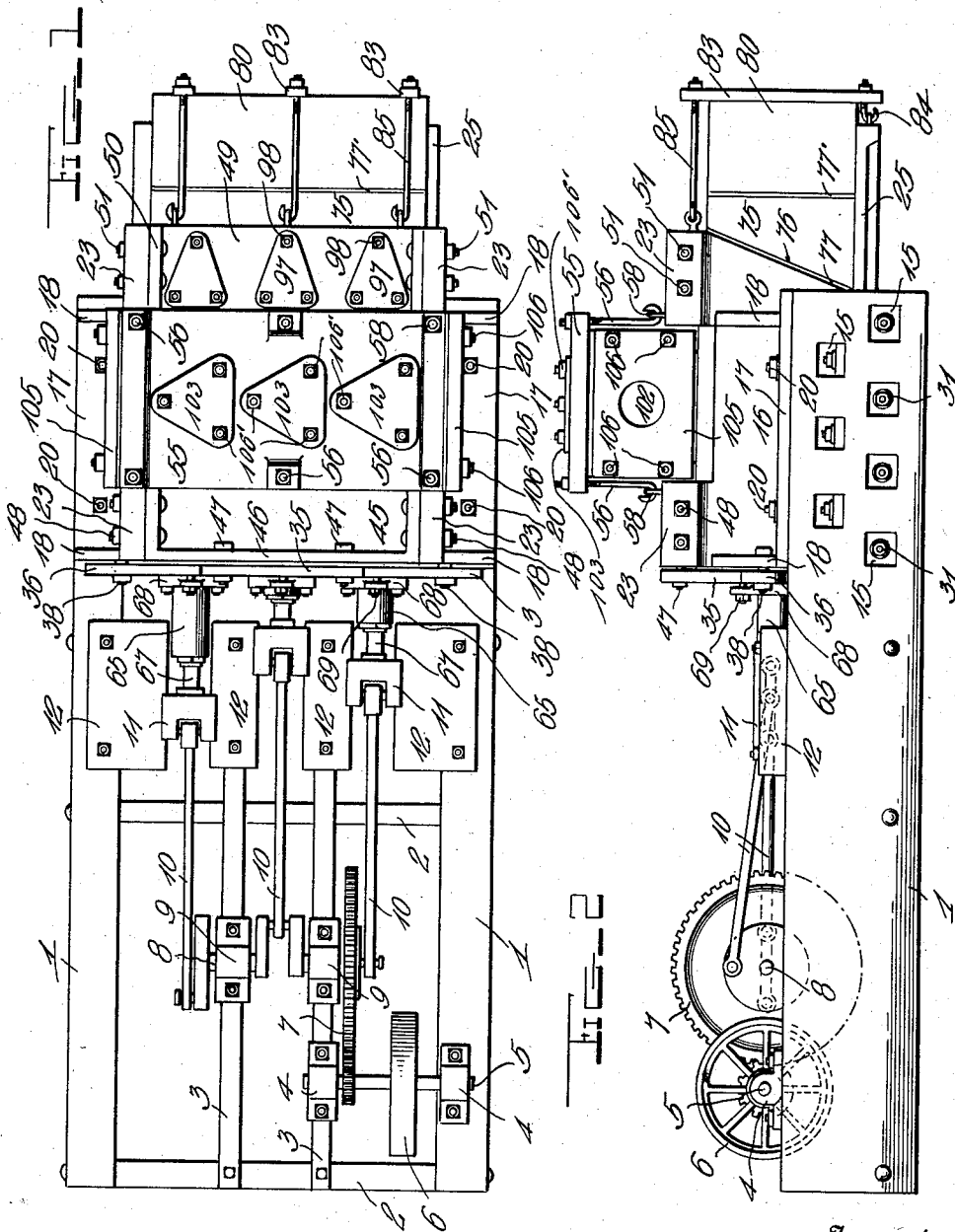


G. ROBSON.
PUMP.
APPLICATION FILED AUG. 21, 1911.

1,021,892.

Patented Apr. 2, 1912.

5 SHEETS—SHEET 1.



Witnesses

E. E. E. E. E.

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Inventor
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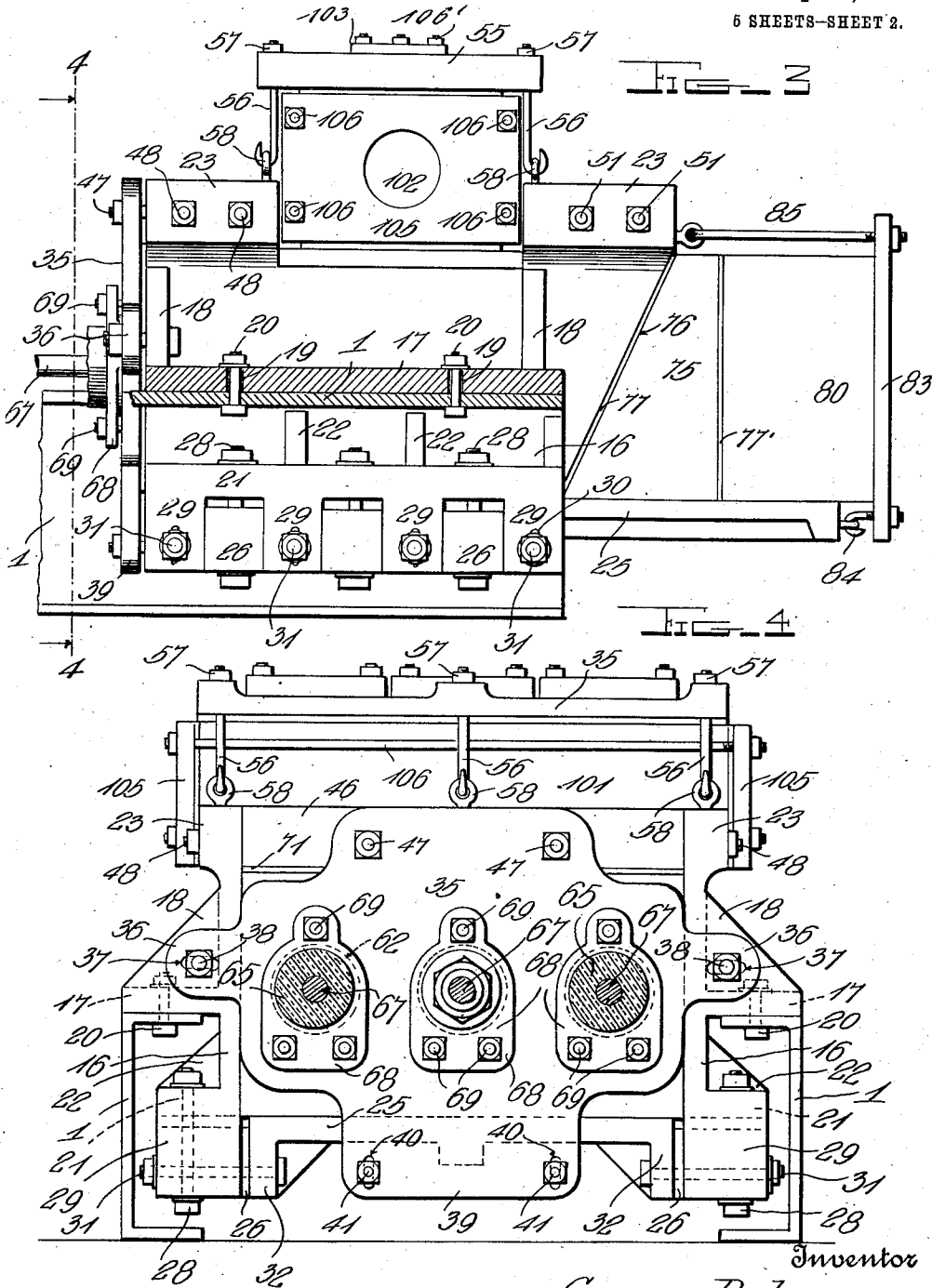
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5 SHEETS-SHEET 2.



Witnesses

E. C. C. C. C.

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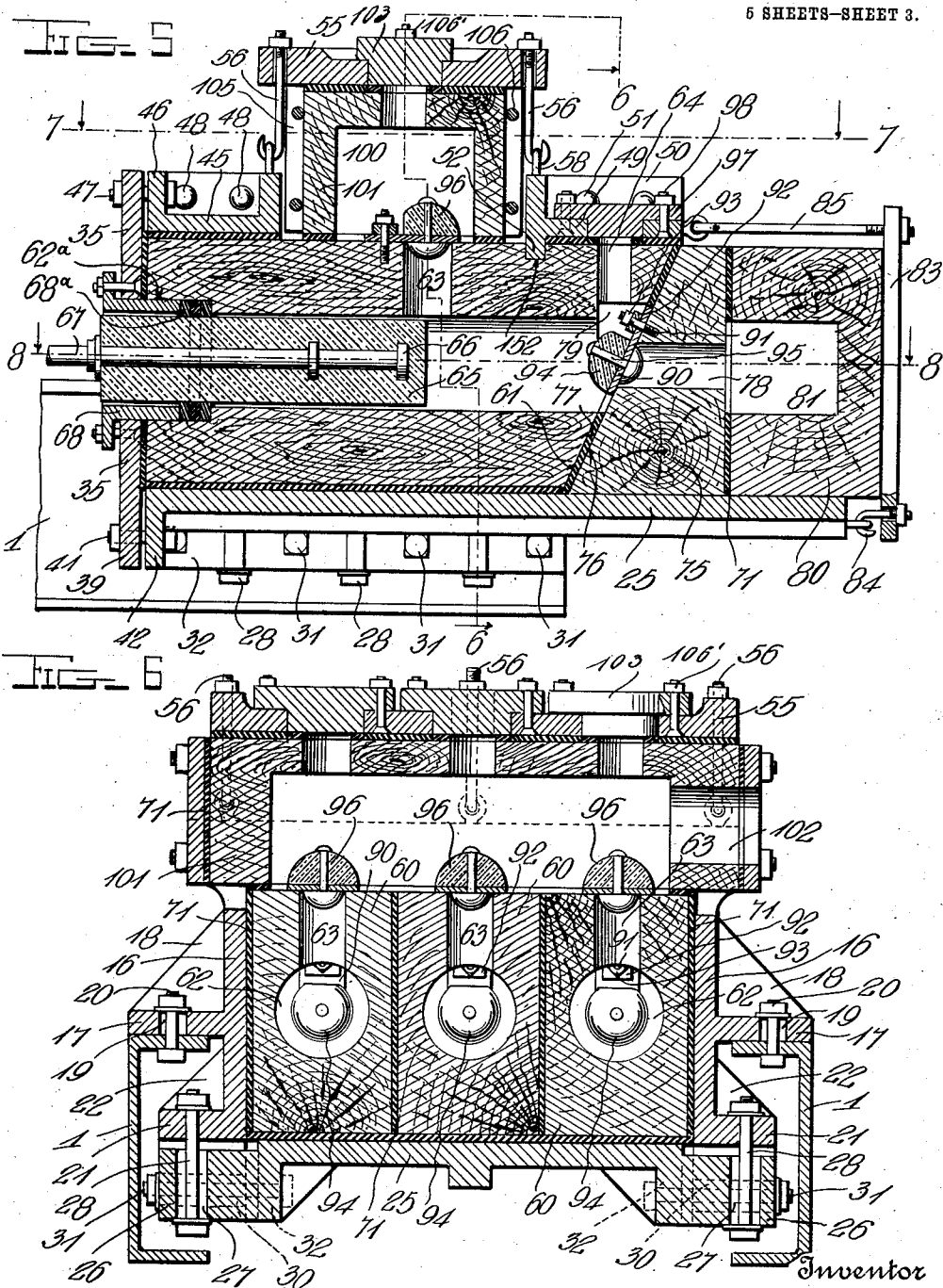
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5 SHEETS—SHEET 3.



Witnesses

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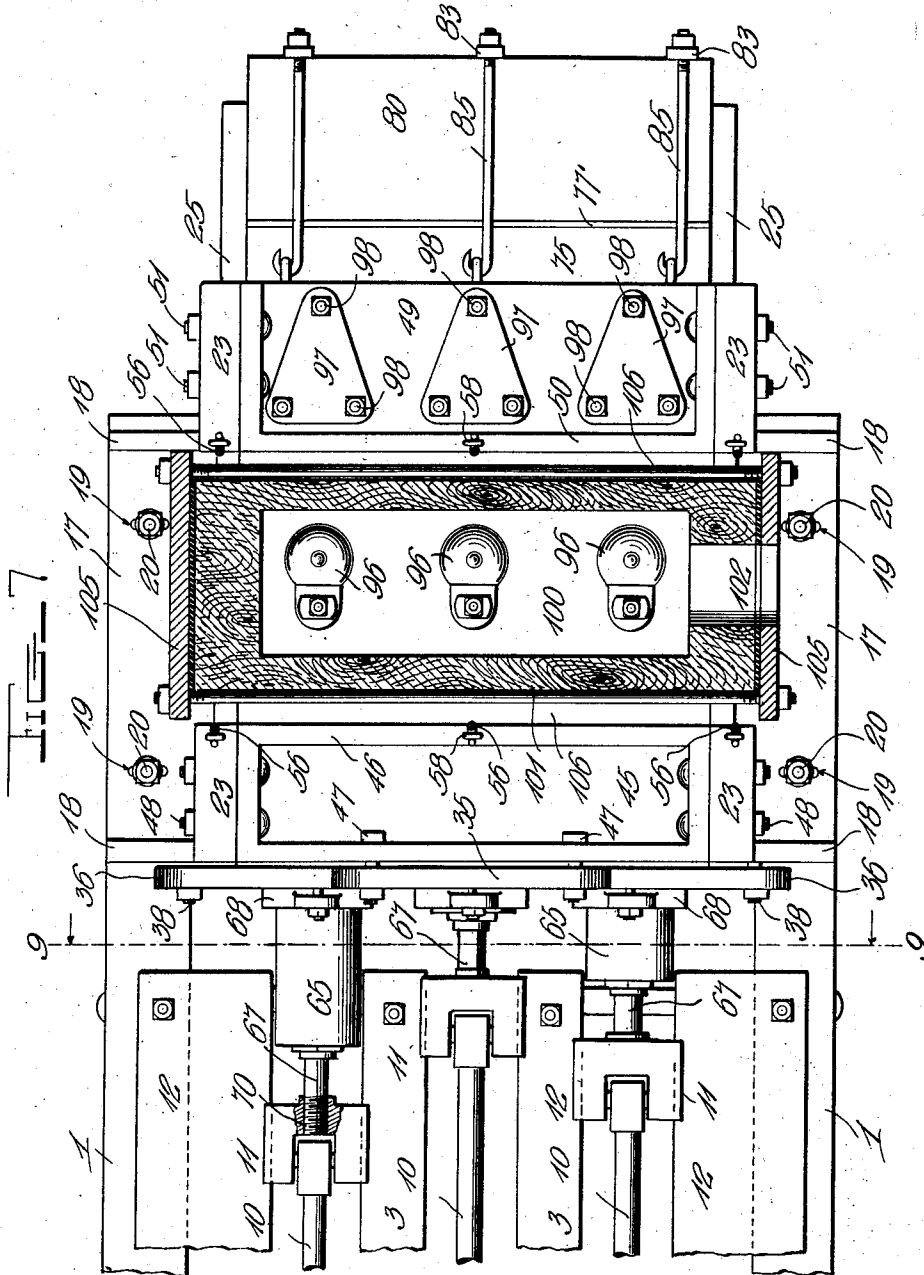
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5 SHEETS—SHEET 4.



Witnesses

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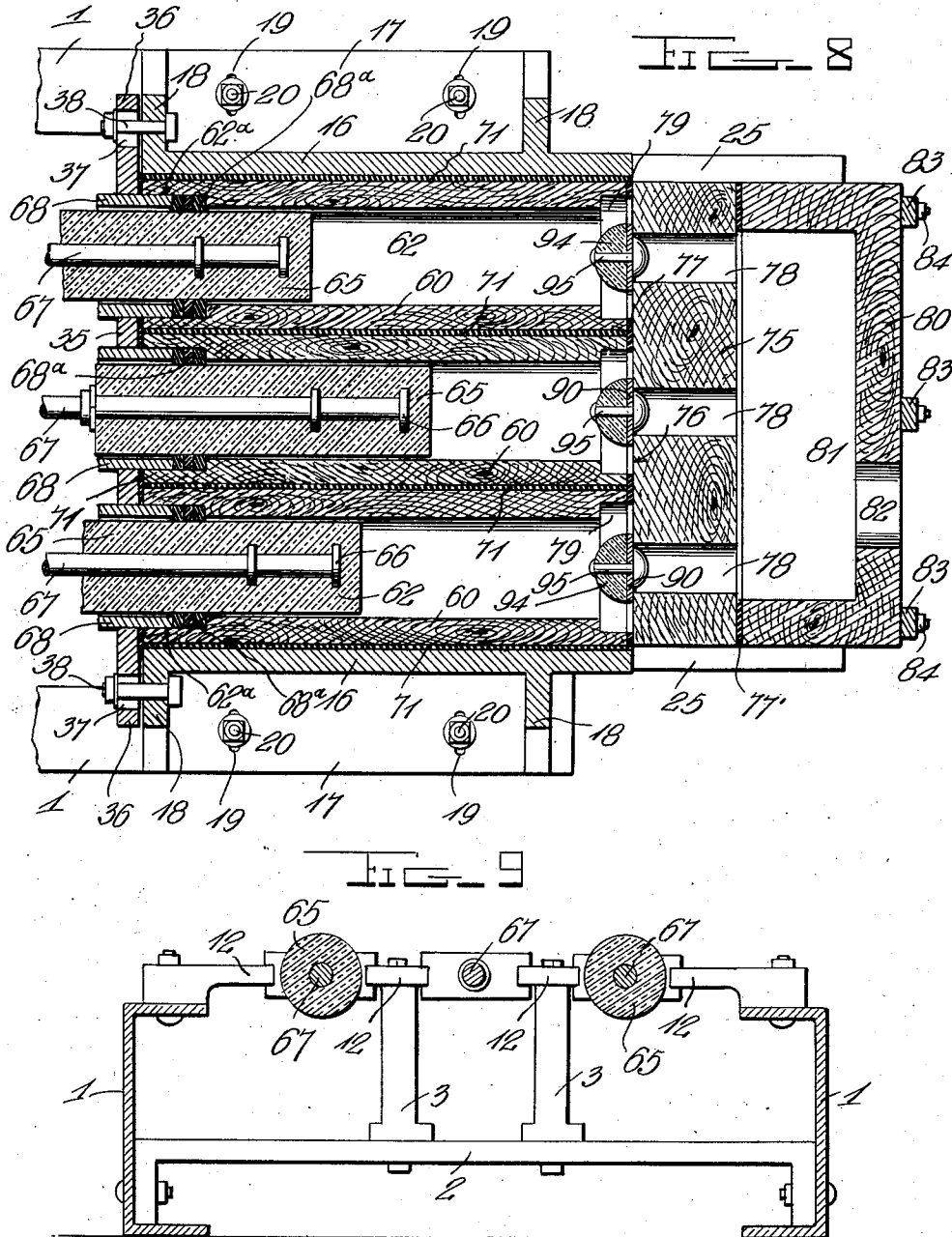
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5 SHEETS—SHEET 5.



Witnesses

E. A. L. L. L.

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UNITED STATES PATENT OFFICE.

GEORGE ROBSON, OF MURRAY, OHIO.

PUMP.

1,021,892.

Specification of Letters Patent.

Patented Apr. 2, 1912.

Application filed August 21, 1911. Serial No. 645,125.

To all whom it may concern:

Be it known that I, GEORGE ROBSON, a citizen of the United States, residing at Murray, in the county of Hocking and State of Ohio, have invented certain new and useful Improvements in Pumps; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to pumps, and more especially to those having multiple cylinders and reciprocating pistons therein; and the object of the same broadly speaking is to produce a pump for use in mines, etc., having its parts as far as possible composed of wood and rendered separable and removable by being held in place by metallic parts or members surrounding the wooden parts and detachably connected with each other and mounted upon the bed.

It is well known that the water and other fluids in mines is frequently mixed with powerful corrosives and other acids which soon destroy or render useless the pumps employed for removing such water, if they are made of metal. As wood successfully resists the action of the deleterious substances, whether in its raw state or treated as with creosote or other preservatives, I have devised the improved pump hereinafter described which is constructed with those parts adjacent the water made almost wholly of wood.

The specific features of novelty in the present instance lie in the structural details whereby the various wooden parts are rendered removable and accessible, are reinforced by metal on the outside so as to prevent them from warping and cracking, and are lined between each other and where they contact with the metal with packing of suitable character, and wherein special provision is made for readily getting at the valves and other parts which wear rapidly and often choke or get out of order. All these objects are accomplished by the construction hereinafter described and claimed and shown in the drawings wherein—

Figures 1 and 2 are respectively a plan view and a side elevation of the entire machine, these views and this sheet being the only instance wherein the power mechanism is illustrated and all remaining views being of the pump alone and on a larger scale; Fig. 3 is a side elevation of the pump

with the sill in the foreground in section; Fig. 4 is a rear end elevation of this pump; Fig. 5 is a central longitudinal section thereof, and Fig. 6 is a cross section on the line 6—6 of Fig. 5; Figs. 7 and 8 are respectively sections on the lines 7—7 and 8—8 of Fig. 5; Fig. 9 is a sectional detail on the line 9—9 of Fig. 7, looking toward the rear of the machine.

The power plant or driving mechanism for this improved pump may be any which is accessible and can be conveniently connected therewith, but by preference I have illustrated it on sheet 1 of the drawings as mounted upon the main sills 1 which are extended considerably to the rear for that purpose. Between them extend cross bars 2 which carry longitudinal beams 3, all of which may constitute a skeleton structure as shown in Fig. 1 for supporting the journals 4 for the power shaft 5 carrying the power wheel 6 which is driven from a suitable source not necessary to illustrate. In the present case this power shaft is geared as at 7 to a crank shaft 8 mounted in suitable bearings 9, and this shaft is shown as having three cranks connected by pitmen 10 with cross heads 11 which move between guides 12 in a manner well understood.

I have not considered it necessary to illustrate the source of power for driving the wheel 6, nor even to show a fast and loose pulley on the power shaft 5; for the fact is that a mining pump of this character usually works constantly, sometimes at excessive speed as in cases where the mine becomes flooded, is always exposed to the weather, has little attention paid to it, and yet is one of the necessities in a mining proposition and often relied upon to save lives and property. The deleterious effect of the chemicals present in the water pumped out of mines soon injures and destroys the parts of pumps of this kind which are made of iron and other metals, and I have therefore used wood so far as possible; and as wood is liable to crack, warp, and surely to swell, I have reinforced or incased it as will be described below.

The sills 1 are preferably of U-iron as best seen in section in Fig. 6, pierced with holes 15 (shown in Fig. 2) for permitting access to the nuts or bolts within, and between said sills are disposed two like side plates 16 each having a wide flange 17 extending throughout its length, braced by

webs 18, and pierced with slots 19 for the reception of bolts 20 by means of which it is adjustably secured upon the upper flange of the sill 1. The side plate 16 also has
 5 another flange or outturned foot 21 extending along its lower edge throughout its length, and possibly also braced by webs 22; and at its top it is provided with lugs 23 which are spaced from each other so as to
 10 leave a cross channel between them as best seen in Fig. 3, for a purpose to appear.

The bed plate 25 has a flat upper surface which is narrower than the normal distance between the inner surfaces of said side plates, and a series of knuckles 26 along both edges
 15 dropped a little below the level of said surface as best seen in Fig. 6 and provided with upright slots 27 through which pass bolts 28 whereby the plate is suspended from the feet 21 of the side plates 16. As seen in Fig.
 20 3 similar knuckles 29 are formed beneath said feet 21 of the side plates and at proper intervals to alternate with the knuckles 26, and these hanging knuckles are slotted as
 25 seen at 30 for the reception of horizontal bolts 31 which pass through them and through a flange 32 extending along the edge of the bed plate proper and connecting all its knuckles 26. By this means there is
 30 therefore formed a trough comprising two upright sides consisting of the side plates 16 and a flat bottom consisting of the bed plate 25, the three members being connected by the interlocking knuckles, bolts, and slots
 35 so that they may be relatively adjusted for a purpose to appear below. The rear end of this so-called trough (which is the rear end of the pump proper and stands between its mechanism and the power mechanism) consists of a rear end plate 35 best seen in Fig.
 40 4, having side ears 36 pierced with horizontal slots 37 through which pass bolts 38 that engage the webs 18 of the side plates 16. The plate 35 also has a depending flange
 45 39 with upright slots 40 through which pass bolts 41 which engage a flange 42 depending from the rear end of the bed as best seen in Fig. 5. Thus it will be seen that the slots 30 and 40 permit the vertical adjustment of the bed plate, and the slots 19,
 50 27, and 37 permit the horizontal adjustment of the side plates, and therefore the attachment of the rear plate in this manner does not prevent the adjustments above described. The nuts on the bolts 41 may
 55 easily be reached through the skeleton structure which supports the driving mechanism first described above, and the holes 15 in the sills 1 are obviously for the purpose of
 60 permitting access to the nuts of the bolts 31 and 28. The cap plate of this trough is in two members. The rearmost numbered 45 has an upright surrounding flange 46 connected by bolts 47 with the upper edge
 65 of the front plate and by other bolts 48

with the lugs 23 of the sides. The front cap plate member 49 also has a flange 50 similarly connected by bolts 51 with the lugs 23, but said flange across the rear edge of this plate depends beneath its otherwise
 70 flat lower surface into a rib 52 which forms a feature of my invention as will be explained below. These two cap members partly close the top of the trough-like structure above referred to but have a cross channel
 75 between them for the outlet of my pump as will be explained later; and above said channel is disposed a top plate 55 which is removably connected to the cap members 45 and 49 by hook-and-eye connections of any
 80 suitable type such as the hook-bolts 56 whose nuts 57 stand above the plate 55 and whose hooks engage eyes 58 in the flanges of said members. I might here say that the hook-and-eye connections hereinafter referred to may all be of this type or of any
 85 suitable type without departing from the principle of my invention; and if it were not desired to remove the detachable members very frequently they could obviously
 90 be connected with the relatively fixed members and held thereto by means of bolts if preferred.

So much of my structure as has thus far been described constitutes a casing which is
 95 by preference composed of metal, probably iron suitably treated to prevent rust and corrosion as far as possible, and its parts are of the proper dimensions to contain the wooden elements hereinafter described and
 100 from which is built up a pump of sufficient size and strength to operate in connection with a mine.

Disposed within the metallic casing or housing described above are the pump barrels which in the present instance are three
 105 in number located side by side as best seen in Fig. 6, and as they are of like construction I will describe but one. Each barrel consists of a wooden block 60 which is right
 110 angular on all sides except that it is beveled off at its front end as at 61 as best seen in Fig. 5, and throughout the length of this block it is provided with a cylindrical bore
 115 62 forming the cylinder of the pump, the same being counterbored at 62^a at its rear end. The cylinder is intersected by the outlet port 63 bored from the top of the block downward into the bore 62, and forward of
 120 such port by an opening 64 which will stand directly above the inlet valve so that the latter may be reached. Within said cylinder reciprocates the piston or plunger 65 which in the present case is made of glass
 125 and molded around heads or enlargements 66 upon the pump rod 67, the latter extending out the rear end of the cylinder and being connected as by a screw thread 70 with the cross head 11. Bolted or screwed as at
 130 69 to the rear plate 35 is the flange of a

stuffing box 68 which latter projects into the rear end of the cylinder and substantially fills its counterbore 62^a, as best seen in Fig. 5, packing rings 68^a being compressed between its inner end and the bottom of the counterbore so that these rings closely engage the piston or plunger which otherwise moves freely along the bore of the cylinder and through the bore of the stuffing box.

When three pump barrels are employed as in the present instance, the cranks of the shafts 8 will be set so that the several pistons will move successively rather than simultaneously within their cylinders, and in their reciprocation the pump rods 67 and the stuffing boxes 68 (both of which may be of metal) are protected from the action of the water within the cylinder by the close fit of the packing around the piston or plunger. Between the blocks constituting the pump barrels 60, and between them and the various metal members and plates which surround them, I dispose sheets or strips of packing 71, as of rubber or the like, the purpose being to permit the swelling of the wooden blocks when they become wet, and to permit their uneven swelling which I find almost invariably occurs, no matter what wood is selected nor how carefully it is chosen. The use of a rather thick packing entirely around the block constituting the barrel is of advantage in connection with a glass piston to reciprocate within its bore, because if the outward swelling of the wood is permitted there will not be so much tendency of the wood to expand into its own bore and choke the latter upon the piston. When absolutely necessary, the pump barrels may be removed and replaced; but the provision of removable stuffing blocks 69 permits the entire withdrawal of the piston rod and piston, and it will be seen from the following description that all valves are accessible from the exterior, and therefore it will not ordinarily be necessary to disarrange the pump barrel blocks when once they are locked in place.

Next forward of the set of barrels is disposed what I call the valve block 75, best seen in Figs. 5 and 8, and the rear end of this block is cut off on a bevel 76 to match that of the front end of the barrels 60, while a packing sheet 77 is interposed between the beveled faces. The block 75 in the present instance is bored with three inlet ports 78 registering with the bores 62 of the pump barrels which are purposely enlarged as at 79 at their front ends just beneath the openings 64 so as to give the inlet valves free movement and to permit the operator to gain access thereto.

Next forward of the valve block 75 and upon the bed plate is disposed what I call the inlet block 80, the same being formed internally with an inlet chamber 81 extend-

ing nearly throughout its length and communicating with all the inlet ports 78 as seen in Fig. 4, and the main inlet 82 communicates with this chamber. Between the blocks 80 and 75 packing 77' may be interposed, but as the liquid within these blocks is not under pressure there is little likelihood of leakage and the surrounding casing members are unnecessary. These blocks may be held in place by any suitable means, but in the present instance I have shown upright yokes 83 extending across the face of the inlet block 80, and hook-and-eye connections 84 between the lower ends of said yokes and the bed plate, and similar but longer connections 85 between the upper ends of said yokes and the front member 49 of the cap plate. It will be obvious that by disconnecting one or both of these connections the inlet block and then the valve block may be removed so that access may be had to the front end of the bore 62 in the various pump barrels 60; and as the valve block is to carry the valves the latter come off with it and are readily accessible when it is removed. Here again the water from the time it enters the main inlet 82 comes in contact only with wood and glass, and with whatever packing is employed, and in so far as possible I avoid the use of metal in the formation of the valves themselves.

The inlet valves are disposed over the inner ends of the inlet ports 78 and are of like construction, and I therefore need describe but one. This valve is by preference of the "flap" variety, and its body consists of a leather sheet 90 of a size and shape sufficient to cover the port and to extend above the same where it is secured upon the inclined face 76 of the valve block 75 by means of a stud bolt 91 of fiber which passes through a wooden washer 92, thence through the upper end of the sheet 90, and into said block 75; and a fiber nut 93 engages the outer end of said bolt, both of which with the washer stand within easy reach through the opening 64 as best seen in Fig. 5. Upon the free portion of said sheet of leather is disposed a glass weight 94, held thereon by a fiber pin 95 passing through the weight and the sheet, and both of these elements are also accessible through the hole 64.

It will hardly be necessary to amplify the details of construction of the outlet valves 96, as by preference they are precisely the same excepting only that each is disposed over the outlet port 63 in the top of a barrel 60 and open upward or away from the bore 62 of the barrel, whereas the inlet valves open inward or into said bore. Attention is directed, however, to the fact that the inlet valves are all mounted upon the valve block 75, so that when the inlet block

80 is disconnected and withdrawn the valve block and with it the valves can also be removed bodily, if the difficulty with the valves be such that it cannot be cured by reaching through the openings 64. In order to permit access to the latter, they are covered by removable hand-hold plates 97 held upon the front cap plate 49 by bolts or screws 98 as best seen in Fig. 7.

The outlet chamber 100 of this improved pump is made in the form of a channel extending throughout the length of a block 101 and opening out its bottom where it communicates with the outer ends of the ports 63 as best seen in Fig. 5, the main outlet 102 being by preference through one end of said block. The latter is separated from the top of the barrels 60 by packing as described above, and packing may also be interposed between the top of this block and the bottom of the top plate 55, so that when the hook-and-eye connections 56 between the top plate and the members of the cap plate are drawn tight, the packing is compressed and the outlet block is clamped close upon the top of the several pump barrels and incloses and surrounds the outlet valves 96. But as the water within the outlet chamber 100 may be under some pressure, especially if the pipe from the main outlet 102 be led up hill, I preferably dispose end plates 105 at both ends of this block and connect them along its sides by bolts 106 passing inside the hook-and-eye connections 56 so as to form a metallic frame entirely surrounding this block and preventing it from bursting and splitting. The top plate 55 will by preference be provided with openings 104 disposed above and nearly if not quite in alinement with the outlet ports 63 and closed by hand-hold plugs or plates 103 (see Fig. 1) secured to said top plate by bolts or screws 106', and when the latter are removed and the plugs withdrawn access may be had to the interior of the outlet chamber 100 and to the outlet valves 96 therein if they need attention. If, however, serious difficulty is encountered with them, the top plate can be unhooked from the members of the cap plate and removed, and then the entire block 101 can be lifted off to expose all the valves which can thereafter be readily repaired or replaced if necessary.

In setting up the various parts of this improved pump, the sills will doubtless be mounted on a stone foundation and the installation of the driving mechanism will need no explanation. The two sides having been bolted to the bed plate in the form of a trough, the whole is slipped into the front ends of the sill and connected to the upper flanges of the latter by the bolts 20; then the pump barrels are put in place with the appropriate packing and the connections between the sides and bed adjusted to hold

the blocks 60 comprising said barrels very tightly in place with the grooves 152 across their upper faces in strict alinement for a purpose to appear; then the rear plate is applied and bolted in place; then the two members of the cap are put into place and bolted to the front and side plates as has been described, the rib 52 of the front cap plate 49 entering the alined grooves 152 of the barrels 60; then the valve block with its valves and packing is brought into position as seen in Fig. 5, and forward of it the inlet block 80 with the packing between the two blocks; then the outlet block 101 is placed over the outlet valves and the top plate 55 applied to it with the interposed packing. When the bolts 47 are drawn up tight the entire cap plate is connected with the rear plate around the channel in which the outlet block 101 is situated, and the engagement of the rib 52 with the grooves 152 holds the barrel blocks 60 against said rear plate and in correct position; and if now the yokes 83 and the hook-and-eye connections 84 and 85 are applied and tightened up, all parts will be clamped securely in position longitudinally of the structure and it remains only to apply the top plate 55 over the outlet block and tighten up its hook-and-eye connections to complete the work. Thereafter the rotation of the crank shaft will cause the successive reciprocation of the pistons within the cylinders and at the rear stroke of each piston water is drawn in through the inlet port, under the inlet valve which rises against its weight, while at the forward stroke of the piston the inlet valve closes by its weight and the water drawn into the cylinder is ejected upward through the outlet port 63, its valve 96 opening against its weight. Thus there is a steady flow of water from the main inlet 82 through the inlet chamber and one of the inlet ports and pump, to and through one of the outlet ports and the outlet chamber and main outlet; and throughout the entire course the water has not come into contact with any metal. What may leak around the pistons may gain access to the piston rods which I have stated are by preference made of soft steel, but if so they may be readily replaced whenever they become corroded, or if possible some other material may be substituted for the steel.

What is claimed as new is:

1. The herein described multiple cylinder pump comprising a series of wooden barrels disposed side by side and having longitudinal bores with outlet ports opening out their upper sides and openings through said sides near their front ends, stuffing boxes in the rear ends of said bores, glass pistons reciprocating in said bores and through said boxes, outlet valves over said outlet ports, a single wooden valve block having inlet ports

registering with the bores of said barrels beneath the openings through the latter, inlet valves mounted on said block over the inner ends of said inlet ports and accessible through said openings, and means for removably closing the upper ends of the latter.

2. The herein described multiple cylinder pump comprising a series of wooden barrels disposed side by side and having longitudinal bores with outlet ports opening out their upper sides and openings through said sides near their front ends enlarged where they communicate with said bores, stuffing boxes in the rear ends of said bores, glass pistons reciprocating in said bores and through said boxes, outlet valves over said outlet ports, a single wooden valve block having inlet ports registering with the bores of said barrels beneath the openings through the latter, inlet valves mounted on said block over the inner ends of said inlet ports and accessible through said openings, means for removably closing the upper ends of the latter, and an inlet block of wood having an internal inlet chamber communicating with the outer ends of all said inlet ports.

3. The herein described multiple cylinder pump comprising a series of wooden barrels disposed side by side and having longitudinal bores with outlet ports opening out their upper sides, their front ends being cut off oblique, stuffing boxes in the rear ends of said bores, glass pistons reciprocating in said bores and through said boxes, outlet valves over said outlet ports, a single wooden valve block having its inner face cut off oblique to complement the oblique ends of said barrels and inlet ports registering with the bores of said barrels, inlet valves mounted on said block over the inner ends of its ports, and an inlet block of wood having an internal inlet chamber communicating with the outer ends of all said inlet ports.

4. The herein described multiple cylinder pump comprising a series of wooden barrels disposed side by side and having longitudinal bores with outlet ports opening out their upper sides and openings through said sides near their front ends, stuffing boxes in the rear ends of said bores, glass pistons reciprocating in said bores and through said boxes, outlet valves over said outlet ports, an outlet block of wood having a cross chamber communicating with all said outlet ports and a single main outlet and having openings through its top above said outlet valves, means for removably closing said openings, a single wooden valve block having inlet ports registering with the bores of said barrels beneath the openings through the latter, inlet valves mounted on said block over the inner ends of said inlet ports and accessible through said openings, means for removably closing the upper ends of the latter, an inlet block of wood having an internal inlet

chamber communicating with the outer ends of all said inlet ports, packing interposed between said blocks, and means for clamping the outlet block upon the barrels and for clamping the inlet block against the valve block and the latter against the front ends of said barrels.

5. The herein described multiple cylinder pump comprising a series of wooden barrels disposed side by side and having longitudinal bores with outlet ports opening out their upper sides and openings through said sides enlarged where they communicate with said bores, their front ends being cut off oblique, glass pistons reciprocating in said bores, outlet valves over said outlet ports, an outlet block of wood having a cross chamber communicating with all said outlet ports and a single main outlet and having openings through its top above said outlet valves, means for removably closing said openings, a single wooden valve block having its inner face cut off oblique to complement the oblique ends of said barrels and inlet ports registering with the bores of said barrels beneath the enlarged part of the openings through the latter, inlet valves mounted on said oblique face, an inlet block of wood having an internal inlet chamber communicating with the outer ends of all said inlet ports, packing between and around said blocks, a metallic skeleton housing surrounding the structure thus far described, and means connected with said housing for clamping the outlet block upon the barrels and the inlet block against the valve block and the latter against the front ends of said barrels.

6. The herein described multiple cylinder pump comprising a series of wooden barrels disposed side by side and having longitudinal bores with outlet ports opening out their upper sides and openings through said sides near their front ends, glass pistons reciprocating in said bores, outlet valves over said outlet ports, an outlet block of wood having a cross chamber communicating with all said outlet ports and a single main outlet and having openings through its top above said outlet valves, means for removably closing said openings, a single wooden valve block having inlet ports registering with the bores of said barrels beneath the enlarged part of the openings through the latter, an inlet block of wood having an internal inlet chamber communicating with the outer ends of all said inlet ports, packing between and around said blocks, a metallic skeleton housing surrounding the structure and including a removable top plate resting upon said block, means for detachably connecting this plate with the remainder of said housing, upright yokes across the front face of the inlet block, and means for detachably connecting said yokes

with said housing for clamping this block against the valve block and the latter against the front ends of said barrels.

7. In a pump of the class described, the combination with a wooden barrel having a longitudinal bore and a lateral outlet port communicating therewith, and a glass piston; of a valve block of wood having an inlet port adapted to register with the said bore, means for clamping it against the front end of the barrel, an outlet block of wood having a chamber, means for clamping this block over the outlet port, and inlet and outlet valves respectively carried by said valve block and by the top of the barrel and each consisting of a leather body lying over the port, a glass weight thereon, and a fiber bolt through the edge of the leather body into the wood of the member supporting the valve.

8. In a pump of the class described, the combination with a rectangular wooden barrel having a cylindrical bore counterbored at its rear end and an outlet port communicating with said bore and extending laterally through the wood of the barrel, a stuffing box within the counterbore, packing between the bottom of the latter and said box, an inlet valve at the front end of said bore, and an outlet valve over said port; of a metallic housing surrounding said barrel and made in separable members with means for clamping them upon it, a glass piston fitting loosely within said bore and closely within said packing, and a metallic piston rod having heads molded in said piston.

9. In a multiple cylinder pump of the class described, the combination with a skeleton framework comprising a bed plate, two side plates, a rear plate, a cap plate made in two members with a cross channel between them, a top plate standing above said channel, means for detachably and adjustably securing this top plate to said members, and means for clamping all the other plates together; of a series of wooden pump barrels inclosed within said framework side by side and having outlet ports opening through their tops, a wooden outlet block disposed within said channel beneath said top plate and having an outlet chamber embracing all said ports, plates against the ends of this block, means for drawing said plates toward each other, a block having in-

let ports and valves adapted to register with the inlet ends of the bores in said barrels, and means for removably clamping this block in place.

10. In a multiple cylinder pump of the class described, the combination with a skeleton framework comprising a bed plate, two side plates, a rear plate, a cap plate made in two members with a cross channel between them, the front member having a depending rib, a top plate standing above said channel, means for detachably and adjustably securing this top plate to said members, and means for clamping all the other plates together; of a series of wooden pump barrels inclosed within said framework side by side and having outlet ports opening through their tops, said barrels having transverse grooves receiving said rib, a wooden outlet block disposed within said channel beneath said top plate and having an outlet chamber embracing all said ports, a block having inlet ports and valves adapted to register with the inlet ends of the bores in said barrels, and means for removably clamping this block in place.

11. In a multiple cylinder pump of the class described, the combination with a plurality of wooden pump barrels having longitudinal bores intersected by transverse outlet ports, removable stuffing boxes in the rear ends of said bores, a glass piston reciprocating in the bore of each barrel and passing through the box in its bore, a wooden valve block across the front ends of said barrels and having inlet ports communicating with their bores, leather inlet valves over the inner ends of these ports, and leather outlet valves over the outer ends of said outlet ports; of a metallic skeleton housing surrounding the parts above described and made in two members detachably and adjustably connected with each other, and packing between the various wooden members and between the wooden and metallic members.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

GEORGE ROBSON.

Witnesses:

WILLIAM PRITCHARD,
LILLIAN ROBSON.