Aug. 31, 1937. S. W. OLDHAM 2,091,876

FLUID PRESSURE GENERATING MEANS

Filed May 14, 1936 2 Sheets-Sheet 1

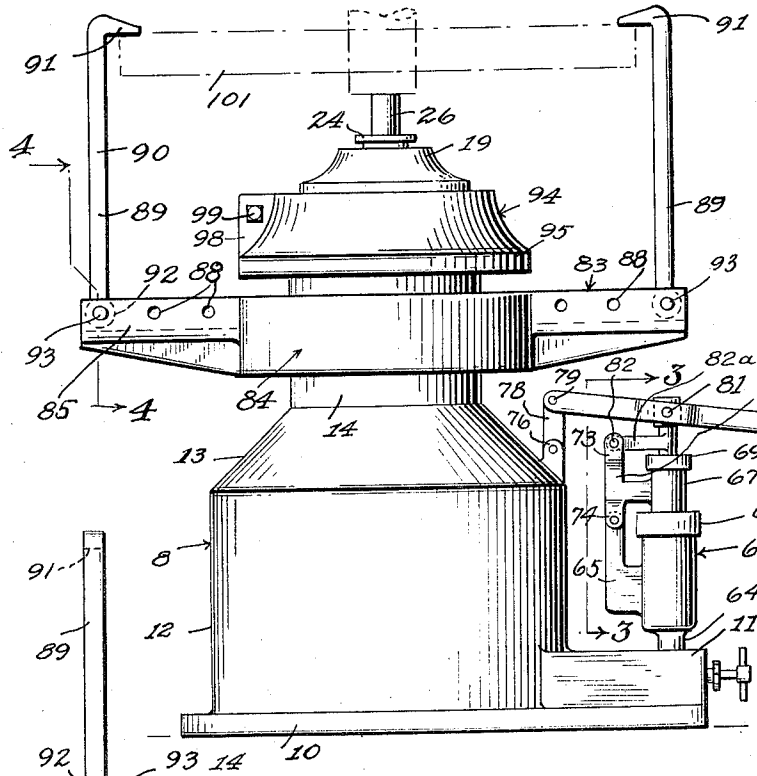


Fig. 1.

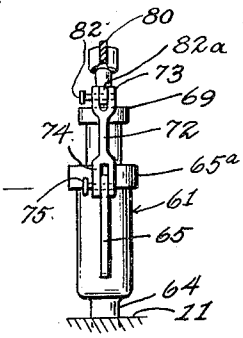


Fig. 3.

Fig. 4.

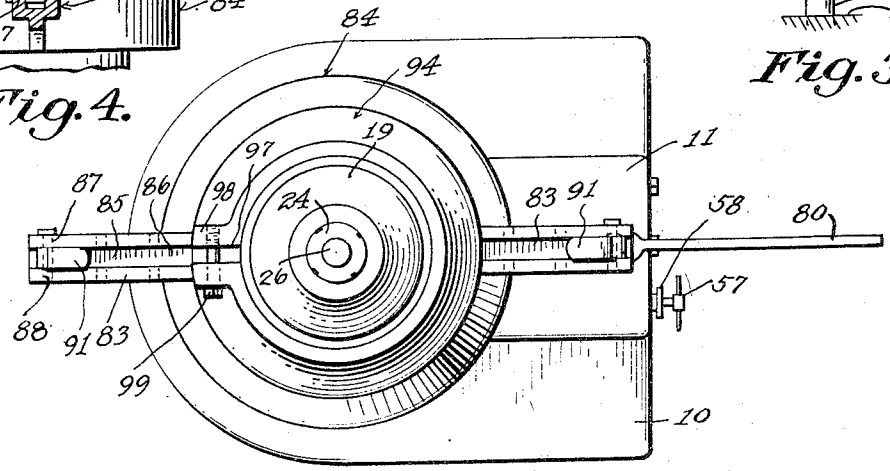


Fig. 2.

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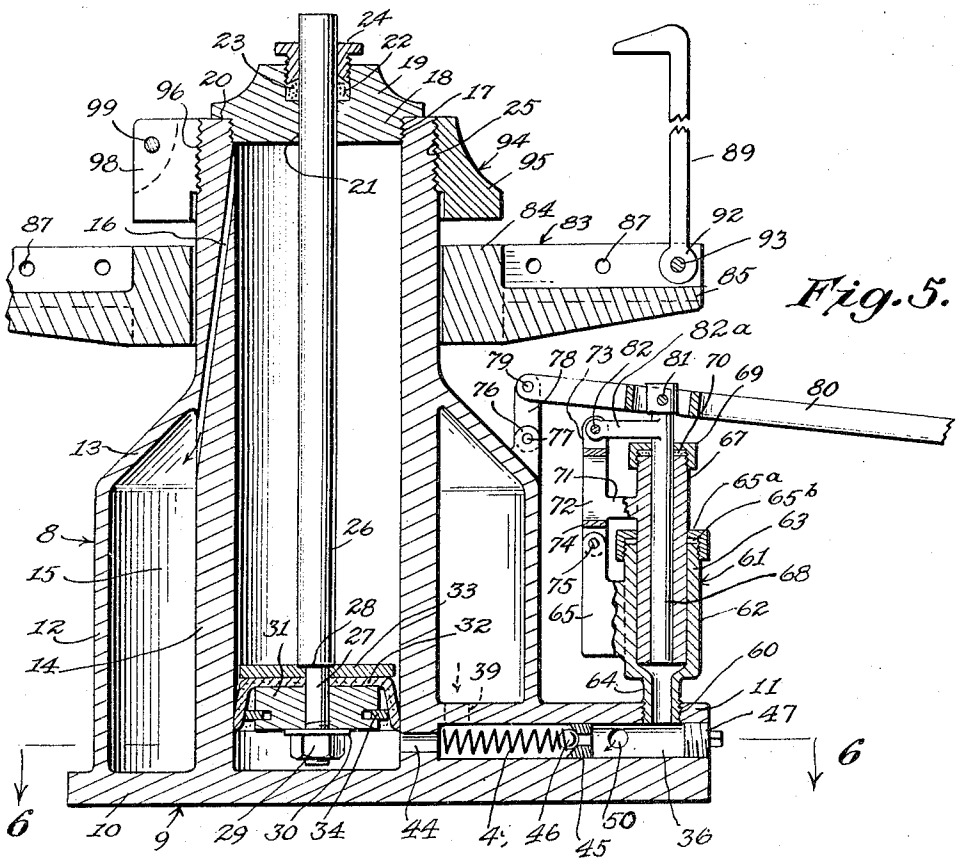


Fig. 5.

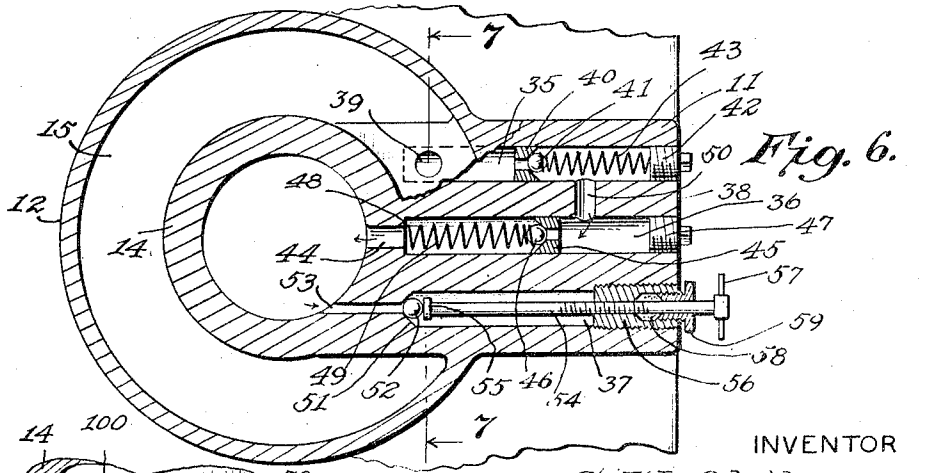


Fig. 6.

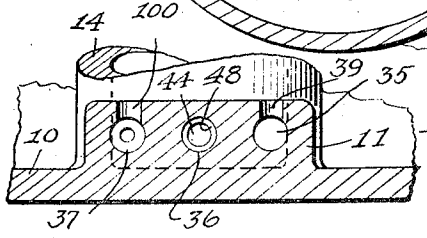


Fig. 7.

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UNITED STATES PATENT OFFICE

2,091,876

FLUID PRESSURE GENERATING MEANS

Samuel W. Oldham, Greenville, Ohio

Application May 14, 1936, Serial No. 79,809

1 Claim. (Cl. 103—37)

This invention relates to a hydraulic pulling apparatus designed primarily for pulling wheels and gears from off their axles, shafts or spindles to which they are fixed, but it is to be understood that an apparatus, in accordance with this invention, is for use in any connection for which it may be found applicable, and the invention has for its object to provide, in a manner as hereinafter set forth, an apparatus of the class referred to including a pressure operated ram and a pressure generating mechanism coacting with the ram comprising a cylinder and a large and a small plunger arranged in concentric relation in such cylinder. The larger plunger is capable of being locked to the cylinder and the smaller plunger is employed, independent of the larger one, for producing very high pressures, and when these latter are not necessary, the plungers may be locked together and operated as one plunger or unit to greatly increase the speed of the ram.

A further object of the invention is to provide, in a manner as hereinafter set forth, an apparatus of the class referred to including a ram structure, a work pulling element slidably mounted on and coacting with the ram structure for pulling the work and having as parts thereof adjustable work couplers, a controllable pressure generating mechanism for building up pressures to provide for the operation of the ram structure, and an abutment element disposed in the path of the pulling element and anchored to the ram structure.

Further objects of the invention are to provide, in a manner as hereinafter set forth, a hydraulic pulling apparatus which is comparatively simple in its construction, strong, durable, compact, thoroughly efficient in its use, conveniently operated, readily installed with respect to the work to be operated upon, and comparatively inexpensive to set up.

With the foregoing and other objects which may hereinafter appear, the invention consists of such parts and such combination of parts as will be more specifically described and are as illustrated in the accompanying drawings wherein is shown an embodiment of the invention, but it is to be understood that changes, variations and modifications may be resorted to which fall within the scope of the invention as claimed.

In the drawings:

Figure 1 is a front elevation of the apparatus showing the adaptation thereof with respect to the work operated upon. The work is shown in dotted lines.

Figure 2 is a top plan view of the apparatus,

Figure 3 is a section on line 3—3, Figure 1,

Figure 4 is a section on line 4—4, Figure 1,

Figure 5 is a vertical sectional view of the apparatus, broken away,

Figure 6 is a section on line 6—6, Figure 5, and

Figure 7 is a section on line 7—7, Figure 6.

The apparatus includes a casting 8 formed of a base 9 having a low portion 10 and a high portion 11 substantially of rectangular contour having its inner end spaced from one side edge, its outer end flush with the other side edge and its sides spaced from the front and rear edges of the low portion 10. The high portion 11 has its inner end arranged substantially at the transverse median of the low part 10. The casting 8 also includes an upstanding annular web 12 having its top part 13 of frusto-conoidal contour. The bottom of web 12 is integral with the upper faces of the portions 10, 11 of base 9. The diameter of the lower part of web 12 will be as desired. The casting 8 also includes a vertically disposed cylinder 14 of greater height than and which is encompassed by and disposed in spaced relation to the web 12 with the exception of the upper end of the latter. The web 12 at its upper end merges into the periphery of the cylinder 14 intermediate the ends of the latter. The cylinder 14 is integral at its lower end with the upper face of portion 10 and at the lower end of one side with the inner end of portion 11.

The web 12 in connection with the cylinder 14 provides an oil reservoir 15. The body of the cylinder 14 is formed with a relief channel 16 which extends from a point in proximity to the upper end of the cylinder 14 and opens into the reservoir 15 at the top of the latter.

The inner wall of the cylinder 14 at its upper end is threaded as at 17 and threadedly engaging with such threads is the reduced lower end 18 of a head 19. The latter is formed with a peripheral annular shoulder 20, an axially arranged opening 21, a pocket 22, a packing 23 in pocket 22 and a packing gland 24. The head 19 provides a closure for the upper end of cylinder 14. The shoulder 20 seats on the top edge of cylinder 14. The latter is formed at its upper end with peripheral threads 25 for a purpose to be referred to.

Operating in cylinder 14 and extending through opening 21 and gland 24, as well as the packing 22 is a ram 26 having a reduced peripherally threaded lower end portion 27 which provides the ram 26 with a peripheral shoulder 28. Engaging

with the reduced lower end portion 27 of the ram 26 is a securing nut 29 contacting a washer 30. Positioned upon the washer 30 and encompassing the reduced lower end 27 is a supporting head 31 carrying an inverted cup-shaped leather packing member 32 for travelling against the inner face of the cylinder 14. Mounted on the reduced lower end 27 and interposed between the packing member 32 and shoulder 28 is a confining member 33 for maintaining the member 32 on head 31. The latter carries an expanding ring 34 which operates against the inner face of the member 32 for the purpose of maintaining the latter in engagement with the inner face of cylinder 14.

The ram 26, in connection with the elements carried by the reduced end portion 27 thereof, the cylinder 14 and head 19 provide a ram structure.

The high portion 11 of the base 9 is formed with spaced parallel channels 35, 36 and 37 providing respectively an intake valve chamber, a supply valve chamber and a relief valve chamber. The channels 35, 36 and 37 extend from the outer end 38 of the high portion 11 substantially to the inner end of said high portion 11. The high portion 11 is formed with an upstanding port 39 for establishing communication between the reservoir 15 and the intake valve chamber formed by the channel 35. Arranged within the latter intermediate its ends is a ported valve seat forming member 40 for the intake valve 41. The outer end of the channel 35 is closed by a removable threaded plug 42 which constitutes an abutment. Interposed between the latter and the intake controlling valve 41 is a controlling spring 43 for such valve. The body of cylinder 14 at its lower end is provided with a supply port 44 which opens into the inner end of the channel 36 which forms the supply valve chamber. Arranged within the chamber 36 intermediate the ends of the latter is a ported valve seat forming member 45 for a supply controlling valve 46. The outer end of the channel 36 is closed by a removable threaded plug 47 which is spaced from the member 45. The supply or intake port 44 is of less diameter than that of the channel 36 thereby providing a shoulder 48. Interposed between the shoulder 48 and the supply controlling valve 46 is a controlling spring 49. The valve seat forming members 40 and 45 are oppositely disposed with respect to each other, as with reference to member 40 the valve seat provided by such member opposes the plug 42 whereas the valve seat provided by the member 45 opposes the shoulder 48 at the inner end of the valve chamber provided by the channel 36. Communication is established between the channels 35 and 36 by a port 50 which is arranged in the high portion 11 outwardly with respect to the valve seat forming members. The high portion 11 is formed with a valve seat 51 at the inner end of the channel 37 and normally held against said seat is a relief controlling valve 52. The cylinder 14 and high portion 11 is provided with a relief port 53 which opens at one end into the cylinder 14 and at its other end into the channel 37. The valve 52 normally closes the outer end of the port 53. The valve 52 is normally held in closed position by an adjustable peripherally threaded retaining stem 54 provided at its inner end with a head 55 which abuts valve 52. Threadedly engaging with the outer end portion of the channel 37 is a peripherally threaded closure plug 56 through which extends the retaining stem 54. The latter has threaded engagement with the plug 56 and extends outwardly therefrom. The stem 54 at its outer end carries a handle means 57 to facilitate the operation thereof. The plug 56 is cut out to receive a packing 58 and a packing gland 59. The high portion 11 is formed with a vertically disposed opening 60 having a threaded wall. The opening 60 communicates with the outer portion of the channel 36 at a point spaced outwardly from the port 50. The valves 41, 46 and 52, in connection with the parts associating therewith, provide a combined intake, supply and relief controlling valve mechanism for the ram structure.

There is associated with the said valve mechanism a pressure generating mechanism indicated generally at 61 and consisting of an upstanding tubular body 62 formed of an upper portion 63 and a lower portion 64. The upper portion is of greater diameter than the lower portion 64 and provides a cylinder carrying a pair of plungers to be presently referred to. The lower portion 64 constitutes an outlet for the cylinder forming portion 63. The lower portion 64 is peripherally threaded and engages with the threaded wall of the opening 60. The upper portion 63, at one side thereof has formed integral with its outer periphery a vertically disposed element in the form of an L-shaped lower bracket 65. The latter consists of a horizontal leg and a vertical leg with the latter extending upwardly from the outer end of the horizontal leg. Threadedly engaging with the outer periphery of the upper end of the portion 63 is a flange collar 65^a and interposed between the latter and the top edge of the portion 63 is a packing ring 65^b which is flush with the inner face of the said portion 63. Arranged within and extending upwardly from the portion 63 is a tubular plunger 67 and a solid plunger 68. The latter is of greater length and arranged within the plunger 67. Plunger 67 snugly engages the inner face of the portion 63 of member 62. Plunger 68 may be operated independently of plunger 67 and when operated independently of the plunger 67, the latter constitutes a cylinder for plunger 68. The upper part of plunger 67 has connected thereto a flange collar 69 and interposed between the latter and the upper end of plunger 67 is a packing ring 70. Formed integral with the plunger 67 above the portion 63 of member 62 is a laterally disposed lower T-shaped bracket formed of a horizontal arm 71 and a vertical arm 72. The arm 71 is integral at its inner end with the plunger 67. The outer end of arm 71 merges into the arm 72 intermediate the ends of the latter. The upper end of arm 72 is bifurcated as at 73. The lower end of arm 72 is bifurcated as at 74. The arm 71 merges into the arm 72 in proximity to the bifurcated lower end 74. The arm 72 is detachably connected to the upper end of the vertical leg of the angle-shaped arm 65 as at 75. The top 13 of the web 12 has an upstanding lug 76 having connected therewith as at 77, a vertical member 78 which is connected, as at 79, to the inner end of an operating lever 80 which extends outwardly with respect to the body 62. Pivotally connected as at 81 to the lever 80 is the upper end of the plunger 68. The bifurcated upper end 73 of the arm 72 is adapted to be detachably connected with the plunger 68 and the lever 80 and for such purpose the plunger 68 is formed with a laterally extending arm 82^a which is pivotally connected, as at 82 to the end 73 of arm 72. The connection 82, when the connection 75 is released, provides for the plungers 67 and 68 to operate as a unit. When the con-

nection 82 is disconnected from the arm 82a and the connection 75 couples arms 72 and 65 together, the plunger 68 operates independently of the plunger 67. The arms 71, 72 and connection 82 provide for locking plungers 67 and 68 together. The arms 71, 72 and connection 75 provide for locking the plunger 67 to the cylinder provided by the portion 63 of member 62. The pressure generating mechanism 61 when operated in connection with the intake supply valve will function to build up a hydraulic pressure upon the ram 26 within the cylinder 14 as on the operation of such generating mechanism 61, the oil will be withdrawn from the reservoir 15 and forced into the ram chamber provided by the cylinder 14 below the head 31 whereby it will act on ram 26 to force it upwardly. Any of the oil which is carried to the top of the ram chamber will be conducted therefrom by channel 16 into the reservoir 15. The smaller plunger, when operated independently of the larger one, is for producing very high pressures in the ram chamber and when such pressures are not necessary, the two plungers are locked together and operated as one large plunger or unit to greatly increase the speed of the ram.

The apparatus includes a pulling element generally indicated at 83 and consisting of an annulus 84 provided with a pair of oppositely extending radially disposed arms 85. Each arm 85 has its top formed with a lengthwise extending groove 86 of the desired width and which is closed at its inner end and open at its outer end. Each arm 85 is formed with two sets of spaced openings. The openings of one set are indicated at 87 and those of the other set at 88. The openings of set 87 align with the openings of the set 88. The element 83 includes a pair of oppositely disposed couplers 89 of like form which are employed for coupling the work to the element 83. Each coupler may be of any length desired and comprises a shank 90 formed at its upper end with an inwardly extending hook 91 having its lower end in the form of an eye 92. The couplers are connected to the arms 85 by pins 93 extending through aligned openings 87, 88 and the eyes 92. The sets of openings 87 and 88 provide for adjustably positioning the couplers 89 to the arms 85. The annulus 84 is adapted to be positioned in encompassing relation with respect to the upper portion of the cylinder 14 and is shiftable lengthwise with respect to the latter.

The apparatus includes an abutment element which is arranged on the cylinder 14 in the path of a pulling element 83. The abutment element is generally indicated at 94 and comprises a split collar 95 having its inner face formed of two different diameters. That portion of smallest inner diameter of collar 95 is of greater length than the portion of largest inner diameter and is threaded as at 96 for engagement with the threads 25 on cylinder 14. Registering with the edges 97 of the edges of the split collar 95 is a pair of outwardly directed parallel apertured lugs 98. The aperture in one of the lugs 98 is threaded. The apertures of the lugs 98 align and mounted therein is a threaded clamping bolt 99 which functions, in connection with the threads of collar 95 and threads 25 of cylinder 14, to clamp the element 94 securely to the cylinder 14.

The high portion 11 of the base 9 is formed with a vertical port 100 which leads from the chamber provided by the channel 37 to the reservoir 15.

The work operated upon is indicated at 101 and shown in dotted lines in Figure 1.

When the pressure generating apparatus is operated to shift the ram 26 outwardly with respect to the ram chamber, the valve 52 is held in position to close the port 53. When it is desired to relieve the built up pressure on the ram 26, the stem 54 is adjusted outwardly whereby valve 52 will not be retained on its seat and the oil within the cylinder 14 below the ram will be forced, as the ram moves downwardly through the port 53 into the channel 37 and from channel 37 outwardly therefrom to port 100 to the reservoir 15.

What I claim is:

In a hydraulic pulling apparatus a pressure generating mechanism comprising a tubular member having its inner part of reduced inner diameter, the other part of said member constituting a cylinder, the said inner part constituting an outlet for said cylinder, a reciprocatory pressure generating tubular outer plunger operating in and extended from said cylinder, a reciprocatory pressure generating solid inner plunger positioned within, extended from and capable of being operated independently of the outer plunger, oscillatory means for operating said inner plunger, a lower laterally disposed element extended from said cylinder, a laterally disposed T-shaped bracket carried by the extended portion of the outer plunger and arranged above said element, means for detachably connecting said element and bracket together to prevent the operation of the outer plunger, a laterally disposed arm carried by the extended portion of the inner plunger, means for detachably connecting said arm and bracket together, when the latter is free of said element whereby said plungers will be operated in unison when the inner plunger is operated, and said inner plunger being operated independently of the outer plunger when said arm is free of said bracket.

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