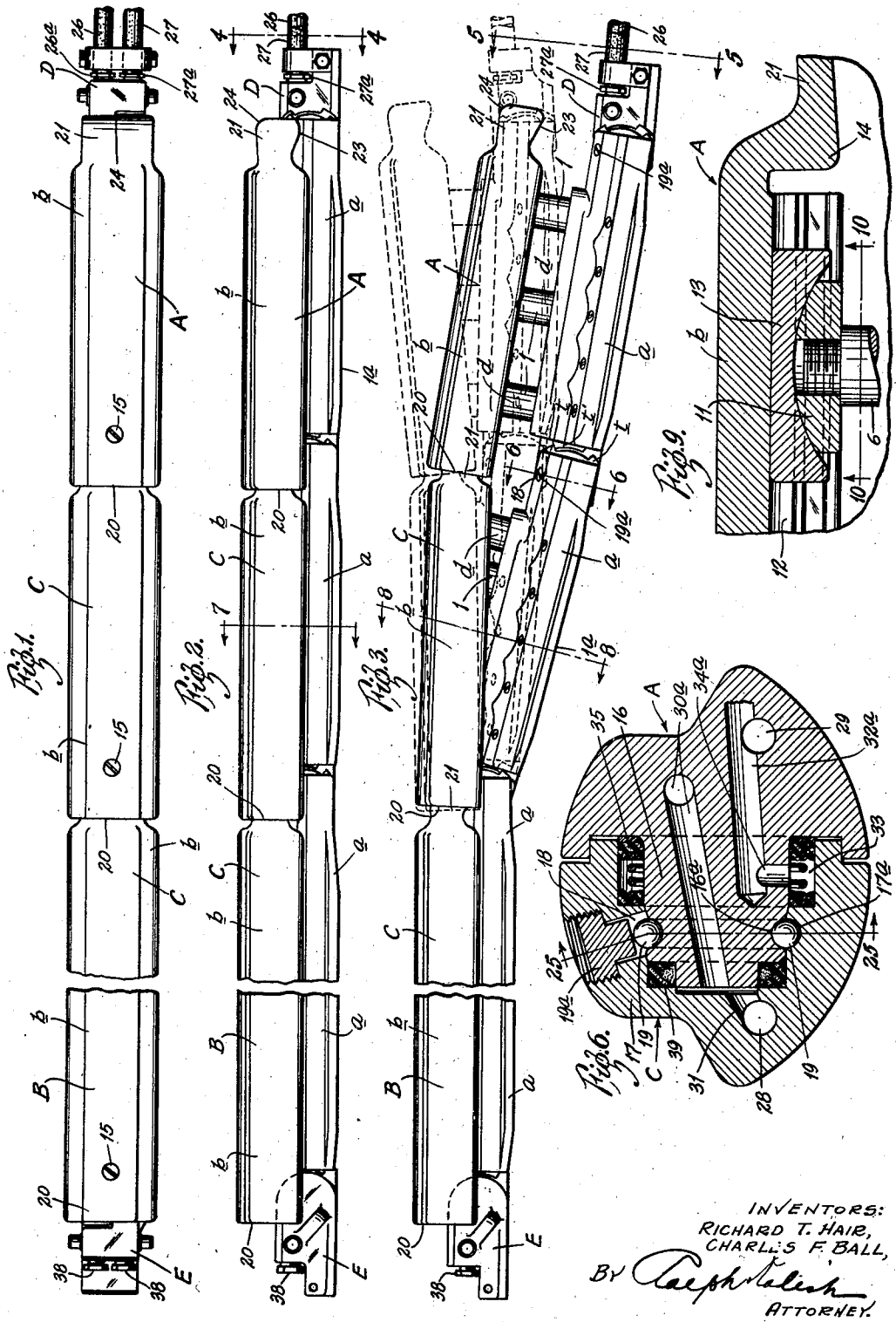
Aug. 12, 1947. R. T. HAIR ET AL 2,425,468

COAL-MINING MACHINE.

Filed April 13, 1944 5 Sheets-Sheet 1



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Aug. 12, 1947. R. T. HAIR ET AL 2,425,468

COAL-MINING MACHINE

Filed April 13, 1944 5 Sheets-Sheet 2

Fig. 4.

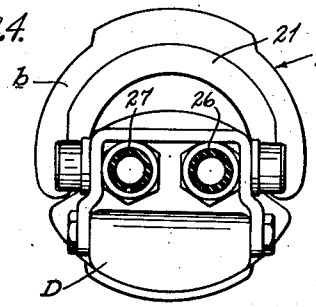


Fig. 5.

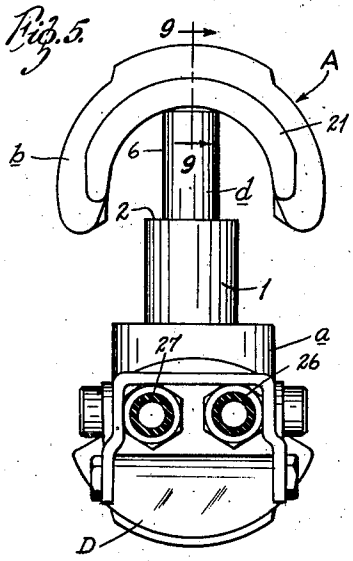


Fig. 11.

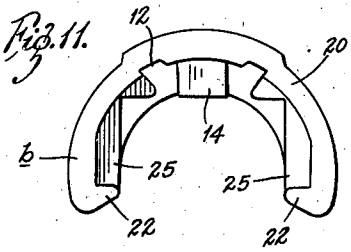


Fig. 13.

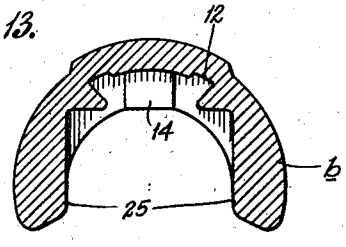


Fig. 7.

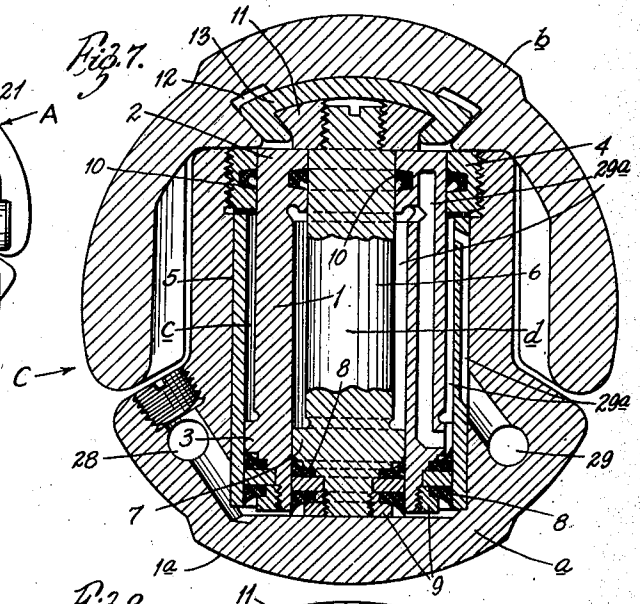
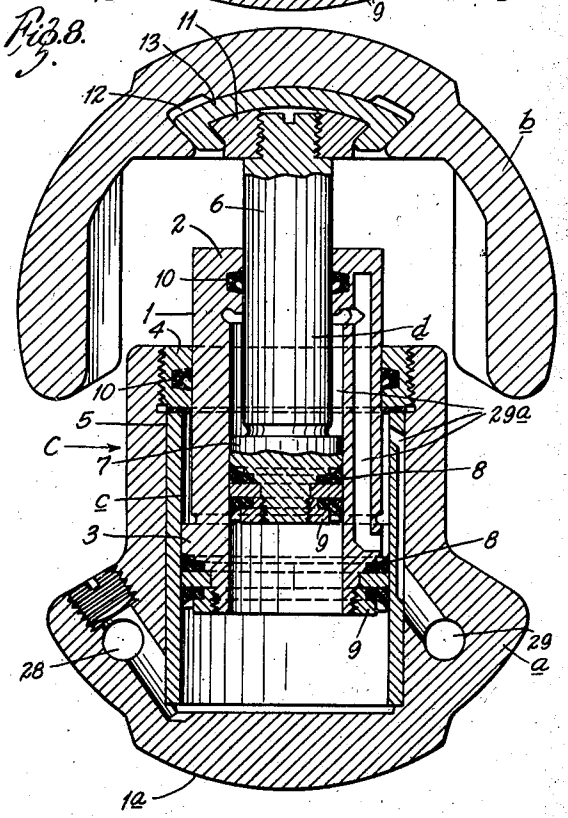


Fig. 8.

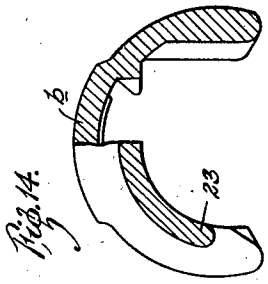


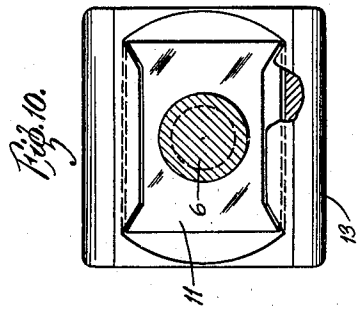
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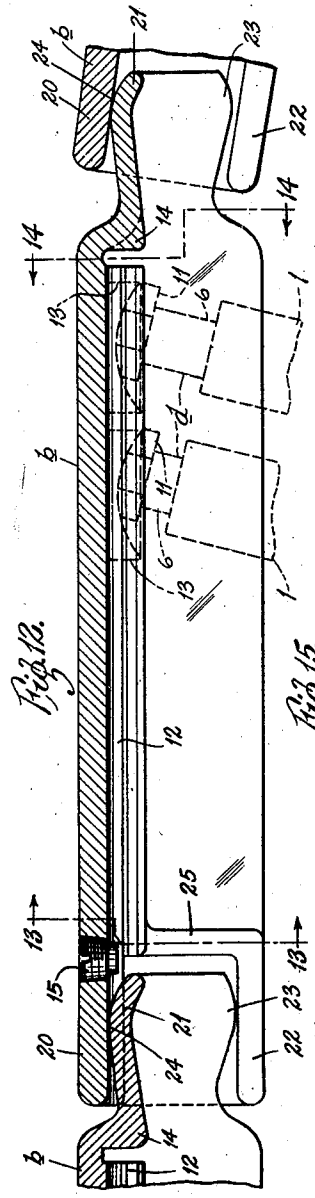
Aug. 12, 1947. R. T. HAIR ET AL 2,425,468

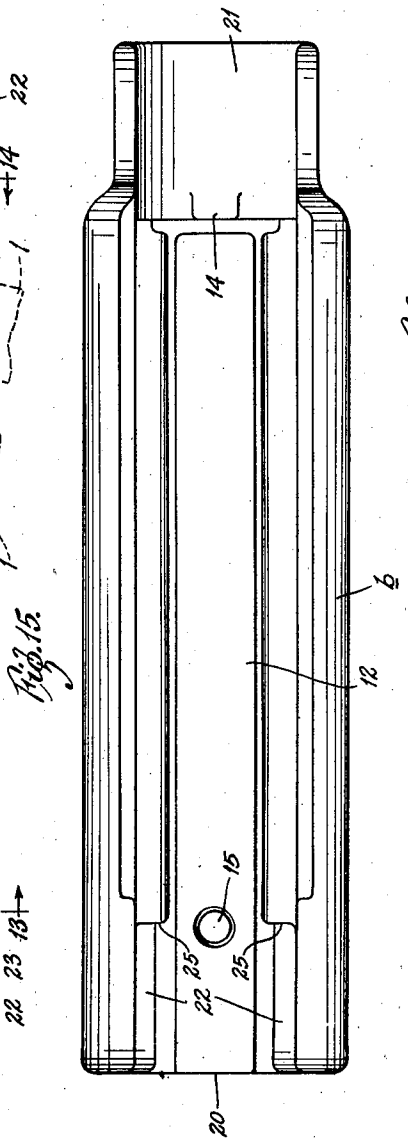
COAL-MINING MACHINE

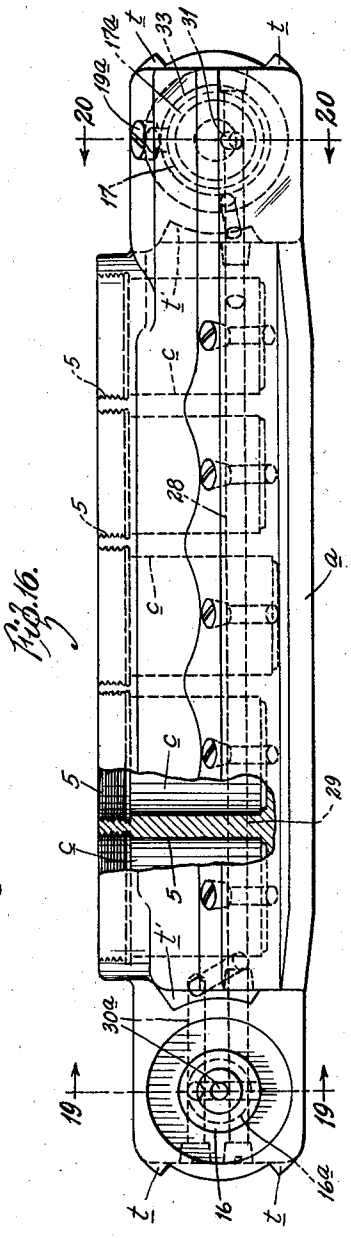
Filed April 13, 1944 5 Sheets-Sheet 3











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COAL-MINING MACHINE

Filed April 13, 1944 5 Sheets-Sheet 4

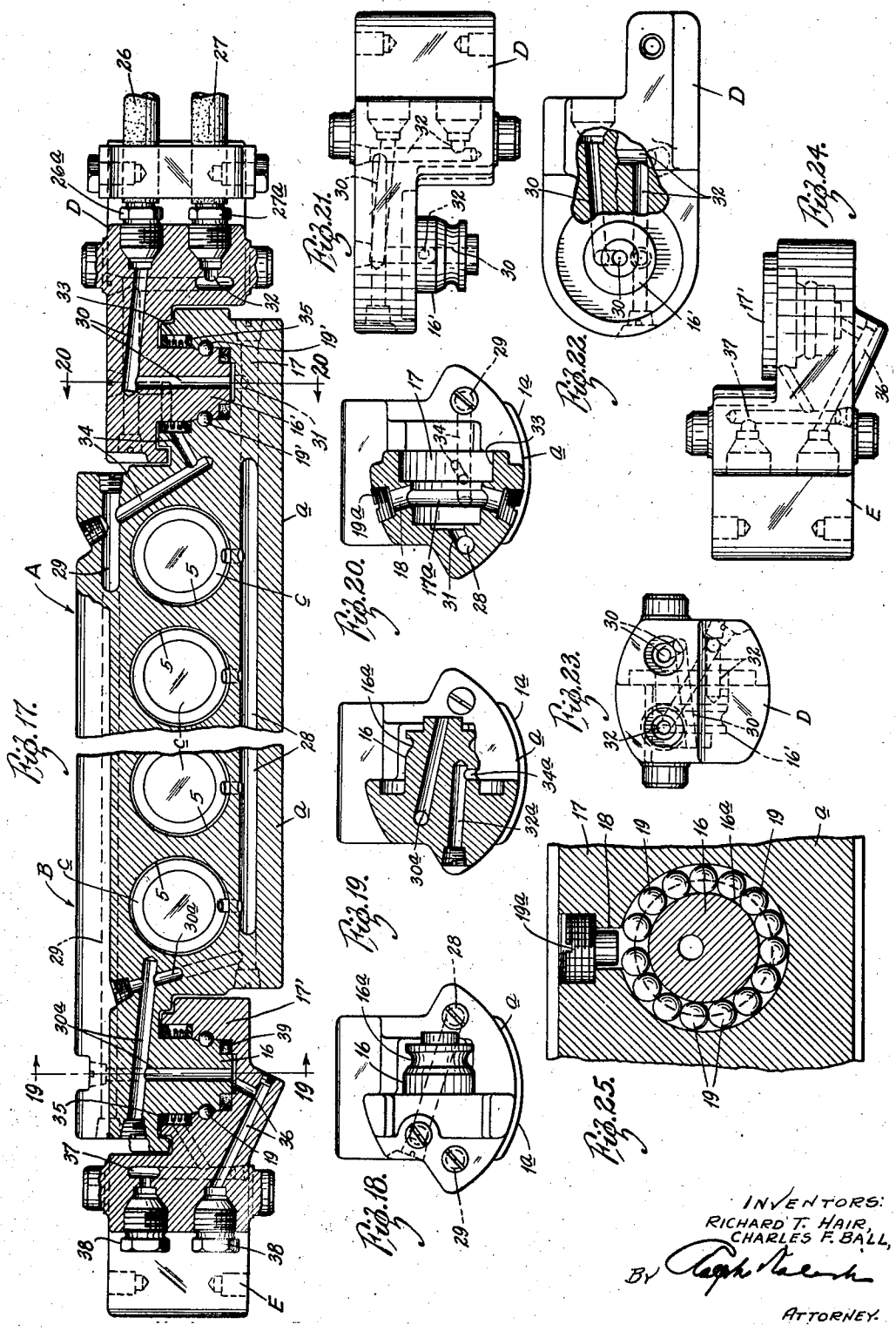


Fig. 17.

Fig. 21.

Fig. 22.

Fig. 24.

Fig. 20.

Fig. 23.

Fig. 19.

Fig. 25.

Fig. 18.

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COAL-MINING MACHINE

Filed April 13, 1944 5 Sheets-Sheet 5

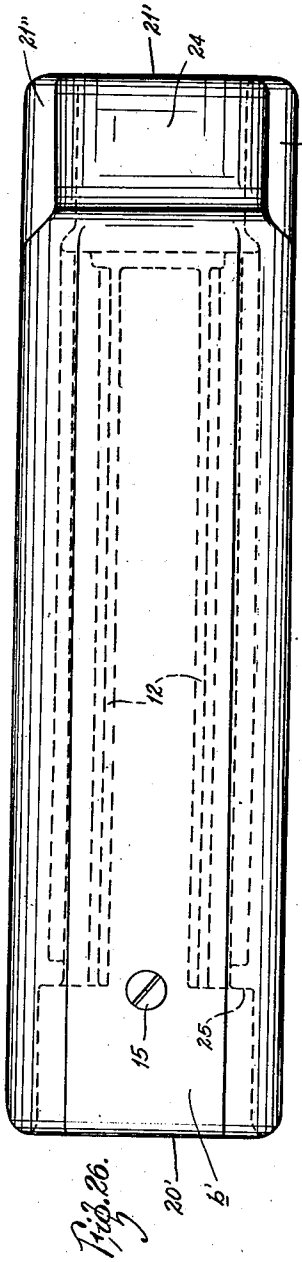


Fig. 26.

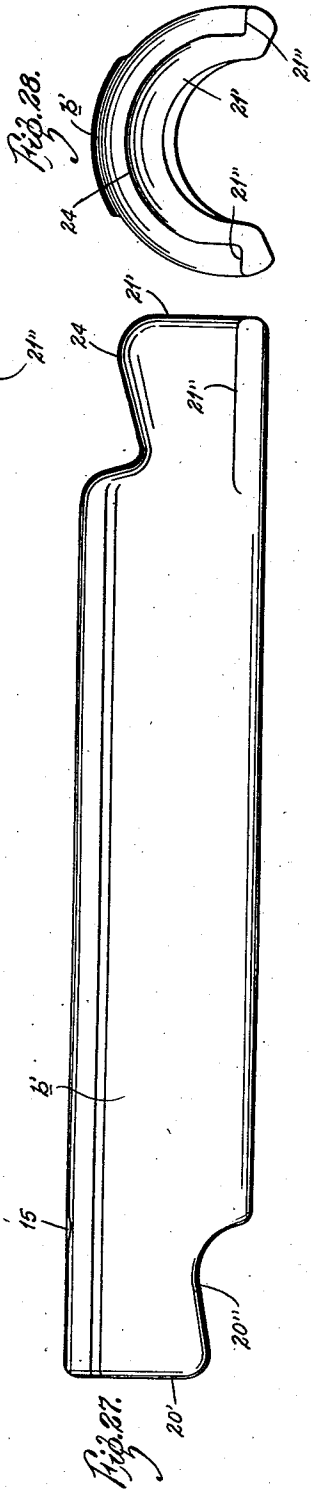


Fig. 27.

Fig. 28.

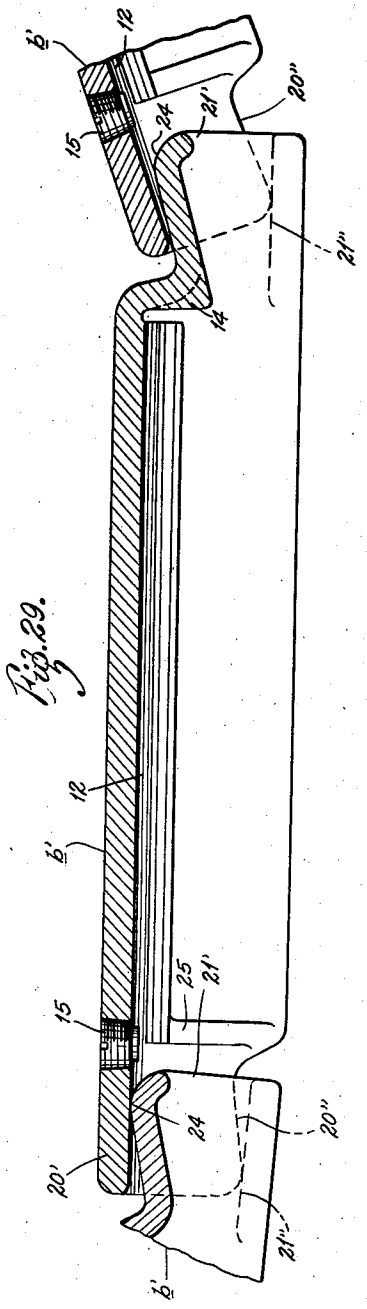


Fig. 29.

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Patented Aug. 12, 1947

2,425,468

UNITED STATES PATENT OFFICE

2,425,468

COAL-MINING MACHINE

Richard T. Hair and Charles F. Ball, Franklin, Pa., assignors to Richard T. Hair, Charles E. Hair, and Binkley Mining Co. of Indiana, a corporation of Indiana, collectively doing business as Hydrabuster Company

Application April 13, 1944, Serial No. 530,790

12 Claims. (Cl. 262—12)

1

This invention relates generally to machines particularly, though not exclusively, adapted for use in coal-mining.

It is common practice in present day coal-mining, so far as we are aware, to first form a kerf in the working face of the coal wall and then to drill or otherwise produce a series of holes at suitable intervals in the face of the coal wall of a horizontal depth approximately equal to that of the kerf. Such holes, it may be observed, are for the purpose of receiving blasting powder or other pressure devices, which, on explosion or actuation, dislodge the coal by moving it toward the kerf.

Dislodging of the coal by blasting powder or by sudden applications of compressed air or gases is accompanied by danger to personnel, loss of time, and, in some instances, economic loss by reason of undesirable excess fragmentation of the coal.

Our invention hence has for its chief object the provision of a rapid method of dislodging coal by means of a hydraulic mechanism capable of saving miners from roof falls caused by the shock of a shattering explosion, such as caused by blasting methods, and also to eliminate excessive fragmentation and dust, as well as danger from fumes, premature explosions, or flying gas cartridges.

United States Letters Patent Nos. 2,346,676, 2,346,677, 2,346,678, and 2,346,679, all issued on April 18, 1944, to Charles Edwin Hair and Richard T. Hair, disclose articulated coal-mining machines of the fluid pressure type, and our present invention has more particularly to do with, and has for an additional object the improvement generally of, coal-mining machines of such articulated fluid pressure type.

And with the above and other objects in view, our invention resides in the novel features of form, construction, arrangement, and combination of parts presently described and pointed out in the claims.

In the accompanying drawings (five sheets)—

Figure 1 is a plan view of a coal-mining machine constructed in accordance with and embodying our present invention, the machine comprising a selected plurality of units for insertion in a hole formed in the working face of a mine and movable relatively to one another, but correlated for co-operative action and the several pistons of the several units being in normal or retracted position;

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Figure 2 is a side elevational view of the machine likewise with the several pistons of the several units thereof in normal or retracted position;

Figure 3 is a side elevational view of the machine with its two right-hand units illustrated as out of alignment and with the pistons of such units in fully and partially expanded or so-called abnormal position, as in a coal dislodging or breaking-down operation;

Figures 4 and 5 are end views of the machine looking in the direction of the arrows 4—4 and 5—5, Figures 2 and 3, respectively;

Figure 6 is an enlarged transverse sectional view taken approximately on the lines 6—6, Figure 3;

Figure 7 is a similar view taken approximately on the line 7—7, Figure 2;

Figure 8 is likewise a similar view taken approximately on the line 8—8, Figure 3;

Figure 9 is an enlarged detail sectional view taken approximately on the line 9—9, Figure 5, looking in the direction of the arrows;

Figure 10 is a longitudinal sectional view taken approximately on the line 10—10, Figure 9;

Figure 11 is a left-hand end view of the upper or so-called yoke or hood of one of the units of the machine;

Figure 12 is an enlarged fragmental longitudinal vertical sectional view of some of the yoke or hood members of the machine, illustrating the associated ends of adjacent or contiguous members and indicating portions of the power-elements for expanding the unit;

Figures 13 and 14 are transverse sectional views of the machine taken approximately on the respective lines 13—13 and 14—14, Figure 12;

Figure 15 is an inverted plan view of the hood or yoke member of one of the units of the machine;

Figure 16 is a side elevational view, partly broken away and in section, of the body or cylinder-block of one unit of the machine;

Figure 17 is, in effect, a horizontal section through the body or cylinder-block of Figure 16, but broken away intermediate its ends to permit drawing to a larger scale and to include the

fluid-coupling blocks applied, respectively, to the right-hand end of the first unit and to the left-hand end of the last unit of the machine;

Figure 18 is a left-hand end view of the cylinder-block shown in Figure 16;

Figures 19 and 20 are transverse vertical sections respectively taken approximately on the lines 19—19 and 20—20, Figures 16 and 17, but showing the body-structure only and omitting the fluid-coupling blocks;

Figure 21 is a plan view of the fluid-coupling block at the right-hand or front end of the machine;

Figure 22 is a side view, sectioned in part, of the portion of the machine or structure shown in Figure 21;

Figure 23 is an end view of the portion of the machine or structure shown in Figures 21 and 22;

Figure 24 is a plan view of the fluid closure block or member at the rear or left-hand end of the machine;

Figure 25 is an enlarged transverse vertical section taken approximately on the line 25—25, Figure 6;

Figure 26 is a plan view of a hood of slightly modified form;

Figure 27 is a side elevational view thereof;

Figure 28 is a right end elevational view thereof; and

Figure 29 is a view analogous to Figure 12, illustrating the modified hood arrangement.

Referring now more in detail and by reference characters to the drawings, which illustrate a preferred embodiment of our invention, the machine, briefly outlined, comprises a front end unit A, a rear end unit B, a desired or selected number of intermediate units C, and preferably front and rear fluid pressure supply and closure members D and E, respectively, all pivotally or hingedly coupled end to end in integrated articulate relation for insertion or disposition endwise in a hole, for example, in the working face of a coal-body.

Each such unit A, B, or C is suitably elongated and of selected height and dimensions for strength and rigidity and includes, in turn, a body or base *a* and an upper or so-called hood or yoke-member *b*, associated with which is a selected plurality of power elements or jacks each comprising a cylinder *c* opening to and upon the upper face of the block *a* and a co-operating fluid pressure actuated piston *d*, the several pairs of cylinders and pistons being spaced longitudinally of the unit with the axes of the cylinders and their co-operable pistons extending at right angles to the length of the unit.

Each cylinder *c* is recessed or otherwise suitably formed in the body or block *a*, as perhaps best seen in Figure 16, the block *a* preferably having a rounded or arcuate under face, as at 1a, as best seen in Figures 7 and 8.

Each piston *d* is preferably of the telescoping or double acting type for securing greater range of movement and comprises an outer hollow or tubular portion 1 having at its upper end an inwardly presented annular flange 2 and being annularly enlarged and thereby provided adjacent its lower end with an annular shoulder, as at 3, for engagement with a ring 4 thread-seated in the upper end of the cylinder-cavity 5 for limiting outward or expanding movement of the piston-portion 1 with respect to the cylinder *c*. A piston-rod portion 6 is similarly enlarged and thereby provided at its lower end with an annular shoulder, as at 7, for engaging the flange 2 for similarly limiting outward or expanding movement of the rod 6 with respect to the tubular member 1. It might be here mentioned that the cylinder *c* and the piston *d* are so relatively proportioned and sized as to be completely nested when in contracted condition, as best seen in Figures 4 and 7, and to have a stretch of approximately three inches when in fully expanded or extended condition, as best seen in Figure 5.

At their respective lower ends, it may be also here mentioned, the piston-members 1 and 6 are annularly reduced, as best seen in Figures 7 and 8, for accommodating suitable cylinder-wall engaging or sealing ring-assemblies 8, 8, preferably held in place by suitable flanged caps 9, while the ring 4 and piston flange 2 are preferably suitably provided with packing-members 10, all for facilitating proper piston reciprocation.

One or more of the power elements or jacks in each unit may be, it may be here stated, arranged for application of suitable pressure fluid selectively to either side of the piston, so that the yoke or hood-member *b* may be forced not only to projected position, but also to retracted position, the latter facilitating the freeing of the machine from the walls of the drill-hole and dislodged coal. In the present instance, the several pistons of each unit are so arranged, the conduits for leading pressure fluid to the several cylinders *c* and pistons *d* being presently fully described.

While the axis of each jack or co-operable cylinder *c* and piston *d* is fixed relatively to the block or base *a*, the connection between each piston *d* and the yoke or hood *b* of each unit is such as to permit relative longitudinal and angular movement therebetween, as shown or indicated, for instance, in Figures 3, 7, 8, 10, and 12.

To provide for this movement of the hood or yoke *b*, each of the piston rods 6 is provided at its outer end with a pillow-block 11, the outer or upper face of which has an arcuate contour longitudinally of the yoke *b* (Figures 8 and 9). A pillow-block 13 having an arcuate under face for mating with the arcuate outer face of the pillow-block 11 is seated for turning movement thereon. The pillow-blocks 13 have their outer surfaces shaped somewhat similarly to a keystone and are mounted for sliding movement in a similarly shaped keystone groove 12 which extends longitudinally of the yoke *b*.

From the foregoing construction, it is apparent that the interengaging mating arcuate faces of the pillows 11 and the pillow-blocks 13 permit the pistons *d* to tilt or turn in a plane extending longitudinally of the yoke *b*, while the blocks 13 slide freely relatively to the yoke *b* as the pistons *d* or the block *a* assume an angular position relatively to the yoke *b*. In assembling a hood or yoke *b* upon several pistons of the particular unit, the blocks 11 and 13 are disposed in co-operative slidable relation, and a yoke or hood *b* then endwise slidably fitted upon the blocks 13, the latter being accommodated in the groove 12. Hence, it may further be said here, the block or base *a* of a unit may move or shift both with and relatively to its companion yoke or hood *b* in a coal dislodging operation, a lug 14, Figure 12, near the right-hand end of the yoke *b* and a detachable locking-plug 15 threaded through the yoke *b* near its left-hand end retaining the base *a* and yoke *b* of a unit in operative relation.

The body or base member *a* of preferably each unit A, B, and C is constructed for connection at both ends to an adjoining member *a* or to the end-members D, E, through overlapping and in-

terfitting end-portions assembled with each other to pivot about an axis extending transversely of the length of the machine, so that the several units or members of a machine may thereby articulate in an up-and-down direction. For such purpose, the body or block *a* of each unit is longitudinally extended at one end in the provision of a trunnion 16 and at its other end in the provision of a co-operable cup 17, the cup 17 of one unit receiving and interfitting with the trunnion 16 of an adjoining unit. Each of the extended ends of the base-block *a* is provided with a pair of projecting vertically spaced stop abutments *t, t,* and the adjacent end faces of each block *a* is provided with a projecting arcuate tongue *t'* sized and positioned for limited swinging movement between the pair of stop abutments *t, t,* on the next adjoining block *a* so as to limit the relative rocking movement of the adjoining units. Each trunnion 16 is furthermore provided with a peripheral semi-circular groove 16ª which registers in opposing relation with a companion or corresponding groove 17ª on cup 17 in the provision of a race or slot for receiving through an aperture or opening 18 formed for the purpose in the surrounding cup 17 a series of balls or spheres 19 for securing the trunnion 16 and cup 17, and consequently also the two particular or adjoining units, together for relative pivot or hinge movement in an up-and-down direction, the locking spheres 19 being retained in their slot by means of a closure plug 19' thread-seated in the opening 18 and the trunnion 16 and cup 17 firmly securing such adjoining blocks *a* against separation or relative longitudinal movement.

As will be evident, however, as seen in Figure 3, the yokes *b,* for successful operation of the machine, should be permitted relative longitudinal movement, as well as relative angular movement, with respect to adjoining units. Hence, each yoke *b* at its left-hand end 20 is approximately semi-cylindrical and of tubular formation in cross-section, as seen in Figures 11 and 12, to receive the right-hand end 21 of a contiguous yoke *b,* which is also semi-cylindrical and of tubular formation in cross-section, but with an outside diameter corresponding to the inside diameter of yoke end-portion 20, the inner face of yoke end-portion 20 being straight, longitudinally of the yoke, to accommodate lengthwise sliding movement of the two yoke end-portions 20, 21, on each other. At and along its lower margins, each yoke end-portion 20 has inwardly turned flanges 22 opposing the lower margins 23 of the associated yoke end-portion 21, whereby the adjacent yoke end-portions are securely held against relative bodily movement vertically of their length. Upon its outer face, the yoke end-portion 21 is curved longitudinally of the yoke, as at 24, so that the assembled yoke-ends may readily incline, as well as slide, lengthwise relatively to each other as occasion may require in a coal dislodging operation, spaced webs 25 formed in the one yoke-portion 20 in suitably spaced relation to its end margin strengthening the yokes *b* of contiguous units.

With the blocks *a* and yokes *b* of contiguous or successive units assembled and joined as described, in a coal dislodging operation the several blocks *a* and yokes *b* are free to take different angular positions within the limits permitted by the interengagement of the abutment tongues *t, t,* and the stop tongue *t',* resulting in what may be referred to as "limited articulation," and also the co-operable jack-forming cylinders *c* and pistons *d* of the several units may take different expanded positions, as best indicated in Figure 3, without undue stress, and, if expansion of one unit, such as A in Figure 3, results in yielding of the material or coal-body engaged by the machine, the thrust exerted by the pistons *d* of unit A will be transferred to and taken up by the adjacent unit C.

The hydraulic or other pressure fluid for actuating the jacks or cylinder-and-piston-power elements of the machine is supplied from a pump or other suitable source of supply (not shown) and enters the machine at the right-hand or forward end thereof through two tubular or pipe-members 26, 27, of which pipe-member 26 conveys the fluid for the expanding action of the machine and the tubular-member 27 conveys the fluid for the contracting action of the machine. Tubes 26 and 27 are connected to the front coupling block or member D, which has a trunnion 16' corresponding to the trunnion 16 at the left-hand end of each unit body *a.* Trunnion 16' is received in the cup 17 at the front or right-hand end of the block *a* of unit A and is similarly retained in assembly therewith by spheres or balls 19'.

Each body or cylinder block *a* has conduits 28 and 29 extending substantially throughout its length upon opposite sides of its cylinders *c,* the conduit or channel 28 having communication with the base or closed end of each cylinder *c* of the unit, substantially as shown, for expanding the several pistons, and the conduit or channel 29 having communication with channels 29ª in a selected piston or pistons *d* of the unit, substantially as shown, for contracting the several pistons.

Pressure fluid from tube 26 is delivered to body-conduit 28 through a channel or passageway 30 in block or member D, as best seen in Figures 17, 21, 22, and 23, the passageway or channel 30 extending inwardly and downwardly from the tube-nipple 26ª and then transversely and downwardly to an orifice at the end of trunnion 16' and on the axis of the latter in registration with an orifice of a passageway or channel 31 in body *a* leading to and communicating with conduit 28. Pressure fluid from tube 27 is delivered to the conduit 29 through a passageway 32 in block D, the passageway 32 extending inwardly and downwardly from the tube-nipple 27ª and then transversely beneath passageway 30 to a radial orifice in trunnion 16' to an annular chamber formed between trunnion 16' and an enlarged bore 33 in the cup 17 of unit A, from which a passageway 34 leads to and communicates with conduit 29.

Conduits 28 and 29 of one body-member *a* have communication with the corresponding conduits in the adjacent body-member *a* through passageways or channels 30ª, 31, 32ª, and 34ª disposed similarly to the two passageways 30 and 32, as best seen in Figure 6, suitable preferably spring-pressed packing 35 being interposed between the trunnion 16 or 16' and cup 17 for sealing the joint between such parts against escape of pressure fluid.

At its left-hand end, the rear unit B of the machine is in like manner coupled with the end-block E and its pressure fluid passageways are preferably closed by the coupling block E, which has a cup 17' for receiving the trunnion 16 of the end unit B and channels or passageways 36 and 37 for receiving the fluid discharged from passageways 30ᵇ and 32ᵇ, respectively, the channels or passageways 36 and 37 being closed by closure-plugs 38, which may be removed for at-

taching tubular or pipe-members to this end of the machine.

In this connection, it may here be said that the machine as a whole may include any selected number of units disposed in end-to-end relation and joined so as to permit the blocks *a* and yokes *b* of the respective units to shift one relatively to the other in an up-and-down direction, the balls or spheres 19, 19', functioning not only as anti-friction members for facilitating hinged movements or articulations of the respective units, but in also retaining such units in such hinged or articulate relation, the expanding actuating fluid entering the end unit A flowing into and through the several cylinder-chambers *c* of the one unit and then, in succession, through the several cylinder-chambers *c* of the remaining units of the machine and is drained back to the source of supply, as presently appears, the several pistons *d* of the several units being telescopically extended as the actuating fluid thus flows from one cylinder to the next cylinder of the particular unit, and the contracting fluid entering the end unit A similarly flowing into and through the several pistons *d* of the one unit and then, in like manner, in succession, through the several pistons *d* of the remaining units of the machine and is in due course drained back to the source of supply and the several pistons *d* contracted and their attached yokes *b* being positively returned to normal positions.

Accordingly, in use and operation, a kerf is suitably formed or produced in or adjacent the bottom level of the particular wall or body of coal being mined, and in suitably spaced relation upwardly from such kerf a desired plurality of suitably spaced holes of suitable depth are formed in the coal-body. One or more machines of our invention are then lengthwise disposed in selected holes, with the several pistons *d* of the respective jacks or power elements thereof in contracted condition or in the condition thereof illustrated in Figures 1, 2, and 7.

The tube or pipe 26 of the end block D of the particular machine is suitably connected with a source of fluid supply, and the fluid in sufficient volume or amount led into the successive cylinders *c* of the successive jacks of the several units of the machine. Hence, as the pistons *d* of a unit A are thus successively elongated or extended, that portion of the coal-wall intermediate said kerf and said several holes is, under the relatively great pressure exerted upon the coal-wall or body by the elongating pistons *d*, successively disrupted and dislodged and its removal from the mine thereby conveniently facilitated.

In such a dislodging operation, the pivot or hinged coupling between the several blocks *a* and also the sliding connection between the several yokes *b* of the several units of a machine readily permit a hingedly shifting movement in graduated increasing amount from the base *a* of each unit to its yoke *b*, comparable to the greater movement of the rim of a wheel as compared to its hub, in an up-and-down direction between the respective units of the machine, with the result that, as the coal shifts under the disrupting pressure exerted thereon by the hoods or yokes *b* under the power exerted by the successively expanding pistons *d* of each successive jack, any one or more of the units of the machine may readily hingedly move obliquely in an up-and-down direction with respect to the remaining units, as indicated in Figure 3. In all such movements, the outward movement of the pistons *d* is limited and controlled by the companion shoulder-couplets 3—4 and 2—7 and, also, the blocks *a* and yokes *b* of the several units may rock or shift with the breaking coal. Hence the machine augments and facilitates shifting movement of the dislodged coal, and at the same time the relative flexibility of the several units and their several jacks and yokes eliminates and obviates breaking of the machine in or by shifting movement of the disrupted coal, the respective arcuate faces of the respective blocks *a* and of the companion pillows 11—13 and the pivotally shifting movement of the coupling means between the several units of a machine facilitating engagement of the machine with the coal-body, as well as subsequent movement of the respective units under the shifting movement of the disrupted coal.

Now, following the completion of a dislodging operation, the motive or pressure fluid in conduits 28 and their associated or communicating channels is permitted to escape to a suitable reservoir, and, at the same time, motive or pressure fluid is supplied to the selected piston or pistons *d* through conduits 29 and the described communicating ways or channels for positively returning the several pistons *d* and attached yokes *b* to normal contracted condition, when the machine may be easily removed for successive operations. In this connection, it may be observed that the several yokes or hoods *b* pivotally shift with, and slidably move relatively to, their respective units, as well as also shift vertically, as it may be said, by and with the piston-rods 6 relatively to the blocks *a* during their coal dislodging travel and thus function in exerting upon, and distributively through a relatively greater area of, the engaged coal the breaking or dislodging pressure developed by the several pistons *d* and in subsequently facilitating removal of the unit when the several pistons thereof recede to normal contracted condition.

As depicted in Figures 26 to 29, both inclusive, a modified form of hood has been found by test to be desirable under certain conditions, particularly when extreme differences in the angularity of adjacent hoods occurs.

In this embodiment, the inwardly turned flanges 22 are dispensed with and the end-portion 20' of the hood *b'* is cut away at its lower left-hand extremity and curved or rounded, as shown at 20''. The opposite end 21' of hood *b'* is provided with outwardly turned flanges 21'' at its lower right-hand extremity. In all other respects, the hoods *b* and *b'* are similar.

In use, the rounded portions 20' of one hood *b'* slidably engage and interfit with the outwardly turned flanges 21'' of an adjacent hood. The hood joint thus formed is similar to that of the main form, and functions in the same manner, but permits adjacent hoods to assume positions of relatively greater angularity.

Preferably each trunnion-cup connection is suitably equipped with a sealing gasket 39, as best seen in Figure 6, and it is to be understood that changes and modifications in the form, construction, arrangement, and combination of the several parts of the machine may be made and substituted for those herein shown and described without departing from the nature and principle of our invention.

Having thus described our invention, what we claim and desire to secure by Letters Patent is:

1. In a mining-machine, a jack-unit including an elongated block, a series of spaced parallel cylinders in the block, pistons reciprocable in and

with respect to the cylinders, each piston having an arcuate upper face, pillow-blocks each having a matching-arcuate under face disposed loosely in engaging relation upon the upper faces of the respective pistons, and an elongated rigid yoke having connection with the several pillow-blocks and being shiftable by and with the pistons throughout their stroke.

2. In a mining-machine, a jack-unit including an elongated block, a series of spaced parallel cylinders in the block, pistons reciprocable in and with respect to the cylinders, each piston having an upper face of arcuate conformation longitudinally of the block, pillow-blocks each having a matching arcuate under face disposed loosely in engaging relation upon the upper faces of the respective pistons, and an elongated rigid yoke having slidable connection with the several pillow-blocks, the yoke being shiftable by and with the pistons throughout their stroke and the several pistons being tiltable relatively to the pillow-blocks.

3. In a mining-machine, a jack-unit including an elongated block, a series of spaced parallel cylinders in the block, pistons reciprocable in and with respect to the cylinders, each piston comprising telescopically co-operable members and each having an upper face of arcuate conblocks each having a matching arcuate under face disposed loosely in engaging relation upon the upper faces of the respective pistons, an elongated rigid yoke of arcuate contour in cross-section having a slidable connection at its central under face with the several pillow-blocks and umbrella-wise disposed over the several pistons, and means for limiting the slidable disposition of the yoke with relation to the pillow-blocks, the yoke being shiftable by and with the pistons throughout their stroke and the several pistons being tiltable relatively to the pillow-blocks in the longitudinal direction of the machine.

4. In a mining-machine, a series of jack-units connected one with the other for articulation, each unit comprising a connected series of spaced parallel co-operable cylinders and reciprocatory pistons, a plurality of yokes one for each unit, each respective yoke having longitudinally rockable connection with the several pistons of such unit for shiftable movement by and with the pistons relatively to the respective cylinders, said yokes being respectively interfitted at their ends so as to pivot and slide relative to each other, the several units having communication one with the other for fluid pressure flow, and fluid pressure means for reciprocating the several pistons and their respectively connected yokes relatively to the respective cylinders.

5. In a mining-machine, a pair of jack-units each comprising an elongated block, a series of spaced parallel cylinders in the block, pistons reciprocable in and with respect to the cylinders, and a yoke disposed over and having longitudinally rockable connection with the several pistons for movement by and with the pistons during their reciprocations, said yokes being respectively interfitted at their ends so as to pivot and slide relative to each other, means joining the blocks endwise together for articulation, and fluid pressure means for reciprocating the several pistons of the respective units and their respectively connected yokes relatively to the respective blocks.

6. In a mining-machine, a pair of jack-units each comprising a block, a series of spaced parallel cylinders in the block, pistons reciprocable in and with respect to the cylinders, and a yoke disposed over and having longitudinally rockable connection with the pistons for movement by and with the pistons during their reciprocations, means comprising extensions on the blocks and interfitting extensions on the yokes for joining said yokes endwise together for slidable and pivotal movement relative to each other, and fluid pressure means for reciprocating the several pistons of the respective units and their respectively connected yokes relatively to the respective blocks.

7. In a mining-machine, a pair of jack-units each comprising an elongated block, a series of spaced parallel cylinders in the block, pistons reciprocable in and with respect to the cylinders, and a yoke disposed over and having longitudinally rockable connection with the several pistons for movement by and with the pistons during their reciprocations, means hingedly joining said blocks endwise together for unit articulation, and fluid pressure means for reciprocating the several pistons of the respective units and their connected yokes relatively to the respective blocks, the yokes of the units having longitudinal extensions loosely interfitting for relative movement on block articulation.

8. In a mining-machine, a pair of jack-units each comprising an elongated block, a series of spaced parallel cylinders in the block, pistons reciprocable in and with respect to the cylinders, and a yoke disposed over and having longitudinally rockable connection with the several pistons for movement by and with the pistons during their reciprocations, means pivotally joining the blocks endwise together, said yokes of the units having longitudinal extensions loosely interfitting for relative slidable movement lengthwise and angularly with respect to each other, and fluid pressure means for reciprocating the several pistons of the respective units and their connected yokes relatively to the respective blocks.

9. In a mining-machine, a pair of power-units, each unit including a co-operable cylinder and a reciprocatory piston, means joining the cylinders for unit articulation, pressure-pads mounted on and movable with the respective pistons, said pads being spaced one from the other, and means comprising interfitting extensions on the pads for forming with the pads a substantially continuous articulated pressure-hood.

10. A mining-machine comprising a plurality of longitudinally aligned hydraulic rams hingedly connected to each other in a successive series, a pair of spaced abutments upon one end of each ram, and a projecting abutment upon the opposed end of the next adjacent ram for limited movement between said spaced abutments.

11. A mining-machine comprising a plurality of power units, each power unit consisting of a base-block having a plurality of cylinders and reciprocable pistons mounted therein, said pistons being provided with an overlying hood operably mounted thereon, each of said base-blocks being hingedly connected at its ends to adjoining base-blocks, a pair of spaced stop-members on each base-block, and a tongue on each base-block sized and positioned for operative dispostion between the pair of tongues upon the next adjoining base-block for limiting the hinged movement of such base-blocks relatively to each other.

12. A mining machine including a plurality of connected base members each having a series of spaced parallel co-operable cylinders and recipro-

catory pistons, and a hood mounted upon and disposed over each of the several series of pistons, each hood being rockably mounted upon the upper ends of such pistons for movement into angular position in a direction longitudinally of the machine and being substantially limited to angular movement in such longitudinal direction, said hoods being endwise engaged for rockable movement with respect to each other.

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