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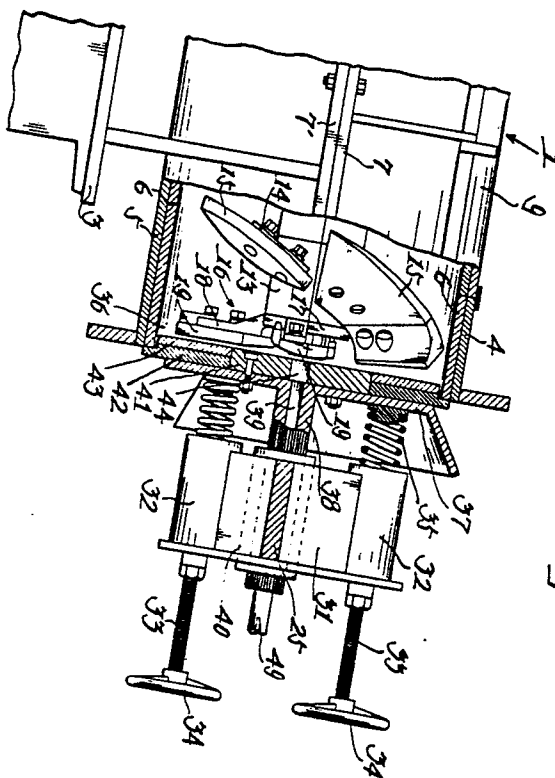
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**Apparatus for washing sand and the like.**

Apparatus for washing sand and the like comprises a cylindrical body (1) having a feed port (8) at one end and a discharge port (36) at the other end. Disposed within the body (1) is a rotatable shaft (10) having a plurality of crush blades (15) spirally mounted thereon and a rotary vane (16) mounted at one end near to the discharge port (36). A pressure cap (37) mounted on a support arm (25) in opposed relationship to the discharge port (36) is biased towards the discharge port (36) by springs (35) acting between the support arm (25) and the pressure cap (37) and is provided with an assembly of detachable wear plates (41,42,43) for co-operating with the discharge port (36). The springs (35) are adjustably mounted for varying the biasing force acting on the pressure cap (37) and the pressure cap (37) has a feed water port (39) for delivery of water to the body (1).



## APPARATUS FOR WASHING SAND AND THE LIKE

This invention relates to apparatus for washing sand and the like and in particular, though not exclusively, to apparatus suitable for washing sands mixed with a lot of soft stones, lumps of clay, lumps of tough loam, etc. in order to obtain sands for making a high quality concrete aggregate for use in construction.

Heretofore, there has been known apparatus for washing sands mixed with soft stones, lumps of clay, lumps of tough loam, etc. in order to remove soft stones, lumps of clay, lumps of tough loam, etc. therefrom. This conventional apparatus is provided at its discharge port with two cover boards or caps each formed with a hole and overlapping one upon the other.

When in use, the caps are slidable with respect to each other to adequately vary the hole size of the caps depending on the conditions of sands to be washed. The sands are washed by appropriately controlling the resistance applied thereto by varying the caps' size.

The conventional apparatus of this type, however, has a crucial disadvantage in that a discharge port formed in the cap is frequently blocked. If more quantity of sands, lumps of clay, etc. are mixed in the sands, the foregoing disadvantage is more easily obtained. Thus, sands of high quality are not effectively obtained.

It is an object of the present invention to provide apparatus for washing sand and the like, especially sand mixed with soft stones, lumps of clay, lumps of tough loam, etc. which remedies the aforementioned disadvantage of the known apparatus.

According to the present invention apparatus for washing sand and the like is characterised by a cylindrical body having a feed port at one end and a discharge port at the other end, a rotatable main shaft disposed within the body, crush blade means mounted on the main shaft and projecting therefrom, a rotary vane mounted to the front end of the main shaft, a support arm mounted at the other end of the body, a pressure cap having a feed water port supported by the support arm in opposed relationship to the discharge port, and spring means acting between the pressure cap and the support arm for biasing the pressure cap towards the discharge port.

The main advantage of the present invention is that sand and the like is effectively crushed by the crush blade means and agitated by the rotary vane positioned in front of the discharge port where it is thoroughly washed by water from the feed water port in the pressure cap prior to being discharged between the discharge port and the pressure cap

under the control of the resilient biasing of the pressure cap. In this way the risk of the apparatus becoming blocked is reduced and sand and the like of high quality can be obtained.

Advantageously the spring means is adjustable to vary the biasing force according to requirements thereby further contributing to the quality of sands and the like that can be obtained.

An exemplary embodiment of the present invention will now be described in more detail with reference to the accompanying drawings, wherein:-

Fig. 1 is a front view of apparatus for washing sand according to the present invention;

Fig. 2 is a plan view of the apparatus shown in Fig. 1;

Fig. 3 is a vertical sectional view of part of the apparatus shown in Figs. 1 & 2;

Fig. 4 is an exploded perspective view, partly cut away, showing the pressure cap and wear plate assembly; and

Fig. 5 is a front view of the moving vane.

In the drawings, reference numeral 1 generally denotes a lateral cylindrical body comprising upper and lower semi-cylindrical shells 4 and 5 mounted on the upper surface of a base plate 3 supported by legs 2, 2' so as to be inclined downwardly from left to right as viewed in Figure 1.

The shells 4,5 have opposed flanges 7,7' respectively on each side of the cylindrical body which are releasably secured together by screws, bolts or the like and the cylindrical body 1 has an inside panel 6 attached to its internal surface by screws to form a two-layer structure.

The cylindrical body 1 is inclined downwardly from its rear end to its front end and is provided on the upper surface at the rear end with a feed port 8 for feeding sands therein. Also provided on the upper surface of the cylindrical body 1 are inspection doors 9 for checking the interior thereof.

A cantilever rotatable main shaft 10 is disposed on the central longitudinal axis of the body 1. One end portion of the main shaft 10 extends near to the front end of the body 1. The other end portion of the main shaft 10 projects from the rear end of the body 1 and is carried by spaced apart bearings 11 fixed to the upper surface of the base plate 3. A drive motor 12 is connected to the main shaft 10 by a chain (not shown).

The main shaft 10 has mounted thereon a plurality of square-shaped sleeves 13. The sleeves 13 are provided at the outer peripheries with mounting plates 14 projecting in a spiral form or circumferentially repeated form therefrom. The mounting plates 14 are attached each with a crush blade 15 by screws.

The main shaft 10 is provided at the front end thereof with a moving vane 16. The moving vane 16 is attached at its front end with a square-shaped shaft plate 17 by screws. On three sides of the shaft plate 17 are attached respective mounting plates 18 projecting therefrom so as not to interfere with the mounting operation of the crush blade 15 provided at the front end of the main shaft 10. The mounting plates 18 are attached each with an agitation wing 19 by screws.

A spline shaft 20 is carried on a bearing 21 fixed to the flanges 7,7' on one side of the body 1 at the front end. One end of the spline shaft 20 is connected with a threaded rod 22. The threaded rod 22 passes through a check plate 23 secured to the flanges 7,7'. The threaded rod 22 is threadedly engaged with nuts 24 arranged on both sides of the check plate 22. Due to the foregoing arrangement, the spline shaft 20 is adjustable in the longitudinal direction.

The other end of the spline shaft 20 is pivotally attached to one end of a support arm 25. The other end of the support arm 25 is formed with a fork-shaped portion 26. This fork-shaped portion 26 receives a threaded rod 28 pivotally attached to a bracket 27 fixed to the flanges 7,7' on the other side of the body 1 at the front end. The support arm 25 is adjustably and releasably attached to the rod 28 by a nut 29 and handle checkscrew 30 threadedly engaged on the rod 28.

The support arm 25 is integrally provided at the intermediate portion thereof with a triangular shaped body 31. The body 31 is provided at each corner portion thereof with a respective threaded sleeve 32. Each threaded sleeve 32 is engaged with a respective threaded pressure rod 33 having a handle 34. Each pressure rod 33 is engaged at the front end thereof with a respective spring 35. The springs 35 are adapted to bias a pressure cap 37 against a discharge port 36 of the body 1.

The pressure cap 37 is provided at the centre of the outer surface facing the support arm 25 with a spline shaft 38 projecting therefrom and received in a bearing 40 integrally formed at the centre of the body 31. In this way, the pressure cap 37 is slidably supported by the support arm 25.

The spline shaft 38 is formed with a central bore providing a feed water port 39 which is connected with a feed water pipe 49. A second feed water pipe 50 is connected to the lower rear end of the body 1.

Fig. 4 illustrates a wear plate assembly consisting of three wear plates 41,42,43 which are attached to the inner surface of the pressure cap 37 facing the discharge port 36. The disc-shaped wear plate 41 is secured to the centre portion of the inner surface of the pressure cap 37 by bolts received in aligned holes in the wear plate 41 and

pressure cap 37. The wear plate 41 is formed with a central hole communicating with the feed water port 39 and is provided at the periphery thereof with the wear plates 42, 43.

The annular wear plate 42 is made up of three similar pieces 45 which engage the inner surface of the pressure cap 37 on one side and are formed at the outer periphery on the other side with a step portion 46 corresponding to the front end of the body 1.

The annular wear plate 43 is also made up of three similar pieces 47 and overlies the wear plate 42 inwardly of the step portion 46. The wear plates 42,43 are secured to the inner surface of the pressure cap 37 by bolts 48 received in aligned holes therein. By this arrangement the wear plate 43 which is subject to the greatest wear can be easily replaced.

When sands are washed by the apparatus according to the present invention, firstly, the threaded pressure rods 33 are rotated by the associated handles 34 to adjust the biasing force exerted by the springs 35 on the pressure cap 37 depending on the sands' state. Thereafter, the drive motor 12 is actuated to rotate the main shaft 10 and the sands are fed into the body 1 through the feed port 8. At the same time, water is fed to the body 1 through the feed water pipes 49,50.

The sands mixed with soft stones, lumps of clay, lumps of tough loam, etc. are transferred from the rear end of the body 1 towards the discharge port 36 at the front end while being agitated by the crush blades 15 rotating within the body 1. At the front end of the body 1, the sands are urgedly pushed against the wear plates 41,43 by the pressure of the succeeding sands, while at the same time being powerfully agitated by the rotary vane 16 and washed by water fed from the feed water port 39. The washed sands are finally discharged from the body 1 through a space created between the discharge port 36 and step portion 46 at the peripheral edge of the wear plate 42 as the pressure cap 37 and wear plate assembly is pushed back against the biasing of the springs 35 by the sand pressure.

As a result, soft stones, lumps of clay, lumps of tough loam etc. mixed with the sands are completely crushed by the crushing effect of the crush blades and the rotary vane as well as the friction effect among the sands etc, and the crushed material is washed and discharged from the front end of the body between the discharge port and the peripheral edge of the wear plate assembly. Thus there can be effectively obtained sands of good quality.

In addition, since the pressure of the wear plate assembly with respect to the sands can be adequately controlled by adjusting the biasing force of the springs acting on the pressure cap, sands of the best quality can be obtained by adjusting the pressure as required.

Although in the above embodiment the apparatus according to the present invention is described for washing sands, it may be effectively used for crushing a concrete structure or a glass product. More specifically, the apparatus according to the present invention can be used for crushing blocks, for example obtained from old structures, into powder-like cement and the like which may be effectively reused for making a ground bed for a buried pipe or ballast and the like which may be used for a concrete aggregate. Likewise, glass products such as old bottles may be crushed into reusable powder-like glass material in large quantity with ease by using the apparatus according to the present invention.

## Claims

1. Apparatus for washing sand and the like characterised by a cylindrical body (1) having a feed port (8) at one end and a discharge port (36) at the other end, a rotatable main shaft (10) disposed within the body (1), crush blade means (15) mounted on the main shaft (10) and projecting therefrom, a rotary vane (16) mounted to the front end of the main shaft (10), a support arm (25) mounted at the other end of the body (1), a pressure cap (37) having a feed water port (39) supported by the support arm (25) in opposed relationship to the discharge port (36), and spring means (35) acting between the pressure cap (37) and the support arm (25) for biasing the pressure cap (37) towards the discharge port (36).

2. Apparatus according to claim 1 characterised in that the cylindrical body (1) comprises two semi-cylindrical shells (4,5) and has an inside panel (6) attached to the internal surface thereof.

3. Apparatus according to claim 1 or claim 2 characterised in that the main shaft (10) is provided with a plurality of sleeves (13) on which crush blades (15) are mounted in a spiral form or a circumferentially repeated form.

4. Apparatus according to any one of the preceding claims characterised in that the rotary vane (16) comprises a plurality of agitation wings (19) projecting from the outer periphery of a shaft plate (17) therefor.

5. Apparatus according to any one of the preceding claims characterised in that the support arm (25) is integrally provided with an angular body (31) having at each corner a respective threaded sleeve (32) in which a threaded pressure rod (33) is engaged, and the spring means (35) comprises a respective spring (35) acting between each pressure rod (33) and the pressure cap (37) to bias the pressure cap (37) towards the discharge port (36) with the pressure rods (33) each having a respective handle (34) for adjusting the biasing force of the associated spring (35).

6. Apparatus according to any one of the preceding claims characterised in that the pressure cap (37) is provided at the centre of the outer surface facing the support arm (25) with a spline shaft (38) engaged in a bearing (40) on the support arm (25), the spline shaft (38) having a central bore providing the feed water port (39).

7. Apparatus according to any one of the preceding claims characterised in that the pressure cap (37) is provided on the inner surface facing the discharge port (36) with a wear plate assembly (41,42,43).

8. Apparatus according to claim 7 characterised in that the wear plate assembly (41,42,43) comprises an inner disc-shaped wear plate (41) and two outer annular wear plates (42,43) extending around the inner wear plate (41).

9. Apparatus according to claim 9 characterised in that the wear plate (42) has a step portion (46) at the peripheral edge thereof adapted to cooperate with the discharge port (36).

10. Apparatus according to any one of claims 7 to 9 characterised in that the wear plate assembly (41,42,43) is detachably mounted on the pressure cap (37).

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Fig. 1.

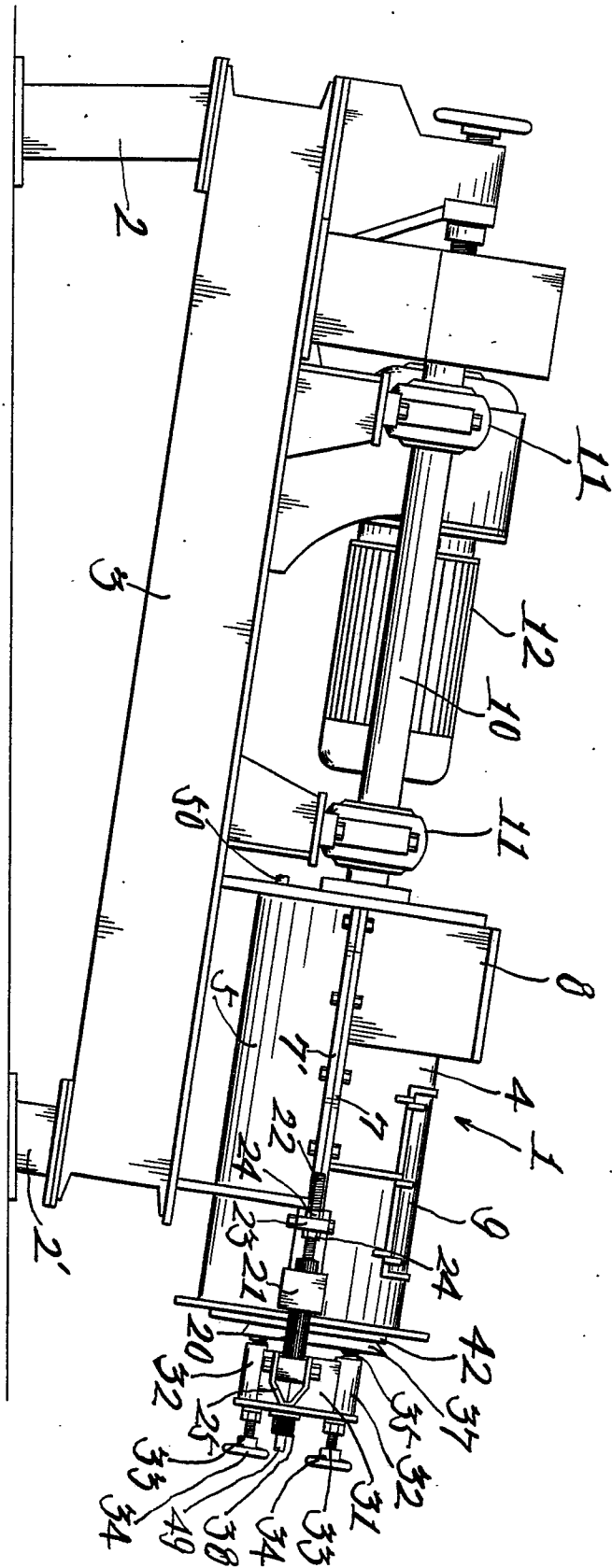
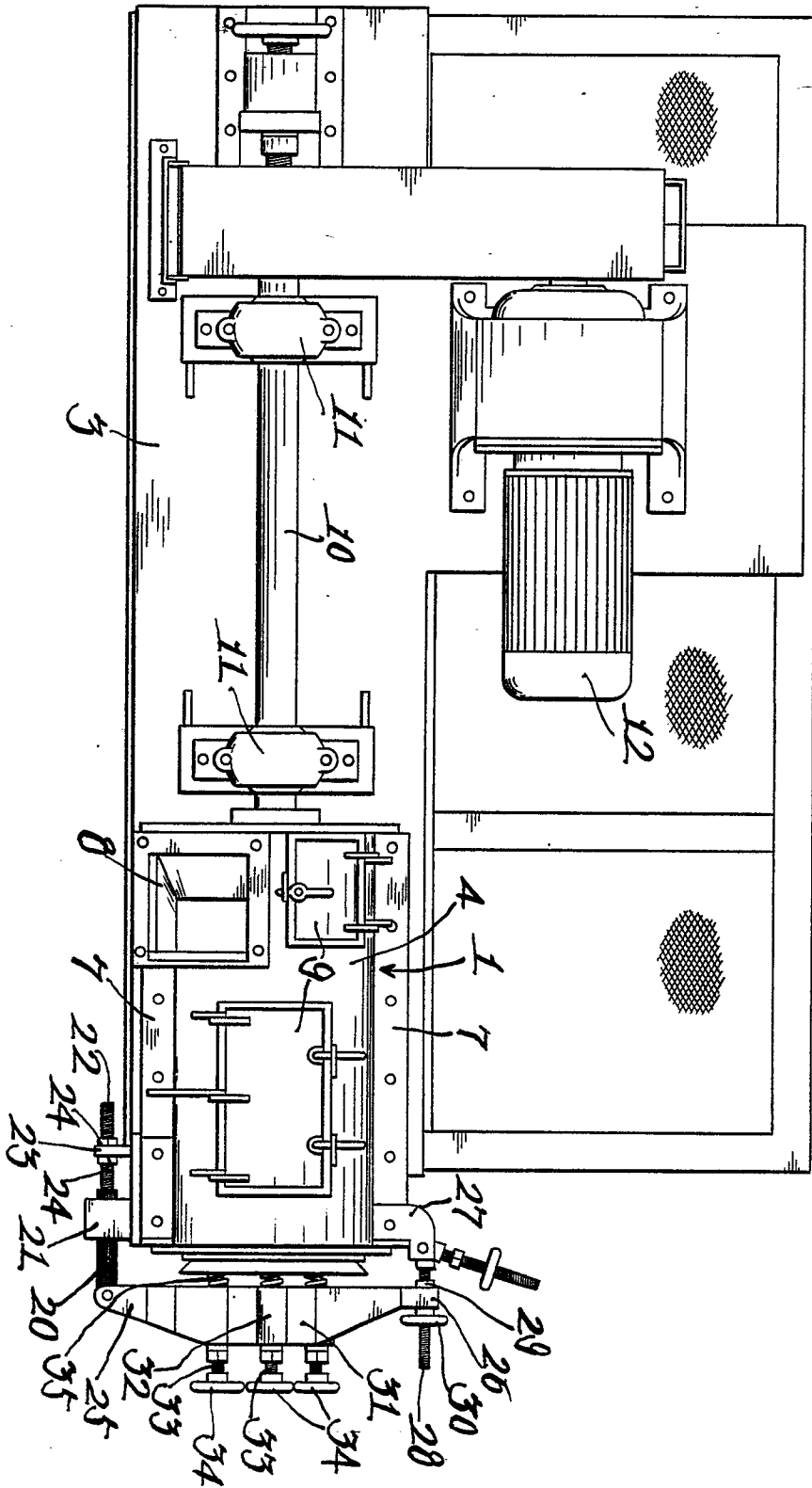


Fig. 2.



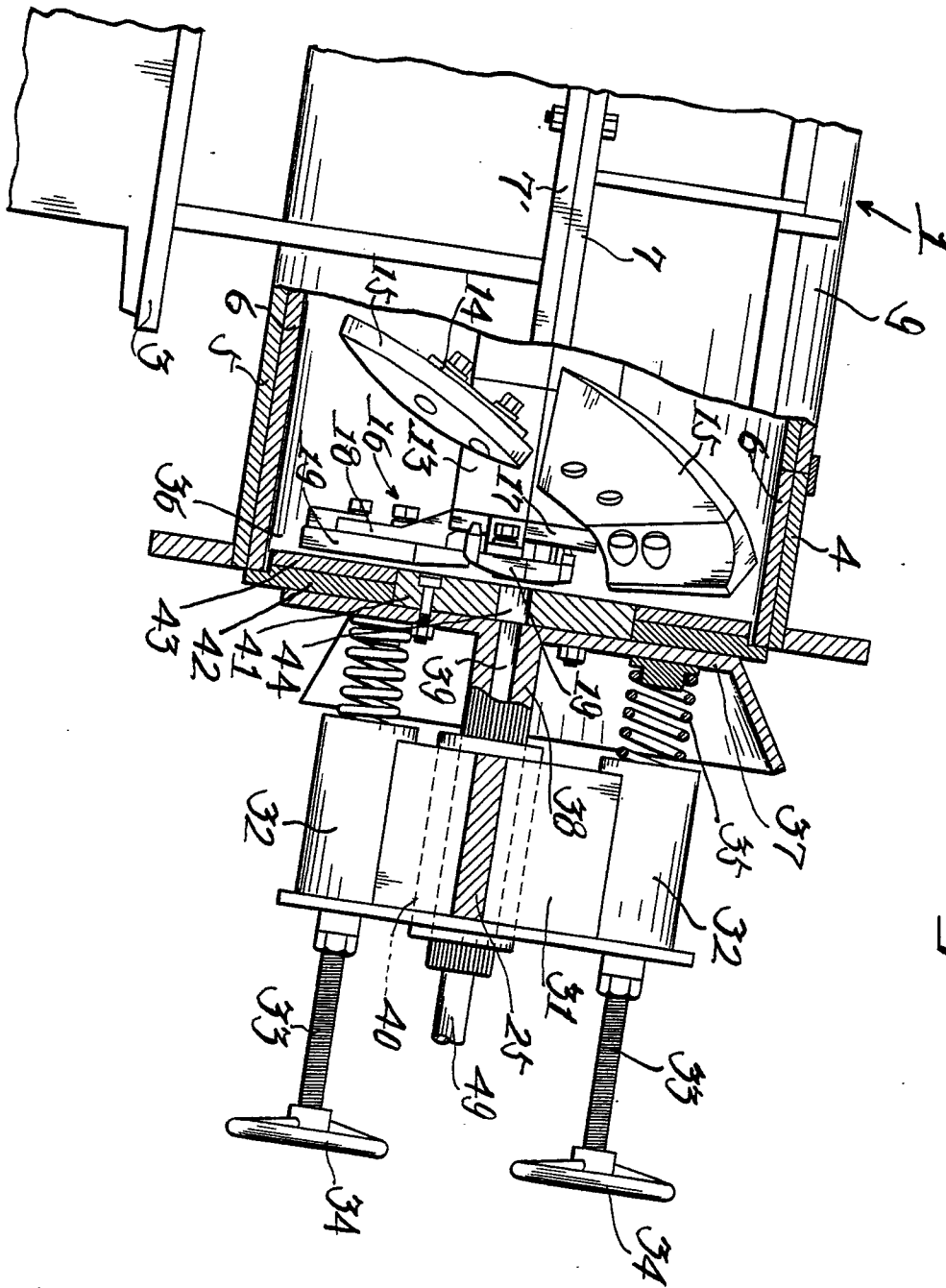


Fig. 3.

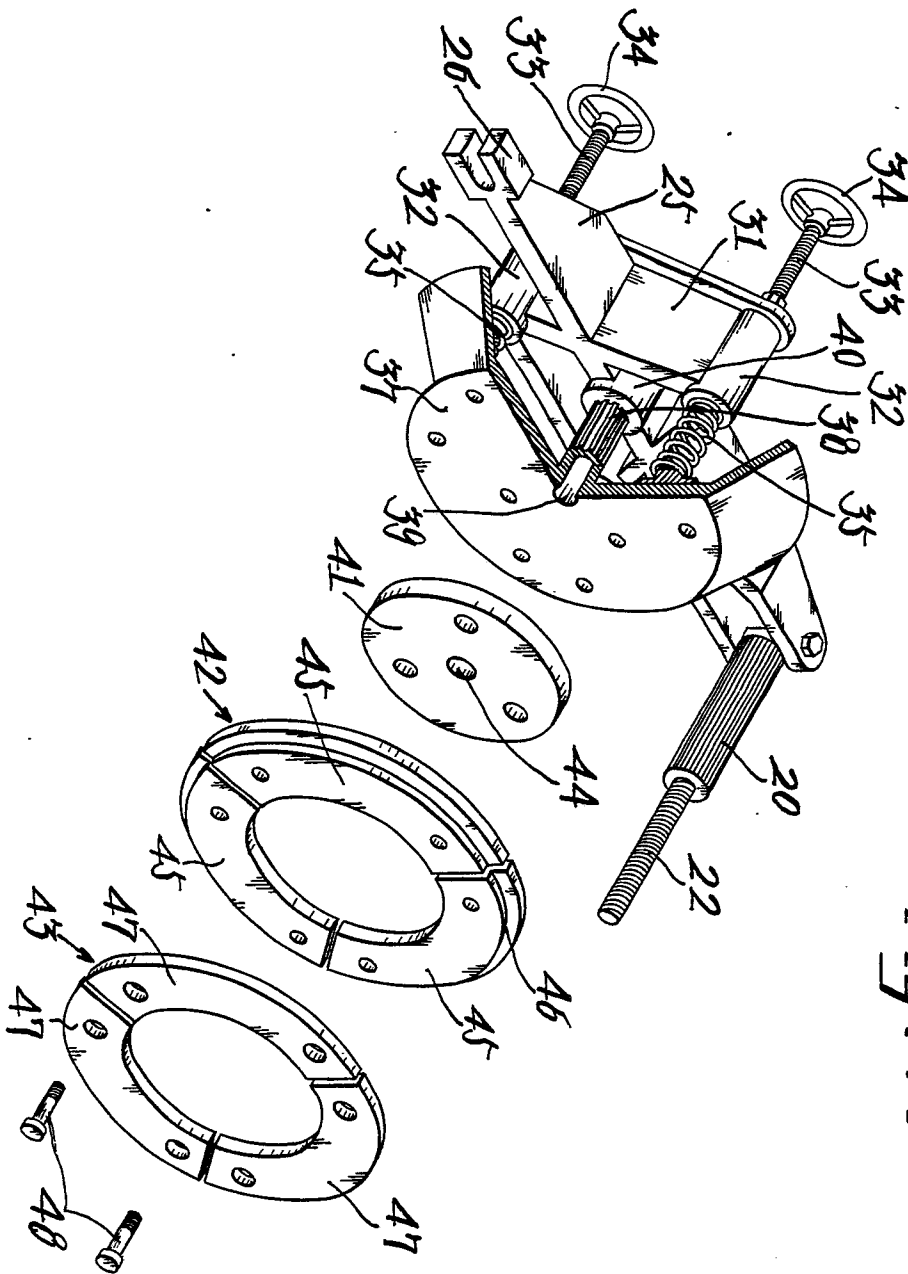


Fig. 4.



*Fig. 5.*