Oct. 8, 1929. J. M. GURLEY 1,730,727

AUTOMATICALLY OPERATED SLIDING FORMS FOR CONCRETE CONSTRUCTION

Filed Oct. 15, 1928 3 Sheets-Sheet 1

Fig. 1.

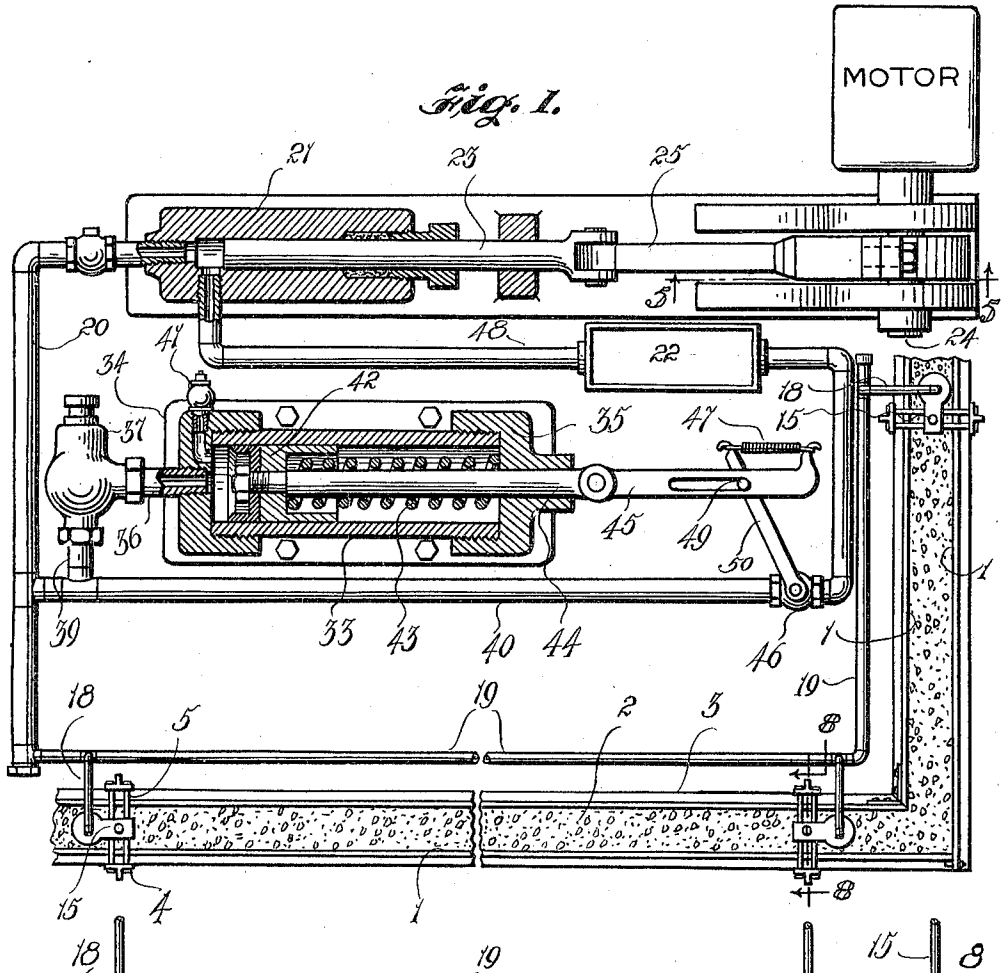


Fig. 2.

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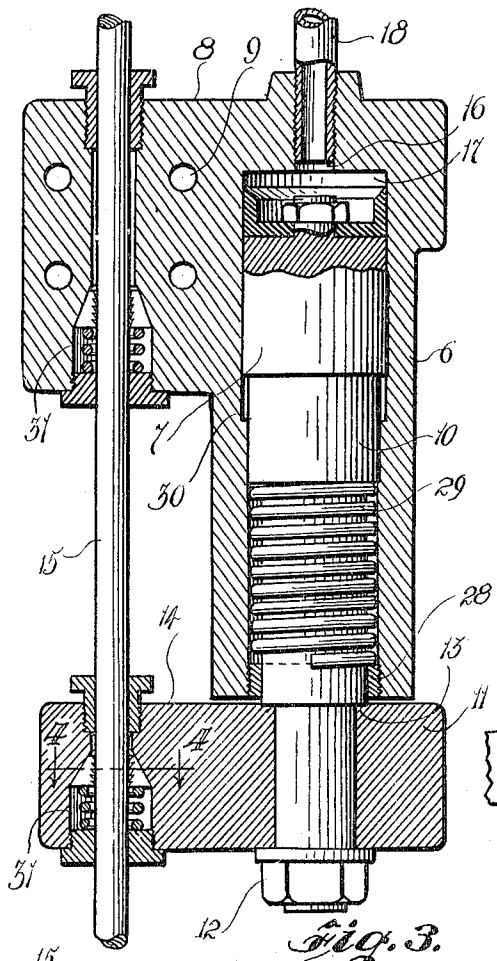


Fig. 3.

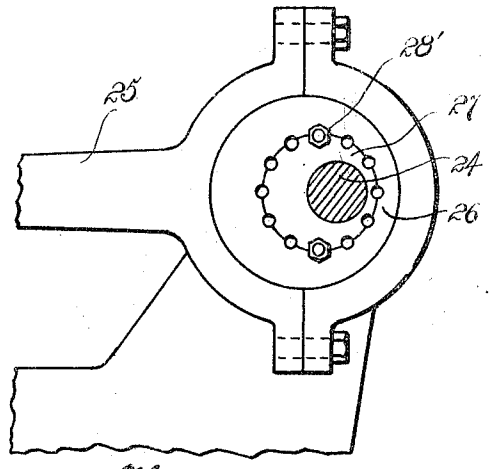


Fig. 5.

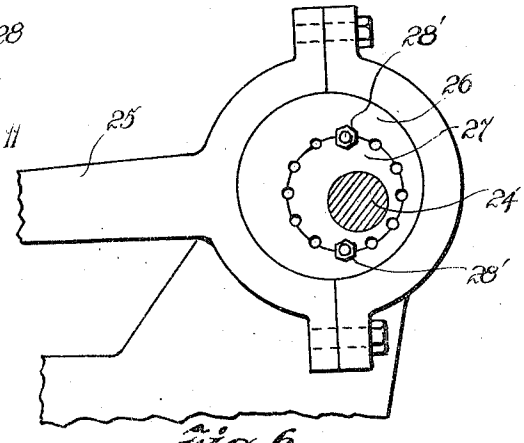


Fig. 6.

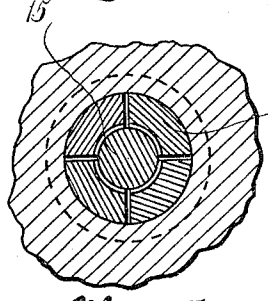


Fig. 4.

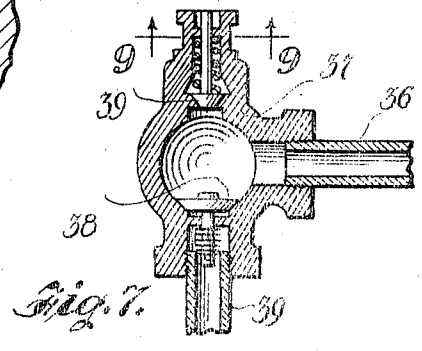


Fig. 7.

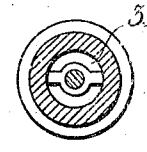


Fig. 9.

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AUTOMATICALLY OPERATED SLIDING FORMS FOR CONCRETE CONSTRUCTION

Filed Oct. 15, 1928 3 Sheets-Sheet 3

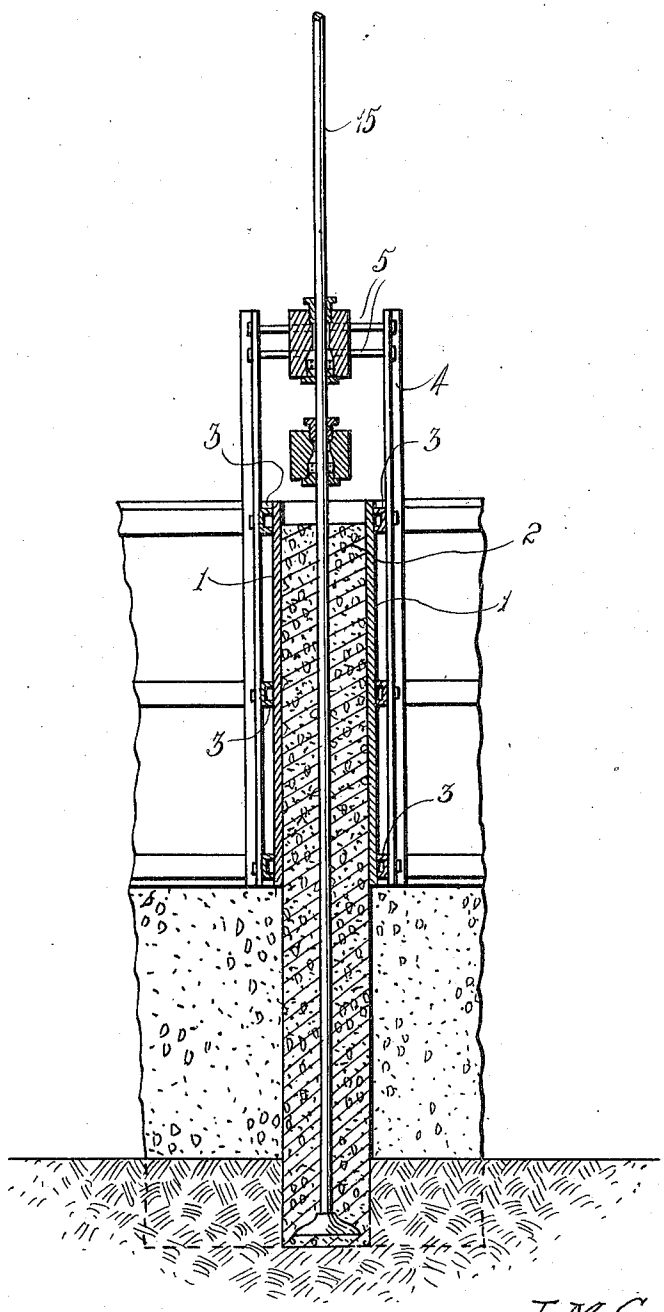


Fig. 8.

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Patented Oct. 8, 1929 1,730,727

UNITED STATES PATENT OFFICE

JAMES M. GURLEY, OF FORT WORTH, TEXAS

AUTOMATICALLY-OPERATED SLIDING FORMS FOR CONCRETE CONSTRUCTION

Application filed October 15, 1928. Serial No. 312,419.

The present invention relates to a new and improved apparatus for making walls of concrete for buildings and the like.

One of the particular objects attained by the use of this invention is that owing to its automatic operation, one man can control the entire system on a very large job, thus dispensing with a large number of workmen and an enormous amount of labor. It is also possible with this system to apply almost any kind of wall finish while the concrete is still "green," making a monolithic finish that is much better than could be obtained on a dry wall, and at the same time greatly reduce the cost of fire-proof construction.

Other objects are that the apparatus by which the process is carried out includes a series of power jacks, either of hydraulic or pneumatic type, operatively connected at suitable intervals to standard construction sliding metallic forms for holding the concrete. These forms are also adjustable to fit any length or thickness of wall, and are adapted to and may be used for slab forms, thereby greatly reducing the cost of construction. All the jacks are connected for uniform operation to a central automatic control.

Further, an object of the invention is to provide a single automatic cut-off valve means for all of the jacks, whereby when the forms have been raised a pre-determined height, the pressure is released and the forms held stationary for the reverse operation of the jacks in renewing and continuing their movement.

Finally, an object of the invention is that by the use thereof it is possible to employ one set of forms on any type of wall. The forms being constructed of heavy gauge steel, will last indefinitely, thereby materially reducing the cost of each job.

Other objects and advantages reside in the special construction, combination and arrangement of the various elements forming the invention as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming part hereof, wherein different numerals refer to various parts throughout, and in which:

Figure 1 is a plan view of the apparatus, certain parts shown in longitudinal section, and illustrating the same in position on a section of the partly completed walls of a building,

Figure 2 is a side elevational view of Figure 1,

Figure 3 is a vertical sectional view through one of the jacks,

Figure 4 is a detail view taken on line 4—4 of Figure 3 and illustrating the cover gripping dog,

Figures 5 and 6 are side elevational views, respectively, taken on the line 5—5 of Figure 1 and showing different positions of a variant eccentric and parts for varying the pump stroke,

Figure 7 is a detail vertical sectional view of a regulator valve,

Figure 8 is a cross-sectional view through one of the side walls and illustrating the position of the forms, jacks, rods and other parts of the apparatus in making a wall, a portion of which has been completed and the forms raised; and

Figure 9 is a cross-sectional view, along line 9—9 of Figure 7.

Referring in detail to the drawings, the forms for making the concrete wall are adapted to and may be used for slab forms, thereby greatly reducing the cost of construction, and as shown are composed of a pair of sections 1 of sheet metal arranged at opposite sides of the wall 2, shown more clearly in Figure 8. Welded or otherwise secured to the forms in spaced relation are horizontal angle irons 3 and bolted to these irons are uprights 4, and to the latter are secured braces 5, thus holding the two forms together. The angle irons 3 provide a strengthening element to prevent buckling and also provide means for attaching the uprights 4.

The jack, constituting a very essential part of the apparatus, is shown in detail in Figures 3 and 4. This jack comprises a cylinder 6, having its lower end open, and within this cylinder is slidably fitted a piston 7. A laterally extending shoulder 8 is formed at the upper portion of the cylinder, and has horizontally disposed openings 9 formed

therein through which the braces 5 are inserted whereby to provide a mounting for the jack between the spaced forms 1.

The underside of the piston 7 is formed with a stem 10, the lower end of which passes through a base 11 and is secured thereto by a nut 12. The stem, having a shoulder 13 resting upon the base, is securely held in upright position. The base 11 is extended laterally at 14 and disposed in alinement with the shoulder 8—both the base extension and shoulder being provided with alined vertically disposed openings through which a jack rod 15 is inserted.

A duct 16 extends through the top of the cylinder for communication with a chamber 17 disposed above the piston 7 and through this duct is attached a feed pipe 18, the pipe 18 of each of the jacks communicating by the common feed pipes 19 and 20 with a compressor or pump 21, and supply tank 22.

The pump or compressor has a piston 23, and as shown is operated by an electric motor through the motor shaft 24 and pump shaft 25—see also Figures 5 and 6. The stroke of the pump may be varied as conditions require giving absolute control of speed for upward movement of forms, such arrangement being effected by means of an outer eccentric 26 and an inner eccentric 27, both having semi-circular notches and through which bolts 28′ are passed. The two eccentrics are tightly embraced and seated in the circular opening in the pump shaft, as clearly depicted in the drawing.

Obviously, shifting and altering the relative positions of the two eccentrics will shorten or lengthen the pump stroke. Thus in Figure 5 the normal position of the shaft 25 is horizontal, while in Figure 6 its normal position is out of the horizontal owing to shortening of the stroke, due to changed relative positions of the eccentrics 26 and 27.

Threaded in the walls of the cylinder beneath the piston 10 is a ring 28. The stem 10 of the piston is reduced in diameter below its center and a spring 29 abuts the shoulder thus formed and seats upon the ring 28. It will be readily understood that the spring 29 serves to yieldably retain the piston 10 in an upward position within the cylinder. The walls of the cylinder have an annular shoulder 30 which limits the downward movement of the piston.

To prevent the jack carrying the forms from slipping downwardly after the pressure has been cut off (which will be hereinafter referred to) there are provided recesses 31 in the shoulder 8 and base extension 14, gripping dogs 32 for engaging the jack rod 15 and eliminating the movement of the jack in one direction, yet permitting free movement of the jack upwardly. As will be apparent from the drawings, Figure 8, the jack rod (or rods) 15 is embedded in the concrete foundation and walls and forms a support for the sliding concrete forms during the raising thereof.

Reference being had to Figure 1 of the drawings, there is interposed between the pump or compressor and the line of jacks an automatic means for cutting off pressure after the forms have been advanced upwardly to a given height. This automatic means comprises a cylinder 33, which has a cap 34 and a cap 35. In the latter cap is a duct for the insertion of a short pipe 36 of a regulator valve head 37, see Figure 7. This head has an inner valve 38 and an outer valve 39, the latter valve being capable of adjustment according to pressure desired. Beneath valve 38 is a short pipe 39 which enables the cylinder 33 to have communication with the tank and pump through pipe 40. Cylinder cap 34 also includes a poppet valve 41 which connects with the tank 22 through a pipe, not shown. The cylinder 33 includes also a piston 42, under spring tension 43, the stem 44 of the piston provided with a slotted arm 45. This arm is for the purpose of enabling a valve 46 to be opened and closed, assisted by the spring 47.

In the operation of the apparatus, fluid under pressure flows from the tank 22 through pipe 48 into the pump or compressor 21. The motor is started and the liquid or air under pressure flows through pipe 20 and pipes 18 and 19 to the jacks. The pressure also at the same time enters the cylinder 33 and begins to build up pressure therein, the arm 45 slowly advancing outwardly. In the meantime, the chamber 17 of the jack is filled, the shoulder 8, to which the forms are secured, rises and the forms are raised to the pre-determined height, the piston 7 having come to a stop on abutting the shoulder 30. This shoulder provides a means of absolute level or exact limit of stop of the upward movement of the forms, and all the jacks will attain a correct level for the upward rise of the forms to a pre-determined height, even though one or more of the jacks were a little tardy in moving, as all the forms will cease upward movement when the shoulder 30 is reached. When the proper height is reached by the forms, pressure has by now been built up in the cylinder 33 sufficiently to move the piston 42, hence the arm 45, outwardly far enough to abut the pin 49 in the valve arm 50, and this valve is opened, permitting the pressure to pass to the tank again. The spring 47 will now expand and move the piston to normal position, and such liquid, or air as remains behind the piston will be forced out through the poppet valve 41 and pass to the tank. Although the forms come to a stop, the raising of them is practically continuous, the cut-off valve means renewing the action of the pump and operation of the jacks after the latter have come to

a stop or arrived at the set position of the jack. The forms of course will move relatively slow and the speed thereof can be gauged very accurately so that the concrete will harden sufficiently at the bottom to permit the continuous upward movement of the forms without stopping the forms completely.

Obviously minor changes and alterations may be made in the apparatus in keeping with the following claims.

What is claimed is:

1. An apparatus for making walls for buildings and the like of plastic material, comprising the combination of a motor, a compressor pump actuated by the motor; a plurality of jacks, a plurality of forms, said forms attached to the jacks and adapted to be raised a pre-determined height by compression from the pump; an automatic pressure means for cutting off pressure from all the jacks when the forms have been raised to said height; and means for automatically returning pressure to the jacks.

2. A plastic composition form jacking apparatus comprising in combination, a plurality of pressure operating jacks secured at suitable intervals to the form, a supply tank carried by the form, a feed pipe connecting the tank with the jacks, a pressure control the tank with the jacks, a pressure control, means interposed in the feed pipe and adapted to interrupt the operation of the fluid feed to the jacks upon creation of a predetermined pressure in said feed pipe.

3. In apparatus for making walls for buildings and the like of plastic material, as set out in claim 1, and wherein said compressor pump includes a shaft for connection to said motor, said shaft carrying an inner eccentric and an outer eccentric capable of variable operable positions for adjusting the length of the pump stroke.

4. An apparatus for automatically operating sliding forms for concrete construction, comprising a plurality of jacks connected to said forms at suitable intervals, power means for automatically raising all said jacks a predetermined height, and means for automatically cutting off the power applied to all said jacks when said predetermined height has been attained.

5. In apparatus for making walls for buildings and the like of plastic material, comprising a continuously operating source of power, a compressor pump actuated from said source of power, a plurality of jacks located at suitable intervals along the walls and operatively connected to said compressor pump, forms carried by said jacks and adapted to be raised a predetermined height by pressure from said pump, and a single means for automatically cutting off pressure from all the jacks when the forms have been raised to said height.

6. An apparatus for making walls for buildings and the like of plastic material, comprising a continuously operating source of power, a compressor pump actuated from said source of power, a plurality of jacks located at suitable intervals along the walls and operatively connected to said compressor pump, forms carried by said jacks and adapted to be raised a predetermined height by pressure from said pump, means for automatically cutting off pressure from all the jacks when the forms have been raised to said height, and means for regulating the stroke of said compressor pump, whereby the speed of operation may be governed.

In testimony whereof I affix my signature.

JAMES M. GURLEY.