

April 5, 1932.

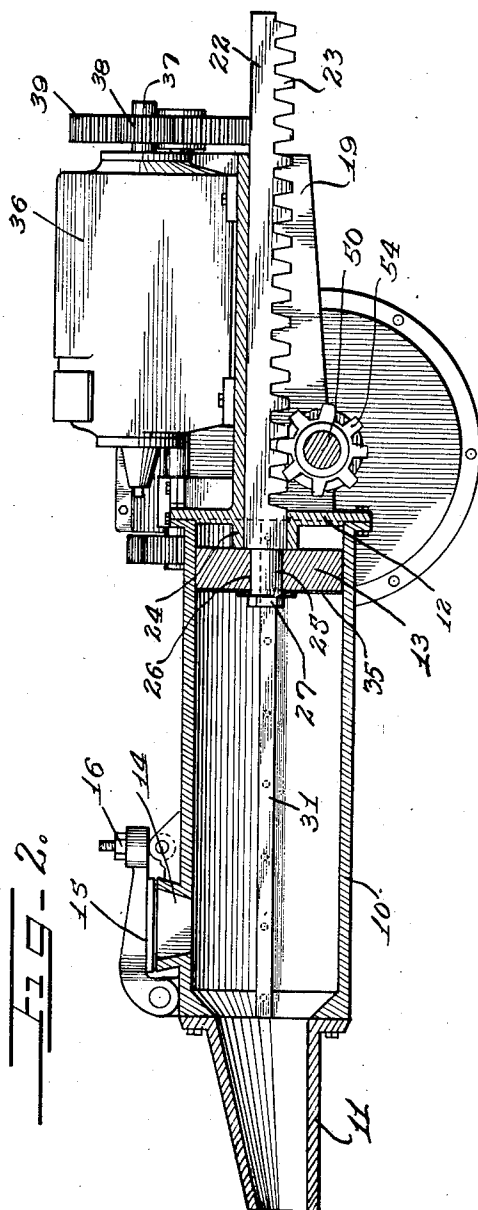
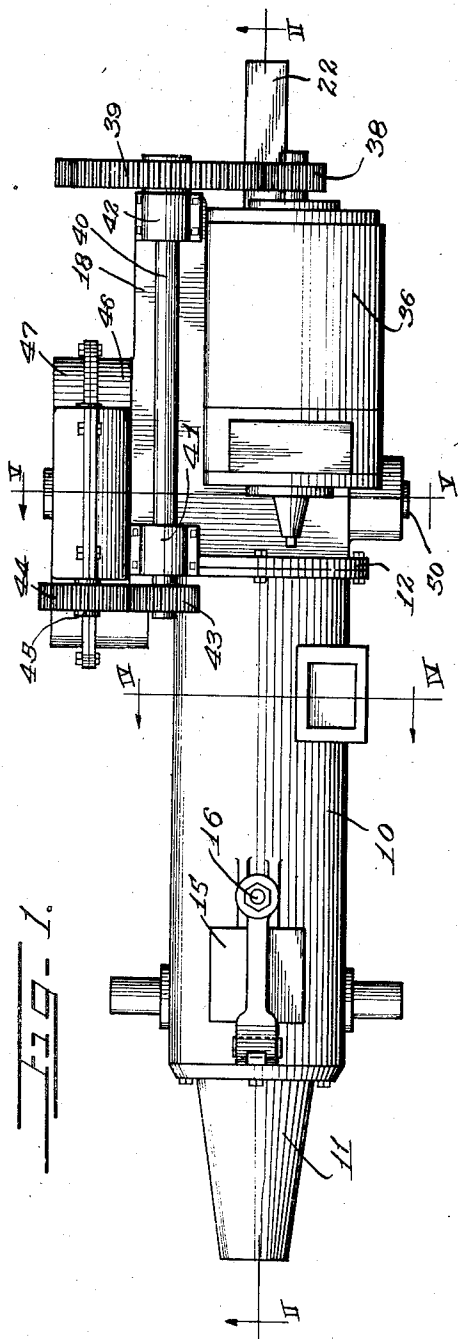
A. F. GIESE, JR

1,852,564

CLAY GUN

Filed March 26, 1931

2 Sheets-Sheet 1



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Fig. 3.

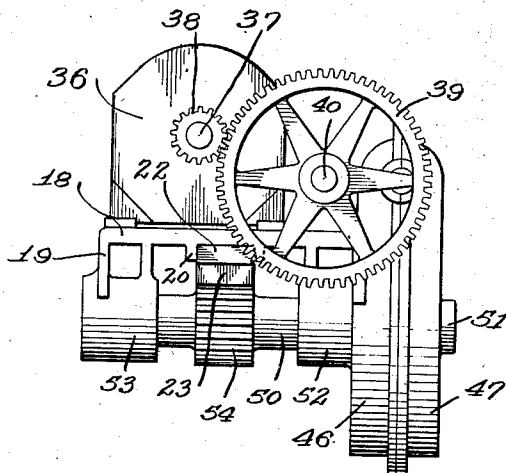


Fig. 4.

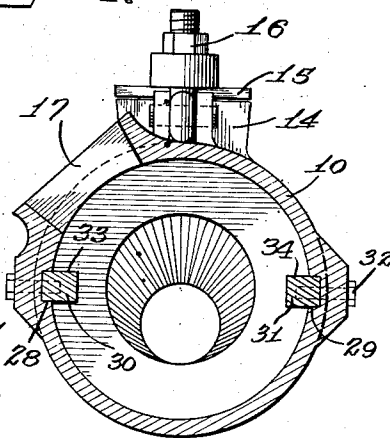
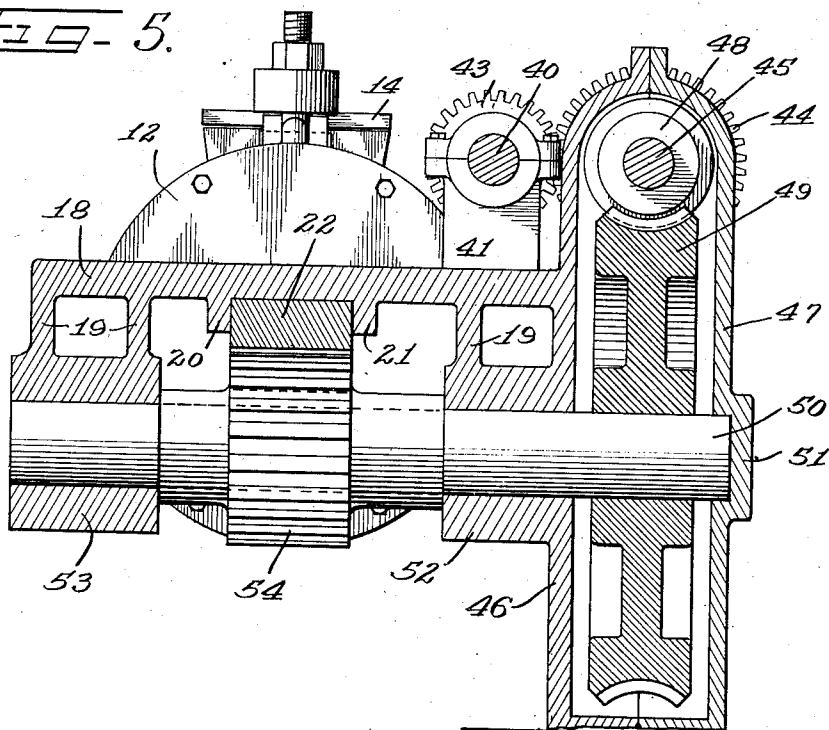


Fig. 5.



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UNITED STATES PATENT OFFICE

AUGUST F. GIESE, JR., OF GARY, INDIANA

CLAY GUN

Application filed March 26, 1931. Serial No. 525,442.

This invention relates to mud or clay guns which are particularly applicable and useful for plugging up the tapping holes of blast furnaces to shut off the flow of molten metal and slag therefrom. The general object of the invention is to provide a compact powerful gun capable of holding a large charge of clay, together with means for powerfully ejecting the clay for the filling in one operation of the gun of a tapping hole to be plugged.

An important object of the invention is to provide improved rack bar drive for the gun piston and a transmission driven by a comparatively high speed motor to cause slow and powerful movement of the rack bar and shifting of the piston through the cylinder to eject clay therefrom.

The above referred to and other features of the invention will become apparent from the following description in connection with the drawings, on which drawings:

Figure 1 is a plan view of the gun;

Figure 2 is a section on plane II—II of Figure 1;

Figure 3 is an outer end view of the gun;

Figure 4 is an enlarged section on plane IV—IV of Fig. 1;

Figure 5 is an enlarged section on plane V—V of Figure 1.

The structure disclosed comprises a cylinder 10 having at its outer end the nozzle 11 and being closed at its other end by a detachable head 12. Reciprocable within the cylinder is a piston 13 and adjacent the nozzle end of the cylinder is the filling hole 14 for clay which hole may be securely closed by a suitable cover structure 15 and lock mechanism 16. Adjacent to the other end of the cylinder and in advance of the piston when the piston is fully retreated, there is another filler opening 17 which may also be provided with suitable closure structure (not shown).

Extending from the head 12 and preferably formed integral therewith is a shelf or platform 18 which is strengthened and reinforced by a number of webs or ribs 19. Depending from the platform along the medium lines thereof are the spaced apart parallel guide ribs or flanges 20 and 21 which with the plat-

form form a guideway for a rack bar 22 which has teeth 23 on its lower side. An inwardly extending lug or flange 24 on the head 12 forms a guide for the rack bar and the bar at its ends has the reduced section or neck 25 which extends through a hole 26 in the piston 13, a nut 27 engaging the outer end of the neck to securely clamp the piston to the bar so that the piston will move with the bar as the bar is reciprocated.

Within the cylinder at diametrically opposite sides thereof are the longitudinally extending grooves 28 and 29 in which guide bars 30 and 31 are seated and secured in place by means of bolts 32. At its opposite sides, the piston 13 has slots 33 and 34 which receive the guide bars so that the piston is supported concentrically within the cylinder but independently of any engagement of its cylindrical surface with the cylinder wall in order to reduce friction and wear and tear of the surface due to the abrasive action of the clay. The piston may be of a diameter slightly less than that of the cylinder bore and a washer 35 of asbestos or other suitable material is preferably applied to the front of the piston and held in place by the nut 27. Besides accurately guiding the piston during its reciprocation in the cylinder, the bars 30 and 31 will prevent rotational movement of the piston and will assist in keeping the rack bar in vertical alignment.

Mounted on top of the platform 18 is the driving motor 36 whose shaft 37 is parallel with the axis of the cylinder, the shaft at its outer end carrying the pinion 38 which meshes with the large transmission gear 39 secured to the outer end of the counter shaft 40 which extends parallel with the motor axis and is journaled in bearing structures 41 and 42 secured on the platform. The inner end of the counter shaft carries a spur pinion 43 meshing with the gear 44 on the shaft 45. This shaft 45 extends through the upper part of a housing structure formed by the half 46 preferably formed integral with the platform structure and the half 47 detachably applied to the half 46. The shaft 45 is journaled in the opposite end walls formed by the housing structure and within the housing

it carries a worm 48 which meshes with a worm wheel 49 secured on the outer end of a shaft 50 extending through the housing structure. The gear supporting end of the shaft is journaled in the boss 51 on the outer housing half 47 and in the bearing lug 52 formed on the platform structure, the other end of the shaft being journaled in the bearing lug 53 depending from the platform. Between the bearing lugs 52 and 53 the shaft 50 supports a spur gear 54 which meshes with the teeth of the rack 22.

The motor together with the gearing arrangement forms a very compact and well balanced structure and with a comparatively high speed motor the rack will be driven slowly and powerfully to shift the piston through the cylinder for the rapid and powerful discharge of clay therefrom. By having the gear rack applied with its teeth on the underside these teeth will be protected against accumulation of dirt and there will always be perfect intermesh between the rack and the pinion 54.

With the powerful drive for the piston, the cylinder may be made of large volume so that a sufficient charge of clay may be received and ejected with one stroke of the piston to fully and completely fill up a tapping hole. With two or more clay filling openings for the cylinder, the cylinder may be rapidly loaded. Where only a small quantity of clay is required, the piston need be retracted only a short distance and then clay filled in through the filling hole 14 adjacent to the nozzle end of the cylinder.

I have shown a practical and efficient embodiment of the various features of my invention but I do not desire to be limited to the construction and operation shown and described as changes and modifications may be made without departing from the scope of the invention as defined in the appended claims.

I claim as follows:

1. In a clay gun, the combination of a cylinder, a discharge nozzle at one end of the cylinder, a head closing the other end of the cylinder, a platform extending from said head, said head having a guide opening below said platform, a rack bar below said platform in axial alignment with said cylinder and guided by said platform and through said guide opening, a piston in the cylinder secured to the inner end of said rack bar to travel therewith, a motor mounted on said platform, a pinion engaging the rack bar, and a driving train between said motor and said pinion for causing reciprocation of said rack bar and shift of said piston in said cylinder.

2. In a clay gun, the combination of a cylinder having a nozzle at one end, a head closing the other end of said cylinder, a platform extending from said head, a rack bar

below said platform, guide walls on said platform to guide said rack bar, said head having a guide opening for said rack bar, a piston in the cylinder secured to the inner end of said rack bar, the teeth on said rack bar being on the underside thereof, a pinion journaled below and meshing with said rack bar, a driving motor mounted on said platform, and a driving train between said motor and said pinion for causing slow and powerful reciprocation of said rack bar and movement of the piston in the cylinder for the ejection of clay therefrom.

3. In a clay gun, the combination of a cylinder having a nozzle at one end, a head closing the other end of said cylinder, a piston reciprocable in said cylinder, said head having a guide opening, and a rack bar secured to said piston and extending therefrom through said guide opening, a platform extending from said head, guides on the underside of said platform for said rack bar, a motor mounted on said platform, a reduction gearing train between said motor and said rack bar for causing powerful reciprocation of said rack bar and of the piston, and supporting guides in said cylinder for said piston for keeping the weight of the piston off the bottom of the cylinder.

4. In a clay gun, the combination of a cylinder having a discharge nozzle at one end, a head closing the other end of said cylinder, a piston reciprocable in said cylinder, a platform supported by said head, a rack bar below the platform extending through said head and rigidly secured to the piston, a motor mounted on said platform with its axis parallel with the cylinder axis, a countershaft journaled on said platform parallel with the motor axis, transmission gearing connecting said motor shaft and said countershaft, a cross shaft supported by said platform, a pinion on said cross shaft meshing with said gear rack, a worm wheel on said cross shaft, a worm engaging said worm wheel and having a supporting shaft, and a gearing train between said worm shaft and said countershaft, the gearing connection between said motor and said rack bar causing slow and powerful movement of said rack bar and movement of the piston in the cylinder.

5. In a clay gun, the combination of a cylinder having a discharge nozzle at one end, a head closing the other end of said cylinder, a piston reciprocable within said cylinder, a driving member secured to said piston and extending therefrom through said head, a driving motor, a driving connection between said motor and said driving member for causing slow and powerful movement of said piston in said cylinder whereby the cylinder may be of large volume for the ejection of a large quantity of clay, and a plurality of

openings for the charging of clay into said cylinder.

6. In a clay gun, the combination of a cylinder having a discharge nozzle at one end, a head closing the other end of the cylinder, a piston reciprocable in said cylinder, a driving member secured to said piston and extending therefrom through said head, a driving motor, a reduction gearing train between said motor and said driving member for causing slow and powerful reciprocation of said piston, a clay filling hole for the cylinder adjacent the nozzle end thereof and another clay filling opening for the cylinder adjacent to the head end thereof.

In testimony whereof I have hereunto subscribed my name at Gary, Lake County, Indiana.

AUGUST F. GIESE, JR.