Aug. 16, 1949. J. E. SHOOK 2,479,422

BALANCED MULTIPLE RAM ACCUMULATOR AND INTENSIFIER

Filed Dec. 13, 1945 2 Sheets-Sheet 1

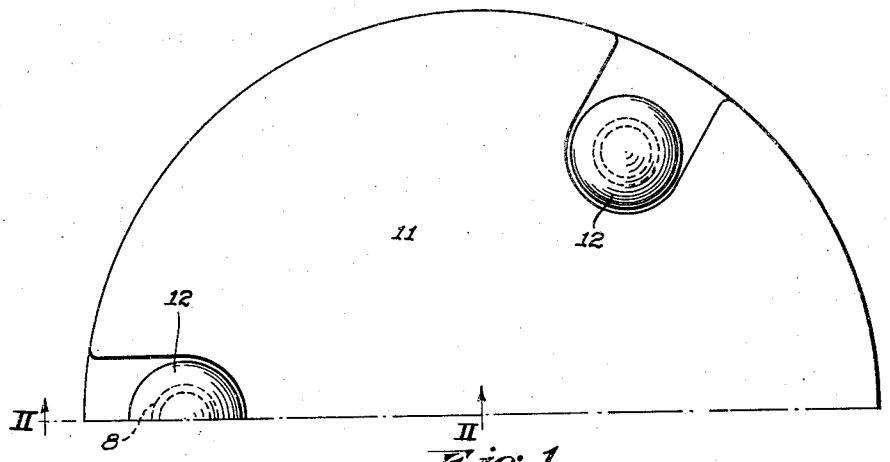


Fig. 1.

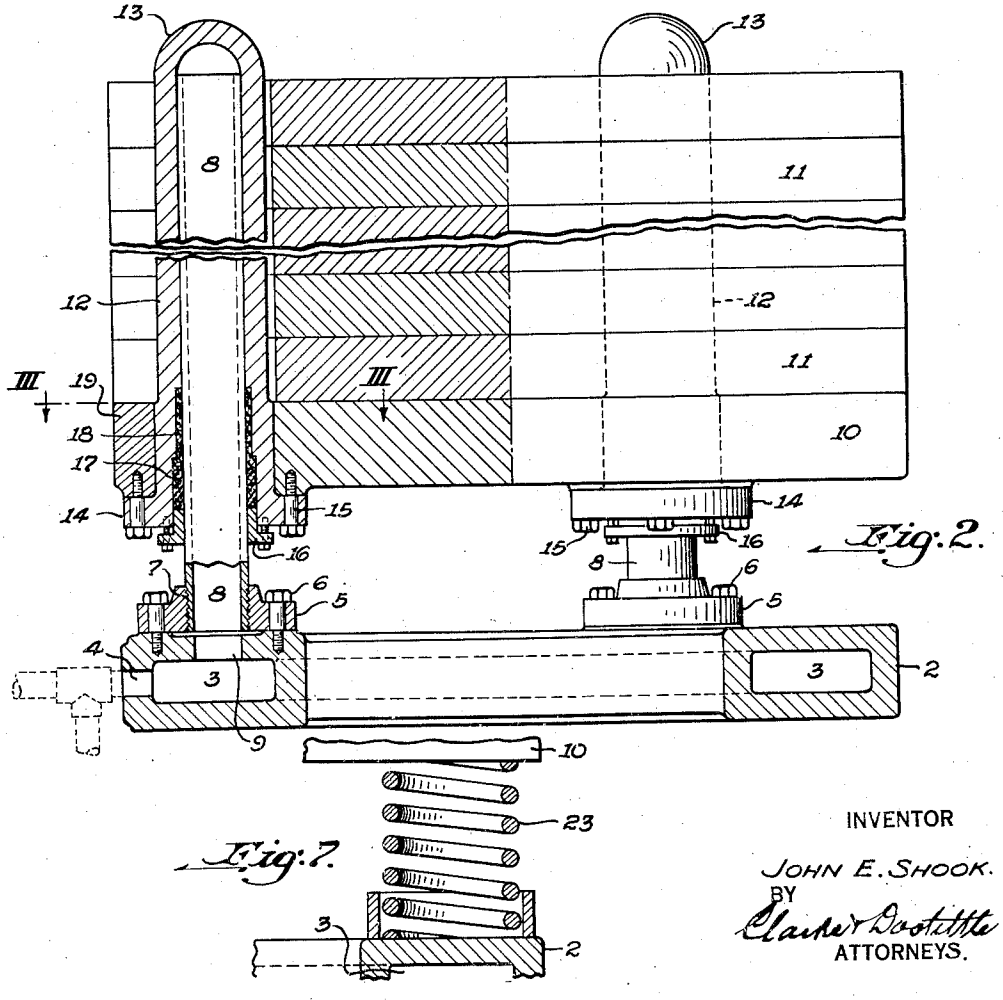


Fig. 2.

Fig. 3.

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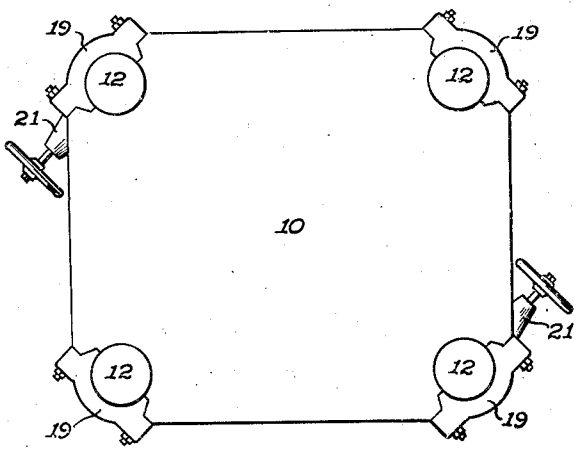


Fig. 4.

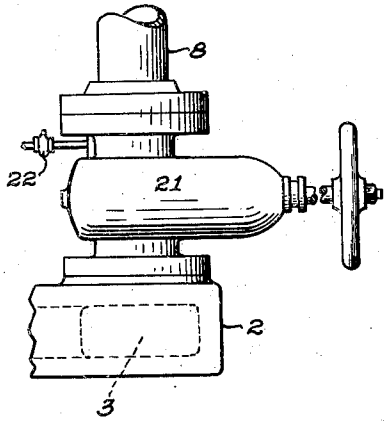


Fig. 6.

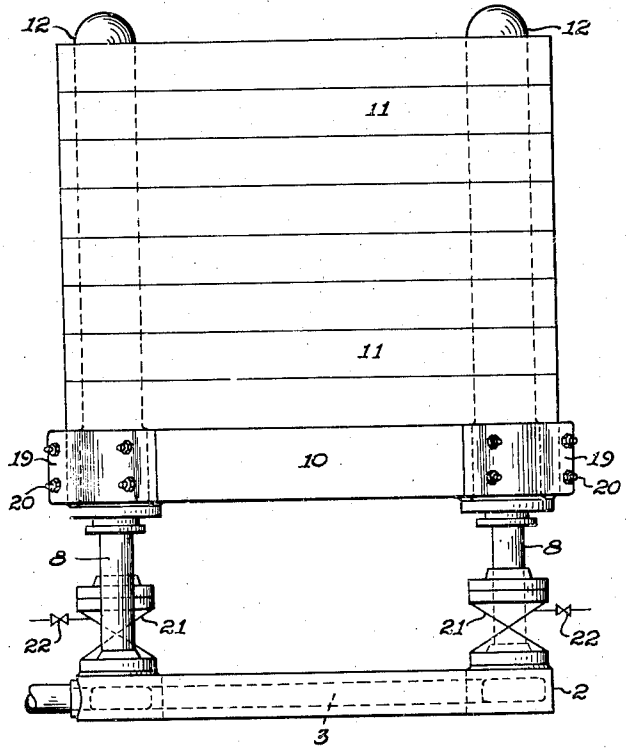


Fig. 5.

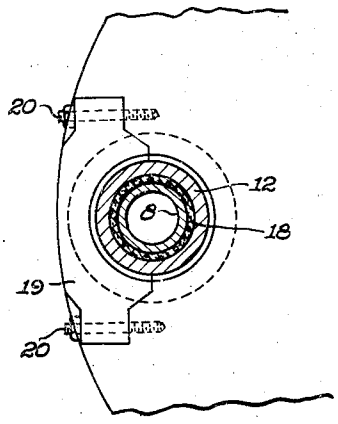


Fig. 3.

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BALANCED MULTIPLE RAM ACCUMULATOR AND INTENSIFIER

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Application December 13, 1945, Serial No. 634,850

5 Claims. (Cl. 138—30)

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My invention consists of an improvement in a balanced multiple ram accumulator and intensifier, for use in connection with any utilizing means subject to the generated pressure thereof.

The objects of the invention are to provide in such an accumulator, a main supporting base, a plurality of cylinders and rams in spaced apart location, connecting same with the base and supporting a superimposed rising and falling weight of material substance, adapted to be elevated and lowered, to perform its intended functions.

Ordinarily, such devices have consisted of a central supporting and elevating ram of the plunger type, a surrounding laterally extending weight or weights, bracing means and connections, and intended to effect generally similar purposes.

In my invention, the base is of ample area, substantially co-extensive with the area of the weight members, the plunger cylinders and rams of any suitable number being located laterally beyond the center, and cooperating with the weight in series of equivalent impulses and resulting lowering, for amplified application of lifting and lowering movements, as shall be more fully hereinafter described.

In the drawings, illustrating certain preferred embodiments of the invention:

Fig. 1 is a one half plan view of an accumulator when provided with a series of three annularly located plunger cylinders and rams;

Fig. 2 is a half elevation and cross sectional view, on the line II—II of Fig. 1;

Fig. 3 is a cross sectional view on the line III—III of Fig. 2;

Fig. 4 is a plan view of an installation utilizing a similar plurality of such members, as four, for reception of the superimposed weights, and provided with localized valves;

Fig. 5 is a front elevation thereof, complete;

Fig. 6 is a view of one of the intensifier valves;

Fig. 7 is a sectional detail view of one form of buffing support for the platform.

Referring to Figs. 1 and 2, the base 2, which may be circular or otherwise, of heavy cast or welded metal, or pipe, is provided with an annular circulation space 3 having connection as at 4 with the input and outflow piping or the like, for introduction of fluid under pressure, for elevation lifting and outflow therefrom respectively, for lowering, and application to any utilizing element, generally similar as to present practice in similar operations.

At preferably equally spaced outer annular locations, are supporting ram bases 5, secured to

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the upper surface of base 2 as by bolts 6, with which are connected in any suitable manner as by threads 7, the upwardly extending tubular open end conduit ram members 8.

These communicate with annular opening 3 by means of a conforming opening 9 at each location of the base, whereby circulation is provided between annular opening 3, and the several tubular ram members 8, simultaneously throughout the series, dependent on the inflow or outflow of the fluid medium.

The weight supporting platform 10, of ample dimensions and thickness for stability, and support of the superimposed weight member or members 11, is provided at locations corresponding to the spacing of the tubular ram members 8, with a corresponding series of cooperating cylinders 12, closely and slidably engaging the continuously hollow ram members.

Such cylinders, of ample dimensions and strength, are telescopically mounted upon and around the open end conduit rams 8, and are preferably rounded and positively closed at their outer ends, as at 13. They are firmly connected with base 10 by flanges 14 and bolts 15 and are preferably provided with stuffing box elements 16, packing 17, and if desired, supplemental bearing rings 18, as shown. They constitute together the elevating and lowering means of the machine. By rounding the upper closing terminals 13 of cylinders 12, placement of the weight members 11 is facilitated.

As illustrated in Fig. 3, the cylinders 12 together with the ram conduits and their bases, are preferably removable radially of platform 10, by means of separable holding caps 19 inserted in suitably spaced radially disposed clearances in the main base platform 10, and held by bolts 20 or other suitable means.

The weights 11 resting upon platform 10 may be of any suitable material, as concrete, series of metal plates, or the like, laid continuously upwardly, and so apertured laterally, as to permit of placement and removal of the ram conduits 8 and cylinders 12, when desired. For such operation, the platform and its gravitating portions 11 may be temporarily supported by suitable means above the base 2.

Otherwise, the cylinders may be permanently installed, extending through the series of weight members, for certain types of the apparatus where removal is not desired. However, facility for such separation is of considerable advantage in disassembling the machine for repair or re-

newal, and is of value in providing safety and economy, as will be readily understood.

In any such operation, the platform and its weights, may be jacked up and temporarily supported by any suitable means, as built up framing supports, or may rest on buffer springs **23** located between the rams, and between the base plate, as in Fig. 7.

Figs. 4 and 5 show a similar construction in which four equally spaced cylinders and rams, of the same general character as above described, are utilized, mounted on a similar hollow circulating base. Such construction is also provided with similar upwardly extending circulating tubular ram members **8**, and cylinders **12**, and otherwise, except as to number, are substantially the same in construction and operation as those above described as to Figs. 1 and 2.

The same general construction is illustrated as to the supporting platform **10**, weights **11**, together with intensifier valves **21** connected with certain of the members **8** through base cavity **3**, and having a bleeder valve **22**, for intensified application of pressure through rams **8**, when desired, dependent on the conditions of desired pressure and varying operation of the entire machine.

Otherwise, the construction is generally the same, and operates in substantially the same manner as above described.

With either form of construction as to location of the cooperating ram conduits and cylinders, the superimposed weight may be raised to the necessary extent by power pressure of the fluid into the interior of base **2**, for lifting, with resulting utilization of the downward pressure for application as desired, the upward and downward movements being necessarily limited by the length of the cylinder and ram.

It will be observed that the machine as thus constructed is always in equilibrium and substantial balance; by reason of the plurality of rams and cylinders, the lifting power is amplified and equally applied at outwardly remote locations for perfect adjustment; the construction insures stability against any tendency to collapse or tilt under lateral strains; and the construction as a whole is in balanced equalization, very substantial and durable by creating an even wear on the ram packing, and capable of continuous accurate and reliable operation, in use.

I claim:

1. An accumulator comprising a main supporting base having an interior circulation cavity provided with means for supply and exhaust, a plurality of spaced apart tubular open end rams communicating with the circulation cavity of the base, a weight supporting platform provided with a series of closed end cylinders telescoped over the rams and in fixed connection with the platform, removable means connecting the cylinders with the platform and for connecting the rams with the base, and removable caps on the elge of the platform holding and permitting removal of the cylinders and rams.

2. In combination with a supporting base having a circulating cavity communicating with means for supply and exhaust, a plurality of tubular open end rams in communication with the base cavity and removably attached to the base, a weight supporting platform having radially disposed recesses, a plurality of raising and lowering cylinders removably secured to the platform and telescopingly engaging the rams, and a corresponding plurality of holding caps for each pair of cylinders and rams securing them to the platform.

3. In combination with a supporting base having a circulating cavity communicating with means for supply and exhaust, a plurality of tubular freely open end rams in communication with the base cavity and removably attached to the base, a weight supporting platform having radially disposed recesses edgewise of the platform, a plurality of raising and lowering cylinders secured to the platform and engaging the rams, and means for removably securing the rams and cylinders to the base and platform respectively consisting of caps for said recesses in holding relation to each assembly of cylinder and ram respectively.

4. In combination with a supporting base having a circulating cavity communicating with means for supply and exhaust, a plurality of tubular open end rams in communication with the base cavity, a pressure supply conduit for the base having an intensifier valve, a weight supporting platform, and a plurality of continuous rounded end cylinders secured to and in elevating relation to the platform and operatively engaging the rams in close telescoping relation thereto.

5. In combination with a supporting base having a circulating cavity communicating with means for supply and exhaust, a plurality of tubular open end rams in communication with the base cavity, a pressure supply conduit for the base having an intensifier valve and a bleeder valve, a weight supporting platform, and a plurality of cylinders secured to and in elevating relation to the platform and operatively engaging the rams in close telescoping relation thereto.

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