

Oct. 28, 1930.

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1,779,656

AUTOMATIC BRAKE REGULATOR FOR ROTARY DRILLING

Filed March 16, 1929

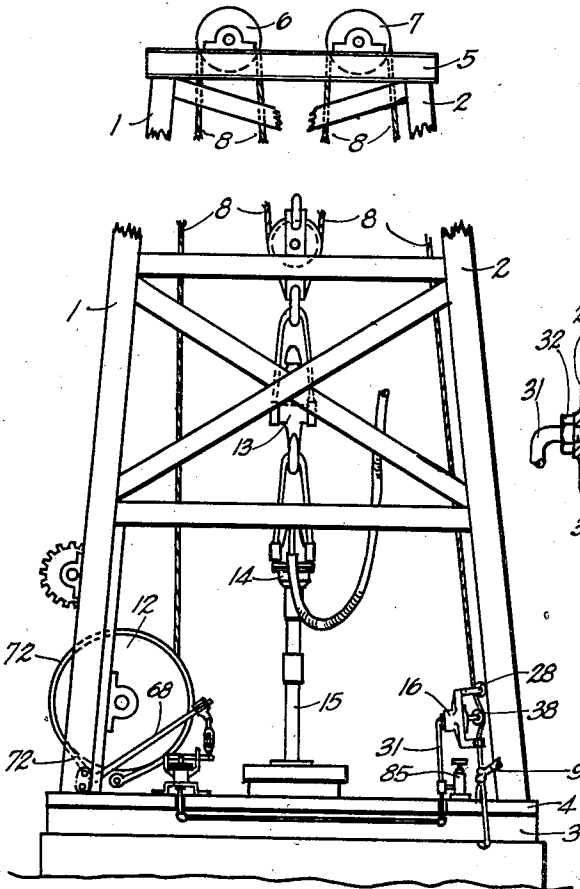


FIG. 1.

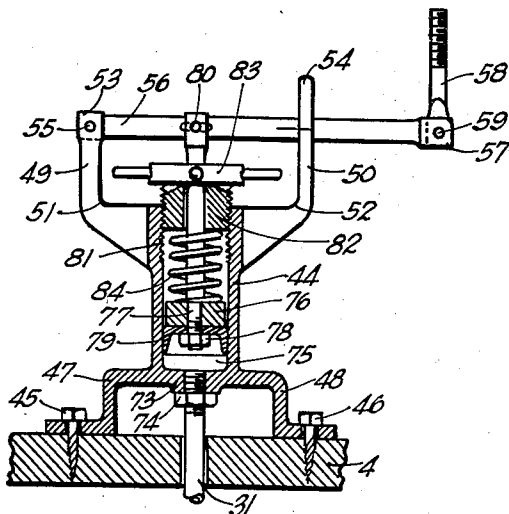


FIG. 2.

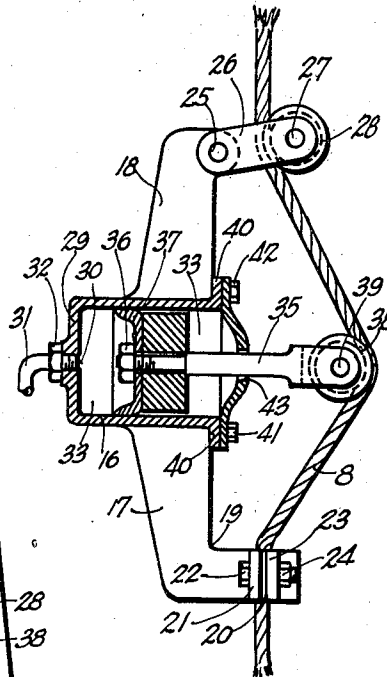


FIG. 3.

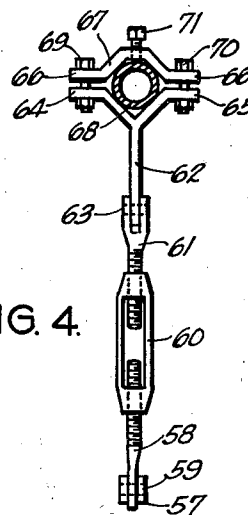


FIG. 4.

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AUTOMATIC BRAKE REGULATOR FOR ROTARY DRILLING

Application filed March 16, 1929. Serial No. 347,556.

My invention relates to automatically lowering drills in oil and gas well drilling.

The objects of my device are to produce an apparatus of this class which will be new, novel, useful and of utility; which will automatically feed a correct amount of drill stem into a well to keep the drill bit in constant contact with the bottom of said well; which will be simple and durable; which will save loss of time and expense; which will operate from the pressure upon the dead end of a drilling cable; which will function through hydraulic pressure; which will govern the playing out of the drilling cable by controlling the cable drum; which will operate the brake on said cable drum; which will be cheap and economical in manufacture; which may easily, be quickly and cheaply installed; which will be economical in operation; which will be efficient for all of the purposes for which it is intended.

At the present time it is practically impossible for the driller of an oil or gas well to constantly keep the drilling bit upon the bottom of the well. The drill bit will drill itself clear and continue to rotate without touching the bottom of the well or actually doing any drilling. It is necessary for one man to continually be at the brake arm of the rope drum, and even with the best of attention the bit will be clear of the bottom of the well part of the time. This of course is very expensive. Any device that will remedy this condition will save the drilling companies a considerable amount of money almost regardless of the cost of the device.

There is a device now beginning to be used that through a gauge placed upon the cable shows the driller when he actually has the weight of his tools upon the bottom of the well. This device is a great help to the driller, however, it does not feed or in any way control the movement of the drilling tools in the well. The tools have to be raised or lowered by the driller and the gauge is mere-

ly to indicate to him when to lower the drilling bit. A great deal of time is lost even when using this gauge because the driller is many times busy at something and does not lower the bit when the gauge indicates it should be done.

My device will automatically lower the drilling tools when they should be lowered. It is easily and quickly installed. Its original cost is small. It is durable. It will efficiently accomplish all of the purposes for which it is intended.

With these and other objects in view as will more fully appear my invention consists in the construction, novel features, and combination of parts hereinafter more fully described, pointed out in the claims hereto appended, and illustrated in the accompanying one-sheet drawing, of which,

Figure 1 is an elevational fragmentary view of a drilling derrick showing my device installed thereon; Fig. 2 is a part sectional view of the brake operating mechanism of the device; Fig. 3 is a sectional view of the device for controlling the brake operating mechanism; Fig. 4 is an elevational view of the clamp and turn buckle used for connecting the device to the brake lever.

Like characters of reference designate like parts in all the figures.

It is understood that various changes in the form, proportion, size, shape, weight and other details of construction, within the scope of my invention may be resorted to without departing from the spirit or broad principle of my invention and without sacrificing any of the advantages thereof; and it is also understood that the drawings are to be interpreted as being illustrative and not restrictive.

A practical embodiment of the invention as illustrated in the drawings includes:

An oil well drilling derrick having cornices 1 and 2, sill 3, floor 4, crown block 5, crown pulleys 6 and 7, cable 8 which has its

dead end 9 tied around or in any manner secured about said sill 3 or some stationary object. Said cable 8 extends from its dead end 9 in the usual manner over said sheave 7 then down and around sheave 10 in block 11 then up and over said sheave 6 and down to drum 12, where it is fastened at its other end, not shown, in a manner usual with rope drums. In drilling, various head blocks are used which have a various number of crown pulleys. It is usual for the said cable 8 to pass over several of these crown pulleys and also to pass several times through said block 11.

For illustrative purposes only, cable 8 is shown as making only one passage from crown pulleys through block 11, but it is to be understood that any usual method of threading the cable, and any desired number of pulleys and sheaves may be employed. Said drum 12 is to represent the usual rope drum of the drilling outfit which is used through power from the engine for raising and lowering said block 11, a swivel 13, a drill stem attachment 14 and a drill stem 15 of any standard rotary drilling outfit.

For use with any standard rotary drilling outfit similar as described above, I provide:

A cylindrical metal compression chamber housing 16 better seen in Figs. 1 and 3, having arms 17 and 18 oppositely extending therefrom and made integral therewith. Said arm 17 having a right angle bend 19 and terminating at its end 20. Said end 20 has flanges 21 extending laterally from each side thereof, through each of which is a perforation for receiving a bolt 22 for fastening a plate 23 by a nut 24. Said bolt 22, plate 23 and nut 24 act as a clamp and clamp said housing 16 rigidly to said cable 8 at a point adjacent its dead end 9. Said arm 18, at a point adjacent its end, has a lateral perforation for receiving pin 25 which fastens a plate 26 to each side of said arm 18. Through the opposite ends of each of said plates 26 from said pin 25 and in alinement with each other are perforations for receiving pin 27. Said pin 27 passes through and operatively positions a sheave 28 between said plates 26. Said cable 8 passes between said plates 26, said arm 18 and against said sheave 28. Said housing 16 has a top 29 made integral therewith, which has adjacent its center a threaded perforation 30 for receiving one end of a pipe 31 which is more fully described below. Said pipe 31 is provided with jamb nut 32. Compression chamber 33 within said housing 16 is for the purpose of receiving and compressing liquid therein and is provided with a piston 34, and piston rod 35 on one end of which is nut 36 for attaching cup leather 37 in a usual manner. Said piston rod 35 at its end portion opposite to said

piston 34, is bifurcated for holding in an operative manner between its bifurcations a sheave 38 upon pin 39 which extends laterally through said piston rod 35. Said housing 16 is formed at its bottom portion opposite to its said top 29 with flange 40 which surrounds the orifice of said compression chamber 33. Said flange 40 is provided with a plurality of threaded perforations disposed therearound for receiving a plurality of stud bolts shown as at 41 and 42. Held rigidly in position over said bottom orifice of said chamber 33 by said stud bolts 41 and 42 is head 43 which is perforated at its central portion for the operative passage of said piston rod 35.

It will be seen that the length of said piston rod 35 is great enough so that when said cable 8 is clamped to said end 20 of said arm 17 and passed over said sheave 38 and then over said sheave 28 on its side nearest said arm 18 that any upward force exerted upon the upper portion of said cable 8 will force said piston 34 toward its said top 29. It will further be seen that when said piston 34 is forced towards said top 29 that said liquid in said chamber 33 will be forced by said cup leather 37 out through said pipe 31.

I further provide as may better be seen in Figs. 1 and 2, a cylindrical metal compression chamber housing 44 which is positioned to said floor 4 by lag bolts 45 and 46 through each of its legs 47 and 48 at a point adjacent said drum 12 of said drilling outfit. Said legs 47 and 48 are to be of any desired shape which is substantial. Oppositely positioned upon the top portion of said housing 44 and made integral therewith I provide arms 49 and 50 which extend outwardly to right angle bends 51 and 52 where they extend in a vertical manner to their respective bifurcated ends 53 and 54. Through said end 53 I provide pin 55 which passes through one end of and movably attaches a bar 56. Said bar 56 extends laterally across and above the central portion of said housing 44 and passes between the bifurcated portions of said arm 50. Said bar 56 is not attached to said arm 50, but merely rests between said bifurcated portions thereof which act as a yoke or guide to prevent any side movement. Said bar 56 extends past said arm 50 to its end 57 which is bifurcated and perforated for receiving the lower end of take-up rod 58 attached by pin 59 therethrough. Said take-up rod 58 is provided with threads for receiving the lower end of turnbuckle 60, better seen in Fig. 4. Said turnbuckle 60 is of any known make or design and is threadedly attached at its upper end to the lower end portion of take-up rod 61 which is oppositely threaded to said threads upon said take-up rod 58. Said take-up rods 58 and 61 and said turnbuckle 60 are adapted to be adjusted as is usual with take-up rods. The upper end por-

tion of said rod 61 is bifurcated to receive therein lower end portion of clamp member 62 which is connected by pin 63. Said clamp member 62 is adapted to hinge upon said pin 63 and between the bifurcated portions of said rod 61. The upper portion of said clamp member 62 is bifurcated into portions 64 and 65 which extend upwardly and outwardly, as better seen in Fig. 4, each of which is perforated adjacent its end. I further provide clamp member 66 the length of which coincides with the outward extension of said portions 64 and 65, and which has an upward bulge 67 in its central portion and perforations in each of its end portions to coincide with the said perforations through said portions 64 and 65 of said clamp member 62. Said clamp members 62 and 66 are rigidly positioned around the upper portion of brake lever 68, better seen in Figs. 1 and 4, by bolts and nuts 69 and 70 through perforations last above described and through said perforations in portions 64 and 65 of said clamp member 62. Said clamp member 66 is further provided through said bulge 67 with set-screw 71 for preventing said brake lever 68 from turning between said clamp members 62 and 66. Said brake lever 68 operates brake band 72 to control said rope drum 12 in a manner usual with brakes on rope drums in oil well drilling. Downward pressure upon the upper end of said brake lever tightens said band 72 and stops said drum 12 while when the pressure on the lever is released it will allow said drum to turn.

Said compression chamber housing 44 has integral therewith bottom 73 through the central portion of which is a threaded perforation for connecting said pipe 31 leading from said compression chamber 33, said pipe is provided with jamb nut 74. The interior of said housing 44 forms compression chamber 75 which is provided with piston 76 and piston rod 77 which is provided at its lower end with nut 78 for positioning cup leather 79 operatively within said chamber 75. The upper end portion of said piston rod 77 is bifurcated and attached to said bar 56 by pin 80, at a point directly above the central portion of the upper orifice of said chamber 75. The upper inside portion of the walls of said chamber 75 are provided with threads 81 for connecting plug 82 which closes the upper orifice of said chamber 75. Said plug 82 has a perforation through its central portion for allowing the operative passage therethrough of said piston rod 77. Said plug 82 is further provided upon its upper surface with handle 83 which is attached in any usual manner or made integral therewith for the purpose of easily turning said plug 82 without the use of a wrench. Around said piston rod 77 I provide compression spring 84 which fits between the lower surface of said plug 82 and the top

surface of said piston 76, and which exerts a downward pressure upon said piston 76.

As may be seen in Fig. 1, said pipe 31 extends from said top 29 of said compression chamber 33 through said derrick floor 4 and across and upward through said floor 4 to said bottom 73 of said compression chamber 75. At any convenient place upon said pipe 31 I provide a compression pump 85 of known make or design, for the purpose of bringing the pressure within said pipe 31 and said compression chamber 33 and 75 to a desired point.

In operation it will easily be seen that when the weight of drill stem 15 is upon the bottom of the well, that brake lever 68 will be held down and that rope drum will be stationary, but that when the weight of the drill stem is on the cable 8, that it will force the liquid from said chamber 33 through said pipe 31 and into said chamber 75. That the pressure of the liquid upon the bottom of cup leather 79 will force piston rod 77 upward which will through bar 56, rod 58, turnbuckle 60, rod 61, and clamp members 62 and 66 release brake lever 68 and allow drum 12 to turn. This will loosen cable 8 until the drill stem is again upon the bottom of the well. When said stem is again resting upon the bottom of the well, the pressure of cable 8 upon piston 35 will allow said spring 84 to force the liquid out of chamber 75. This will pull down said brake lever 68 and again tighten the brake and hold said drum 12 stationary.

Obviously, the invention is susceptible of embodiment in forms other than that which is illustrated in the accompanying drawings and described herein, and applicable for uses and purposes other than as detailed, and I therefore consider as my own all such modifications and adaptations and other uses of the form of the device other than as herein described as fairly fall within the scope of my invention.

Having thus described my invention what is claimed and desired to be secured by Letters Patent, is:

1. An apparatus as described, embodying a drilling cable having one of its ends anchored and its other end connected to a rope drum, a first metal piston chamber and pipe adapted for attachment upon said cable adjacent its dead end, a piston within said chamber adapted to transmit pressure from said cable to a liquid within said first chamber and to force said liquid into said pipe, a second piston chamber, said pipe connecting said first and said second piston chambers, a brake on said drum, and a mechanical device for transmitting motion from said liquid to said brake.

2. An apparatus as described, embodying a drilling cable having one of its ends anchored and its other end connected to a rope drum,

a first metal piston chamber and pipe adapted for attachment upon said cable adjacent its dead end, a piston within said chamber adapted to transmit pressure from said cable to a liquid within said first chamber and to force said liquid into said pipe, a second piston chamber, said pipe connecting said first and said second piston chambers, a second piston in said second chamber, a brake on said drum, and a mechanical device connecting said second piston for transmitting motion from said liquid to engage and disengage said brake with said drum.

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