulling machine.

Another object of this invention is to provide means by which the mulling pressure can be varied without stopping the operation of the mulling machine.

A further object of this invention is to provide means whereby the mulling wheels can be retracted during the discharge cycle of the mulling operation in order to eliminate caking of the material between the muller and the wearplate.

A still further object of this invention is to provide a means for supplementing the pressure exerted by the muller wheels on the material in the crib of the mulling machine.

According to the teachings of the present invention, there is provided a set of muller wheels pivotally mounted on rocker arms on a cross-head of a mulling machine for rolling movement in a circular path on the bedplate of the machine. The cross-head is rotated by a power-driven shaft.

The rocker arms on which the muller wheels are mounted are provided with opposed upstanding arm members. A single-acting fluid cylinder, which may suitably utilize liquid or air, is pivotally mounted to one upstanding arm having the piston rod of the movable piston pivotally mounted to the other arm. The cylinder is arranged so that when fluid under pressure is applied to the cylinder the piston will be moved in a direction to push the piston rod out of the cylinder so that the effective length of the pressure cylinder is increased for pivoting the muller wheels downwardly toward the bedplate of the crib. A spring inside the cylinder resists the movement of the piston when pressure is applied so that when the pressure is released the spring will move the piston in an opposite direction tending to pull the piston rod into the cylinder and decrease the effective length of the cylinder assembly and thus raise the mullers from the wear plate.

Other and further features, advantages and objects of the present invention will be readily apparent to those skilled in the art from the following detailed description of the annexed sheets of drawings.

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On the drawings:

Figure 1 is a vertical sectional view taken centrally through a mulling machine constructed according to the teachings of the present invention;

Figure 2 is a top plan view taken on line II—II of Figure 1; and

Figure 3 is a fragmentary diagrammatic showing of the control apparatus of the present invention.

As shown on the drawings:

In Figures 1 and 2, the reference numeral 10 indicates generally a mulling machine including a crib having a flat base plate 11 of circular configuration with an upstanding flange 12 extending around the periphery of the plate. A cylindrical shell 14 is secured in place on the crib inside the flange 12 by a plurality of bolts 15. A secondary vertical wall 16, fitting snugly against the shell 14, extends substantially half way up the shell 14 and is held in place also by the bolts 15. This secondary plate is made of a special wear-resistant material as also is a wear plate 18 disposed on the base plate 11.

A turret 19 is secured by cap screws 20 in a recessed portion 21 in the base plate 11.

Rotation of the mulling apparatus is effected by means of a drive shaft 23 which is journaled in roller bearings 24 at the lower end of the turret 19 and is driven by an electric motor 25 through a gear drive 26. At its upper end the drive shaft is keyed to a cross-head 27 which is supported on the turret 19. Thus, as the shaft 23 is rotated, the cross-head 27 is also rotated.

Two mulling wheels 30 and 31 are mounted for free rotation on axles 32 and 33 respectively. The axle 32 is secured, as by a press fit, in one end of a rocker arm 35 which has a tubular end portion 37 mounted between outstanding ears 38 of the cross-head 27. The axle 33 is mounted at one end of a rocker arm 40 having a tubular end portion 41 pivotally disposed between ears 42 on a portion of the cross-head 27 directly opposite to the ears 38. Each of the rocker arms 35 and 40 is arranged for rotation on a shaft 44 which extends between the ear members on either side of the cross-head.

The rocker arm 35 has an upstanding arm portion 35a which is disposed directly opposite to an upstanding arm 40a of the rocker arm 40. A power cylinder 47 is disposed in the crib between the arms 35a and 40a having one end flange portion 47a pivotally mounted by means

of a pin 48 to the arm 35a. A piston rod 49 is pivotally mounted by means of a pin 50 on the bifurcated upper end of the arm 40a. The piston rod extends into the cylinder 47 and has an integrally formed head 53 resiliently urged by a spring 54 in a direction to pull the piston rod into the cylinder.

Power is supplied to the fluid cylinder 47 by means of a revolving joint 57 of any standard construction which permits a lower portion of the joint to rotate with support bracket 58 while the supply line 60 thereabove remains stationary. A supply line 62 of flexible material delivers the fluid under pressure to one end of the cylinder 47.

An adjustable screw device 65 may be connected to an arm 66 depending from each rocker arm 35 and 40 having an end 65a abutting the side of the cross-head 27 for limiting the downward pivoting movement of the muller.

Referring to Figure 3, it is seen that air is supplied to the rotary union 57 by means of a liquid or compressed air line 60 into which is connected a surge chamber 86 of any suitable construction, a hand-operated valve 87, and a pressure release or control valve 88.

As best shown in Figure 2, an outer plow member 67 is positioned for scraping, plowing action along the surface of the wear plate 18 and is supported by an arm 69 which is attached by screws 68 to a projecting portion 70 of the cross-head 27. During the mulling cycle, the plow 67 tends to move the material on the wear plate inwardly toward the path of the muller wheels.

An inner plow or scraper 71 is secured directly, by cap screws 72, to an outstanding projection 73 of the cross-head 27. In operation, the inner plow tends to move material at the edges of the wear plate radially outwardly toward the path of movement of the muller wheel.

A discharge door 75 is mounted to close an arc-shaped opening 76 in the wear plate. The door 75 is pivotally mounted by means of a pin 77 to an ear 79 secured to the wall of the crib. A handle 80 attached to the door 75 is provided to facilitate the pivoting, opening movement of the door 75.

In operation, when fluid under pressure is supplied to the cylinder 47, the pressure of the spring 54 is overcome and, depending upon the setting of the pressure control valve 88, a variable muller pressure can be exerted upon the material of the wear plate on the mixer. The surge tank 66 serves the purpose of cushioning the rise and fall of the muller wheels during the muller cycle without materially increasing or decreasing the effect of pressure on the materials to be mixed.

When the control valve 87 is moved to a fluid venting or exhausting position, the spring 54 surrounding the piston rod 49 forces the piston to the left and raises the muller away from the wear plate.

Thus, it will be seen that there is provided in this invention a simple control device wherein, by manipulation of a hand-controlled valve, the muller wheels may be lifted upwardly off the wear plate of the mulling machine, or pressure can be applied to the cylinder 54 for acting through the arms 35a and 40a of the rocker arms 35 and 40 for pivoting the muller wheels downwardly toward the material on the wear plate 18 of the crib to vary the pressure of the mullers on the material being mixed.

It is possible, therefore, with this muller to control the unit pressure of the muller wheels on the material being mixed, to vary the pressure of the muller wheels as more material is added to the mulling machine, and to raise the muller wheels completely off the wear plate of the mulling machine to facilitate the discharge of material through the discharge door 75 when it is opened.

It will be understood that modifications and variations may be effected without departing from the scope of the novel concepts of the present invention.

I claim as my invention:

1. A mulling machine comprising a material-receiving crib having a base plate, a cross-head rotatably mounted in said crib, a pair of opposed muller wheels separately and independently pivotally supported on said cross-head and rotatable therewith, an upstanding abutment arm associated with each of said muller wheels, a generally horizontally extending fluid-actuated power cylinder mounted between said upstanding arms and pivotally connected thereto, a piston in said cylinder arranged to be moved by fluid pressure from an initial position to an adjusted position in a direction to pivot the muller wheels relative to said cross-head toward said base plate into material-engaging position in the crib, fluid pressure means for actuating said cylinder, and spring means in said cylinder arranged to return said piston to its initial position when the fluid pressure means is exhausted to effect the pivoting movement of the muller wheels away from the base plate and to elevate said wheels within said crib.

2. A mulling machine comprising a crib, a cross-head rotatably mounted in said crib, power means for rotating said cross-head, a pair of opposed muller wheels disposed for rotation in said crib, opposed rocker arms connecting said cross-head to said muller wheels, upstanding arms on each rocker arm, a fluid-actuated cylinder disposed between said upstanding arms, one end of said cylinder being pivotally mounted to one of said upstanding arms, a piston rod extending through the wall at the opposite end of said cylinder for pivotal engagement with the other upstanding arm, a spring in said cylinder resisting movement of the piston rod from an initial position outwardly of said cylinder, a piston on said piston rod, a source of fluid under pressure different from atmosphere for establishing communication between said source of pressure and said cylinder to move said piston rod from its initial position outwardly of said cylinder against the action of said spring to pivot said rocker arm and said muller wheels into material-engaging position on the crib of said mulling machine, movement of said piston rod under the influence of said fluid under pressure pre-loading said spring for returning the piston rod to its initial position when communication of said source and said cylinder is interrupted.

3. A mulling machine comprising a crib, a power-driven cross-head rotatably mounted in said crib, rocker arms pivotally mounted on said cross-head, muller wheels rotatably mounted at the end of said rocker arms, an upstanding abutment arm on each rocker arm, said abutment arms being in diametrically opposed relation, fluid pressure means including a pressure cylinder pivotally mounted between and acting directly upon said abutment arms, a conduit arranged to deliver fluid under pressure to said cylinder, a rotary union in said conduit permitting rotation of the portion of said conduit which is con-

nected to said cylinder, said fluid pressure means acting on said abutment arms to pivot said rocker arms in one direction upon delivery of fluid under pressure to said cylinder to move said muller wheels into material-engaging position in said crib, and spring means acting upon said arms in opposition to said fluid pressure means and preloaded by movement of said arms in response to fluid pressure to pivot said rocker arms in an opposite direction, said spring means supporting at least a portion of the weight of said muller wheels raise the muller wheels off the material in the crib.

4. A muller comprising a crib, a cross-head rotatably mounted in said crib, opposed muller wheels pivotally mounted on said cross-head, diametrically opposed abutment arms on said muller wheels, a fluid cylinder disposed between said arms having one end pivotally connected to one of said upstanding arms and having an aperture in the other end, a piston rod extending through said aperture having one end portion pivotally mounted on the other upstanding arm and having a piston at the other end in said cylinder, means for delivery of fluid under pressure to said cylinder to move said piston rod outwardly of said cylinder to pivot said mullers toward the material in the crib, and spring means in said cylinder operable against said piston in opposition to said fluid pressure and preloaded by fluid pressure-responsive movement of said piston to move said piston rod into said cylinder when said air pressure means is vented to atmosphere, said spring supporting at least

a portion of the weight of said mullers upon venting the air pressure means to atmosphere to lift said mullers away from the material in the crib.

5. In a mulling machine including a material-receiving crib having a base plate, a cross-head rotatably mounted in said crib, a pair of opposed muller wheels separately and independently pivotally supported on said cross-head and rotatable therewith, an upstanding abutment arm associated with each of said muller wheels, a generally horizontally extending cylinder between said upstanding arms and being pivotally connected thereto, means in said cylinder arranged to be moved by fluid pressure from an initial position to an adjusted position in a direction to pivot the muller wheels relative to said cross-head toward said base plate, and fluid pressure means for actuating said means.

WALTER HORTH.

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