

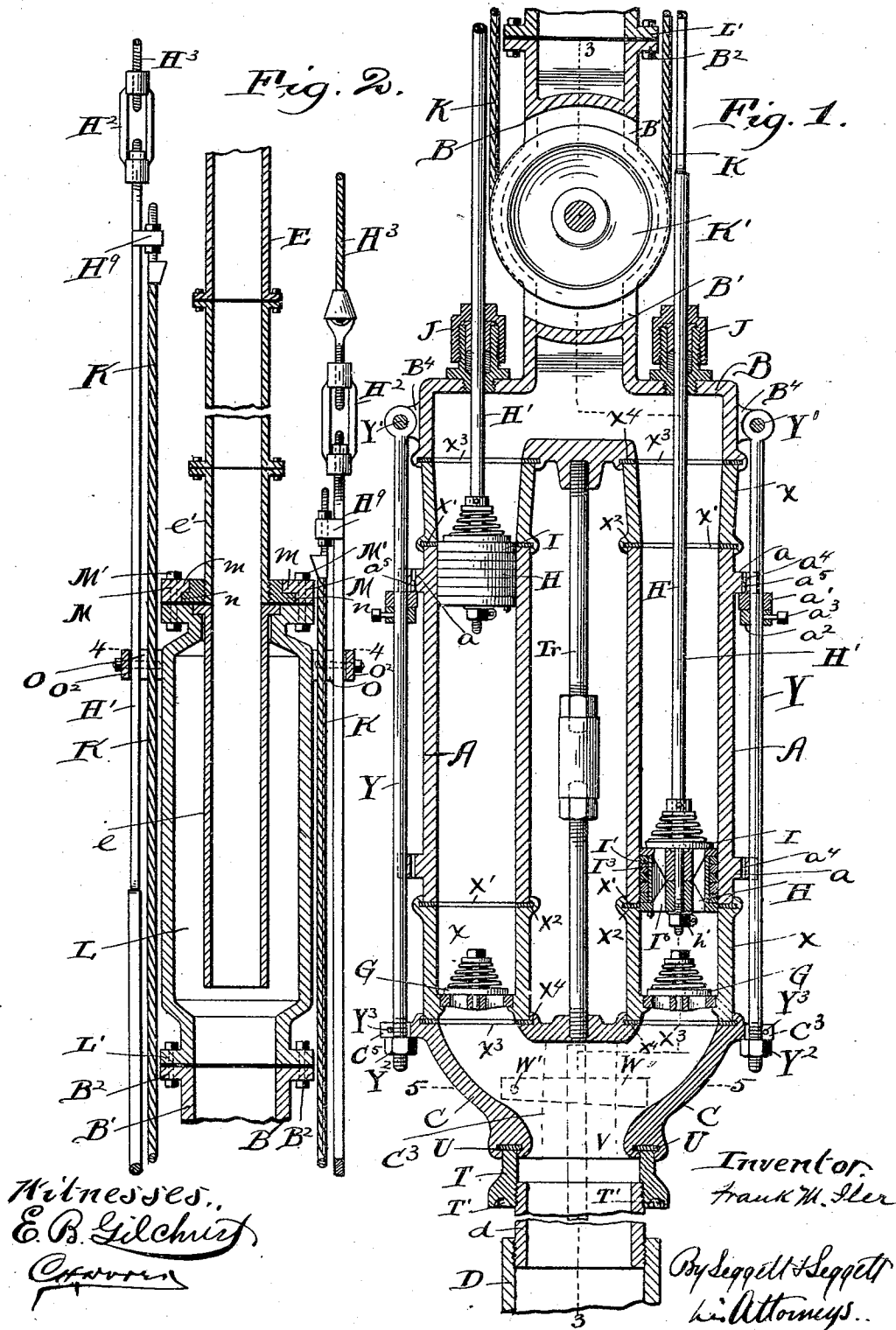
(No Model.)

3 Sheets—Sheet 1.

F. M. ILER.
PUMPING APPARATUS.

No. 536,807.

Patented Apr. 2, 1895.



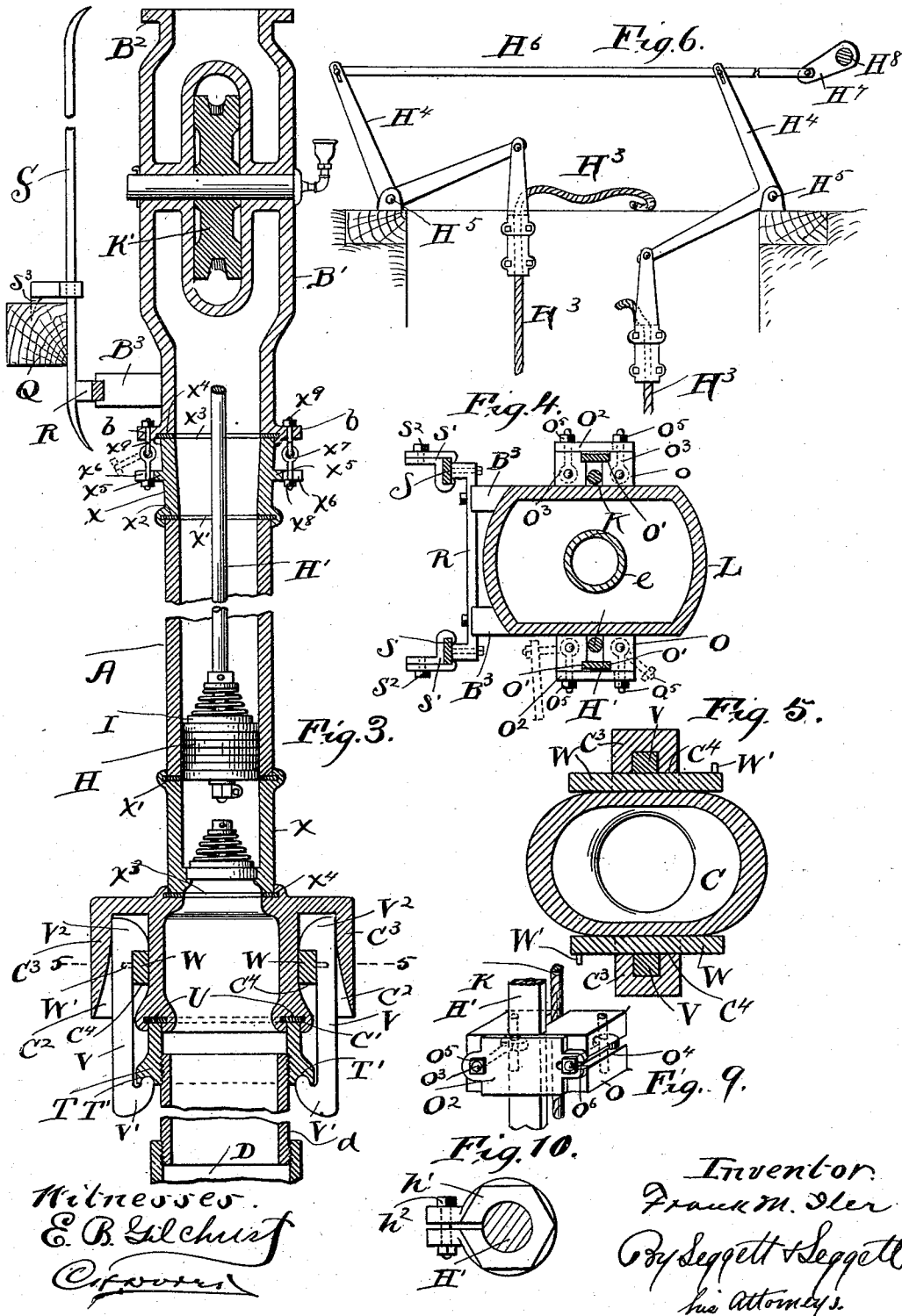
(No Model.)

3 Sheets—Sheet 2.

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3 Sheets—Sheet 3.

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Fig. 7.

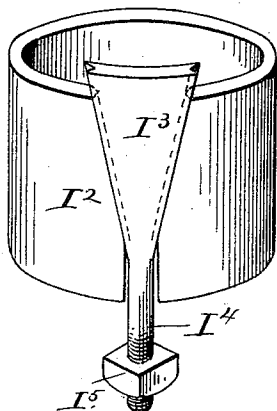


Fig. 11.

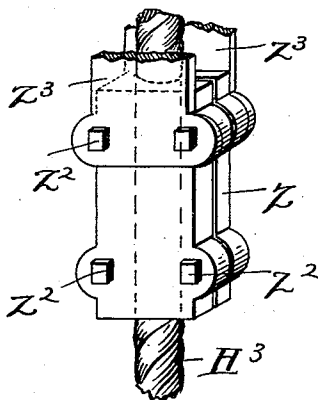


Fig. 8.

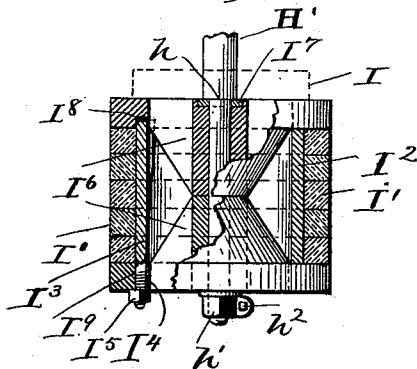
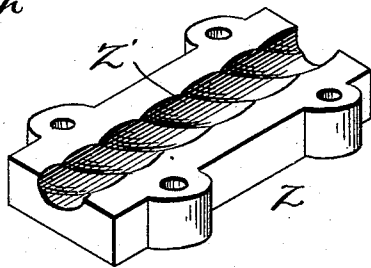


Fig. 12.



Witnesses:
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C. Brown

Inventor:
Frank M. Iler
Ray Siggett & Siggett
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UNITED STATES PATENT OFFICE.

FRANK M. ILER, OF RICO, COLORADO.

PUMPING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 536,807, dated April 2, 1895.

Application filed September 28, 1893. Serial No. 486,726. (No model.)

To all whom it may concern:

Be it known that I, FRANK M. ILER, of Rico, in the county of Dolores and State of Colorado, have invented certain new and useful Improvements in Pumping Apparatus; and I do hereby 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 pertains to make and use the same.

My invention relates to improvements in mining-pumps, or mine-sinking pumps, the primary object being to construct pumping apparatus of the character indicated, whereby there is no condensation of steam between the surface and bottom of the mine as with the steam-pumps heretofore used; wherein the buckets are actuated by ropes or cables extending up through the shaft of the mine; that occupies less space than a steam-pump having the same capacity; whose wearing parts are more quickly renewable; from which obstructions, that interfere with the operation of the pump, can be more readily removed and wherein the means of attachment of the suction-hose is greatly simplified.

With this object in view, and to the end of realizing certain other advantages hereinafter detailed, my invention consists in certain features of construction, and in combinations of parts hereinafter described and pointed out in the claims.

In the accompanying drawings, Figure 1 is an elevation, mostly in central vertical section, showing the barrels of the pump, heads of the same, &c. Fig. 2 is a central vertical section showing, among other things, the lower portion of the delivery-pipe, the connection between the bucket-stems or rods and operating-cables, and the means employed whereby when one bucket is elevated or hoisted, the other bucket is positively lowered. Fig. 3 is a vertical section on line 3—3, Fig. 1. Fig. 4 is a transverse section on line 4—4, Fig. 2, looking downwardly. Fig. 5 is a transverse section on line 5—5, Fig. 1, looking downwardly. Fig. 6 is an elevation showing the operating crank-shaft and the lever-mechanism, &c., operatively connecting the bucket-actuating cables with said shaft. Fig. 7 is an enlarged detail in perspective hereinafter described. Fig. 8 is an enlarged elevation, partly in section, of one of the buckets. Fig. 9 is a

detail in perspective hereinafter described. Fig. 10 is a plan in detail, partly in section, and Figs. 11 and 12 are details in perspective, all hereinafter described.

Referring to the drawings, A A represent the upright barrels of the pump, and B and C the upper and lower chambered heads of the barrels, respectively, the barrels having heads in common as shown in Fig. 1. The lower head C is in open relation with the suction-hose D suitably connected with said head as hereinafter described. The upper head B communicates with delivery-pipe E (see Fig. 2) that is suitably connected with said head, preferably as hereinafter described, and extends to the surface above.

G designates the suction-valves of the pump; H the buckets, and I the bucket or delivery-valves.

H' represents the bucket-stems or rods that extend upwardly through stuffing-boxes J suitably attached to the upper head of the pump-barrels, and the bucket-rods or stems, at their upper ends, are connected, respectively, preferably by means of turn-buckles, H², with ropes or cables, H³, that in turn are suitably connected (see Fig. 6) with bell-crank-levers, H⁴, fulcrumed, as at H⁵, to any suitable support on the surface above and operatively connected with each other by means of a link or connecting-rod, H⁶, that in turn is operatively connected in any suitable manner with the operating machinery, for instance, as shown, with the crank, H⁷, of a crank-shaft, H⁸, to which power is applied in any manner. The two bell-cranks H⁴ are so arranged relative to each other that the two buckets of the pump are simultaneously actuated in opposite directions, respectively. The means thus employed by me for hoisting and lowering the buckets is much simpler and cheaper and does not possess less efficiency than any means or mechanism heretofore employed for the purpose. Suitable means are provided whereby upon hoisting either one of the buckets the other bucket is positively lowered. Preferable means for the purpose is illustrated in Figs. 1 and 2 of the drawings, wherein the bucket-stems or rods, at or near their upper ends, are provided, respectively, with a laterally-projecting lug or member H⁹.

A rope or cable K leads from the projecting-

member H⁹ of the one bucket-rod or stem, to which it is suitably attached, downwardly to and over a sheave or pulley K' suitably supported by the upper head of the pump-barrel, and thence returns and is suitably secured to the projecting-member H⁹ of the other bucket-stem or rod. By this construction, it will be observed that as either one of the buckets is elevated, the other bucket owing to the downward pull exerted by rope or cable K, upon its rod or stem, is positively lowered, said rope or cable, of course having length sufficient to accommodate the stroke of bucket-rods or stems.

The delivery-pipe E is connected with the upper head of the pump-barrel in any suitable manner. Head B is enlarged upwardly at its central portion, as at B', and the chamber of said enlarged portion of the head, through which chamber passes the water or liquid pumped, is divided, at its central portion to accommodate the location of sheave K'. Portion B' of head B, at its upper end, is provided with an external flange B², that is bolted to external flange L' of the casing of a chamber L into which the lower section, e, of the delivery pipe extends. M designates a ring or collar that rests upon and is bolted, as at M', to the upper end of casing of chamber L, ring or collar M, at the top, being provided with an internal flange, m, that is adapted to engage the top side of an external flange n of a ring N that is screw-threaded internally and mounted upon the correspondingly externally screw-threaded lower end of pipe-section e', that constitutes the delivery-pipe-section next above section e.

I would here remark that the delivery-pipe is usually composed of flanged sections of pipe, with the flanges at adjacent or contiguous ends of the pipe-sections bolted together, and that the last section that is secured in place is section e'. Sometimes, however, upon the completion of the delivery-pipe, excepting the connection of said section e' with the pipe-section next above, it is found that the bolt-holes in the flange at the upper end of section e' do not register with the bolt-holes in the flange at the lower end of the pipe-section next above. Hence the importance of being able to turn pipe-section e' in order to bring the holes in the flange at the upper end of said pipe-section into registering relation with the holes in the flange at the lower end of the pipe-section next above. This is conveniently accomplished by the construction hereinbefore described, it being merely necessary to loosen bolts M' that secure ring or collar M, whereupon pipe-section e' can be readily turned in the one direction or the other, to bring the same into the position required relative to the pipe-section next above.

The bucket-stems or rods H' operate in suitable guide-ways O' formed by the opposing surfaces of a pair of lugs O projecting laterally from the adjacent side of the casing of cham-

ber L, as shown very clearly in Figs. 4 and 9, and are held in the respective guide-ways, by means of a cap-plate O², removably secured to the outer ends of lugs O in the following manner:—The cap-plate at or near each end is secured to the adjacent lug by means of an eye-bolt, O³. Both bolts O³ are pivoted within slots O⁴ of the respective lugs O (see Fig. 9) and have nuts O⁵ mounted upon the screw-threaded shanks thereof at the outer side of the cap-plate. The cap-plate is slotted, as at O⁶, to enable the one bolt to be swung, upon loosening the nut thereon, out of engagement with the cap-plate as shown in dotted lines, Fig. 4, whereupon the other bolt with the cap-plate can be swung away from the respective bucket-rod or stem, as shown in dotted lines, same figure, to enable the removal of said rod or stem from the respective guide-ways. Each pair of lugs is located a suitable distance apart to accommodate between them the location and operation of rope or cable K.

The pump is supported in any suitable manner, preferably from timber, Q, in the mine-shaft. (See Fig. 3.) Preferable means for supporting the pump from said timber is illustrated in Figs. 3 and 4, wherein the center portion B' of head B, at one side and at a suitable interval apart is provided with two laterally-projecting flanges or lugs B³ that, at their outer end, have secured thereto a yoke R that connects and has bolted thereto two upright bars S. Each bar S is embraced or engaged by a pair of clamping-jaws S' caused to tightly engage and clamp the respective bar by means of a bolt S² that extends through the pair of clamping-jaws, and the one clamping-jaw is provided with a tooth or spur, S³, that engages the supporting-timber. Supporting-timber Q may not be found at the same elevation in all mine-shafts. Hence clamping-jaws S⁴ are adjustable up and down said bars S, and the latter are quite long.

A feature of my invention of vast importance consists in the simple and convenient means employed for supporting the suction-hose or pipe from the lower head of the pump, and referring to Figs. 1, 3 and 5 that show the means referred to, the suction-hose-nipple d is screwed into a sleeve, T, that, at its upper end engages a gasket, U, seated in an undercut groove or recess C', in the lower end of head C. Sleeve T, in its lower end, is provided with an annular groove or recess, T', that is engaged by the lower hooks V' of hook-ended upright-bars, V, that extend upwardly into holes or cavities C², in laterally-projecting lugs C³ of head C, and terminate at their upper ends, in hooks, V², that are engaged by wedges, W, driven in undersaid hooks through lateral perforations C⁴ in lugs C³, the wedges at or near their reduced ends being provided, respectively, with a laterally-projecting lug or member W' that serves as a stop to prevent the wedges from backing out entirely in

loosening the same by which construction there is no liability of the wedges becoming lost.

Joints X connect the barrels of the pump with the respective heads of the pump. A gasket or packing X' is interposed between each joint X and the ends of the pump-barrels, said packing or gaskets being seated in undercut annular grooves, X², of the joints. A gasket or packing, X³, is interposed between each joint X and heads B and C of the pump, packing or gaskets X³ engaging undercut grooves X⁴ in said pump-heads. Suction-valves G of the pump are preferably located within the lower joints X, being suitably seated preferably in the lower portion of said joints.

Heads B and C, pump-barrels and connecting-joints are held assembled by means of two bolts or rods, Y, located on opposite sides of the pump, respectively, and pivotally secured at their upper ends, as at Y', to laterally-projecting lugs or ears, Y⁴, of the upper head B. Said bolts or rods extend downwardly, respectively, through a slot in laterally-projecting lugs C⁵ of the lower head, said connecting-bolts or rods being secured in place by means of nuts Y² mounted thereon below lugs C⁵ and preferably further secured by means of pins or cutters, Y³, extending laterally through said lugs at the outer side of the rods or bolts. The pump-barrels are suitably hinged upon said rods or bolts Y in such a manner that by loosening bolts or rods Y, the parts will loosen or separate sufficiently to permit the pump-barrels to be swung laterally upon said bolts or rods for repairs, cleaning or other purposes. A preferable hinge-connection of the pump-barrels with aforesaid rods or bolts is shown in Fig. 1, wherein the barrels are provided, respectively, with a laterally projecting lug or ear *a* that preferably partially embraces the respective bolt or rod and rests upon a collar, *a'*, loosely mounted upon the bolt or rod, but held in place by means of a collar, *a''*, rigidly mounted upon the rod or bolt preferably by means of a set-screw or bolt *a'''*, the hole *a⁴* of lug or ear *a* engaging the upright pintle *a⁵* of collar *a'*.

The pump-barrels have preferably an ear *a* at or near either end to render the barrels reversible so that in the assemblage of parts no particular care need be exercised as to which end of the pump-barrel will come upper or lowermost. Screws or bolts *a'''* are of course loosened preparatory to the afore-mentioned swinging aside of the pump-barrels. If desired, the heads of the pump may be tied together, centrally between the pump-barrels, by means of a tie-rod, Tr, but said rod should be made of two parts joined together by means of a turn-buckle or coupling as shown.

To prevent the upper joints X from dropping upon swinging the pump-barrels laterally, as hereinbefore indicated, said joints are provided, respectively, (see Fig. 3) with laterally-projecting lugs X⁵ provided with open-

ended vertical slots X⁶ for the passage of eye-bolts X⁷, the eyes whereof are uppermost and engage the eyes of eye-bolts, X⁹, that are suitably secured to laterally-projecting lugs or ears *b* of head B. Upon loosening nuts X⁸ that are normally tightened against lugs X⁵, eye-bolts X⁷ can be swung outwardly, as shown in dotted lines, Fig. 3, to permit the removal of upper joints X as required in replacing or renewing the packing at the ends of the joints or for other purposes.

An important feature concerning upper joints X consists in the downward taper of the internal wall of said joints, the latter, at the lower end, corresponding in diameter with the diameter of the pump-barrel, but having their diameter gradually increasing toward their upper end to facilitate the entrance of the buckets into the pump-barrels upon the assemblage of parts, more especially where elastic packing is used on the buckets.

The delivery-valves I are seated upon the buckets in the usual manner.

Another important feature of my invention consists in suitable means for expanding the packing of the buckets without necessitating the removal of the buckets from the pump-barrel. Preferable means for the purpose is shown in Fig. 1, wherein one of the buckets is shown in section and wherein I' designates the annular packing of the bucket, and in Figs. 7 and 8 wherein I² designates an elastic split ring that engages the inner side of the packing. The edges of said ring, at the split in the ring are preferably V-shaped, (see Fig. 7) and engage corresponding grooves in the edges of a wedge, I³, that at its reduced end terminates in a screw-threaded shank I⁴ that has mounted thereon a nut, I⁵, engaging the lower end of the bucket. The bucket comprises, preferably, two spiders or perforated conical members I⁶, between the rims of which the packing is confined, the hubs of said spiders or conical members abutting each other and nicely mounted upon the lower end of the plunger-rod or stem, a butt-ring I⁷, preferably of steel, being interposed between a shoulder *h* on the bucket-rod or stem and the upper member I⁶ and engaging a recess in the hub of said member I⁶, the plunger-rod or stem being screw-threaded at its lower end and extending below the bucket where it has mounted thereon a nut, *h'*, that, in conjunction with shoulder *h* on the bucket-stem or rod, securely holds the parts of the bucket together. The upper end of wedge I³ is adapted to extend above split ring I² and the rim of the upper spider or conical member of the bucket is recessed, as at I⁸, Fig. 8, to accommodate the location of said end of the wedge. The shank of the wedge extends through a hole I⁹ in the rim of the lower spider or conical member of the bucket and the wedge is operated by means of nut *h'* that, as already indicated, is mounted on the shank of the wedge below the bucket. By turning said nut in the one direction or the other the packing of the bucket is ex-

panded or contracted as desired. Hence, it will be observed that when the packing becomes worn, it need not be renewed immediately, but is simply readjusted by expanding the same and thereby maintaining the required engagement or fit of the packing with the internal wall of the respective barrel of the pump.

Nut h' is preferably of the split variety, as shown more clearly in Fig. 10, and clamped upon the bucket-stem or rod by means of a bolt and nut, h^2 , by loosening which the split-nut can be quickly removed when required.

Referring again to the means employed for actuating the buckets, I would remark that the operating ropes or cables are not shown attached directly to the links that depend from the bell-cranks, but (see Fig. 11) extend through half-clamp-boxes, Z, (one of which is shown detached in Fig. 12) that tightly clamp the ropes or cable between them, the internal surface of the half clamp-boxes being corrugated, grooved or otherwise formed, as at Z' , Fig. 12, to conform to the external surface of the rope. The operating cables should be of such length that they can readily be lengthened when required by separating or loosening the clamp-boxes and leaving out more rope or cable. The companion half-clamp-boxes are preferably clamped upon the respective rope or cable by means of bolts Z^2 that extend through corresponding holes in the clamp-boxes and are suspended from the respective bell-crank lever H^4 above by means of links Z^3 .

What I claim is—

1. In pumping-apparatus of the variety indicated, the combination with the upright pump-barrels, upper head of the pump, chamber L connected with the upper end of said head, delivery-pipe extending into said chamber, buckets and bucket-rods or stems extending upwardly through said pump-head a suitable distance above the head, suitable means for simultaneously actuating said rods or stems in opposite directions, respectively, lugs, O, rigid with the casing of the aforesaid chamber, eye-bolts, O^3 , pivoted to said lugs and capable of swinging outwardly, guide-ways O' formed upon the lugs, cap-plate O^2 and nuts, O^5 , the cap-plate being slotted, as at O^6 , all arranged, substantially as shown, for the purpose specified.

2. In pumping-apparatus of the variety indicated, the combination with the lower or suction-head of the pump-proper, the casing of said head having cavities or holes C^2 , of a sleeve, T, for the attachment of the suction-hose or pipe, said sleeve being fitted to the outer end of the aforesaid pump-head, hook-ended bars, V, the hooks at one end of said bars engaging the outer end of said sleeve and wedges for engaging the hooks at the other end of said bars, the casing of the aforesaid pump-head having holes for the reception of said wedges, substantially as set forth.

3. In pumping apparatus of the variety indicated, the combination with the lower or

suction-head of the pump-proper, the casing of said head having cavities or holes C^2 , an annular undercut groove in the lower or outer end of the head, a gasket or packing within the undercut portion of said groove, a sleeve T engaging said groove and the packing therein, said sleeve being designed for the attachment of the suction-hose or pipe, hook-ended bars V extending into the aforesaid cavities or holes of the pump-head, the outer hooks of said bars engaging the outer end of the aforesaid sleeve, and wedges for engaging the hooks at the inner ends of said bars, the casing of the pump-head having holes for the passage of the wedges, substantially as set forth.

4. In pumping-apparatus of the variety indicated, the combination with the lower or suction-head of the pump-proper, the casing of said head having cavities or holes, C^2 , a sleeve T fitted to the outer end of said head, said sleeve being suitably constructed for the attachment of the suction-hose or pipe and provided with an annular groove in its outer end, hook-ended bars V extending into the aforesaid cavities or holes of the casing of the pump-head, the hooks at the outer ends of said bars engaging the groove in the outer end of the aforesaid sleeve, and wedges, W, for engaging the hooks at the inner ends of said bars, said wedges at or near their reduced end having a laterally-projecting lug or member W' , respectively, substantially as and for the purpose set forth.

5. The combination with the pump-barrels and heads of the pump, of bolts or rods Y connecting the heads together, the barrels being hinged to said rods or bolts, substantially as set forth.

6. The combination with the upright pump-barrels, and upper and lower heads of the pump-proper, of bolts or rods Y connecting said heads, said rods or bolts being pivotally connected with the upper heads and removably secured to the lower heads, and the barrels being hinged to said bolts or rods, substantially as set forth.

7. The combination with the pump-barrels and heads of the pump-proper, of bolts or rods Y connecting said heads, said bolts or rods being pivotally secured to the one head and removably secured to the other head and the pump-barrels being reversible and hinged to said rods or bolts, substantially as set forth.

8. The combination with the pump-barrels, heads of the pump-proper, and bolts or rods Y connecting said heads, said rods or bolts being pivotally secured to the one head and detachably secured to the other head, of collars, a^3 , rigid upon said bolts or rods, collars a' loose upon the rods or bolts and resting upon the aforesaid rigid collars, said loose collars being provided with upright pintles a^5 and the pump-barrels having laterally-projecting lugs or ears provided with holes or perforations to engage said pintles, substantially as set forth.

9. The combination with the pump-barrels, heads of the pump-proper and bolts or rods Y connecting together said heads, the pump-barrels being hinged to said bolts or rods and being capable of being swung laterally, of joints for connecting the pump-barrels with the upper pump-head and suitable means for supporting said joints when the pump barrels are swung laterally out of position, substantially as set forth.

10. The combination with the upright pump-barrels, heads of the pump-proper and bolts or rods Y connecting together said heads, the pump-barrels being hinged to said bolts or rods and being capable of being swung laterally, of joints for connecting the

pump-barrels with the upper pump-head and suitable means for supporting said joints when the pump-barrels are swung laterally out of position, said means comprising eye-bolts or suitable devices detachably secured to the joints and suitably suspended from the adjacent pump-head, substantially as set forth.

In testimony whereof I sign this specification, in the presence of two witnesses, this 15th day of June, 1893.

FRANK M. ILER.

Witnesses:

C. H. DORER,
WARD HOOVER.