J. L. SMITH.

DEVICE FOR REMOVING FLAWS FROM STEEL BILLETS WHILE HOT.

APPLICATION FILED JAN. 16, 1920.

1,380,430.

Patented June 7, 1921.

3 SHEETS—SHEET 1.

Fig. 1.

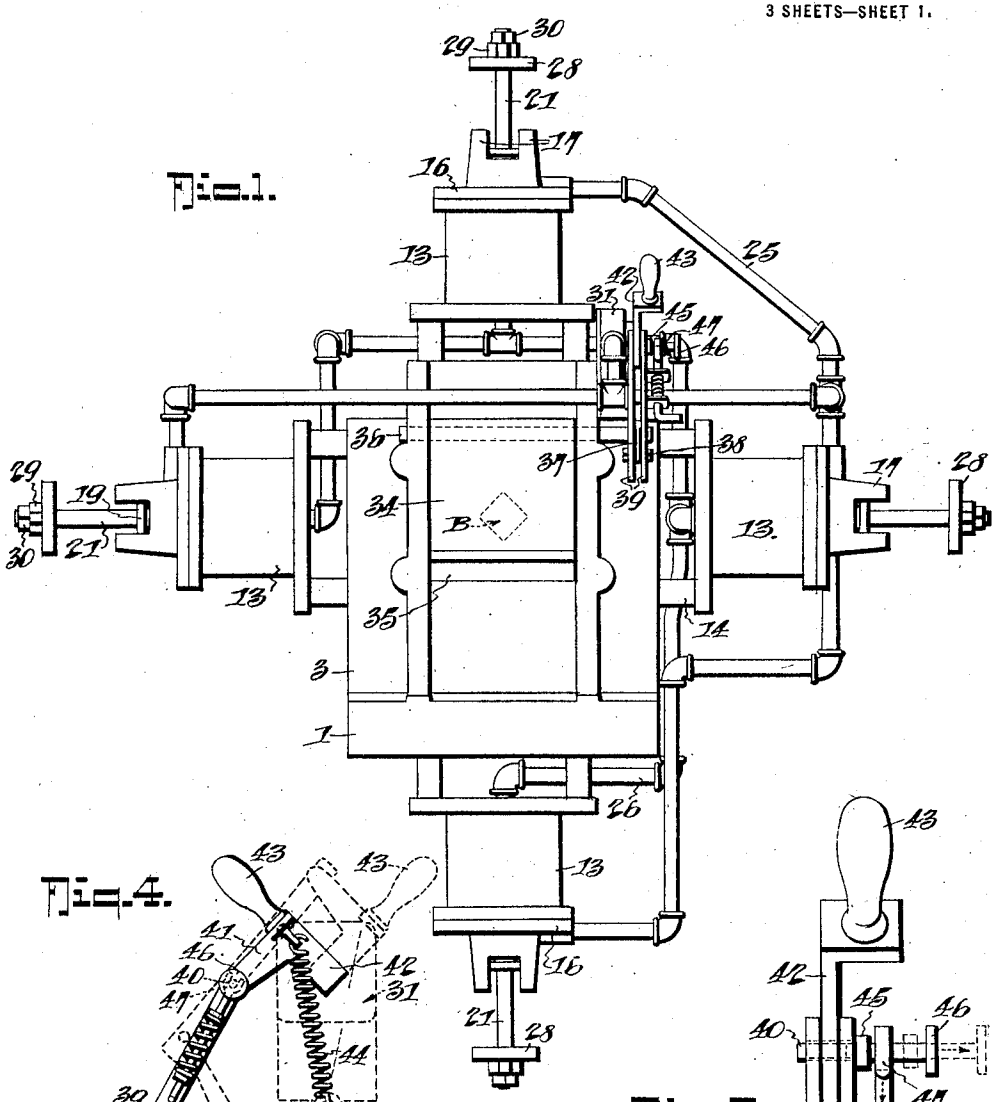


Fig. 4.

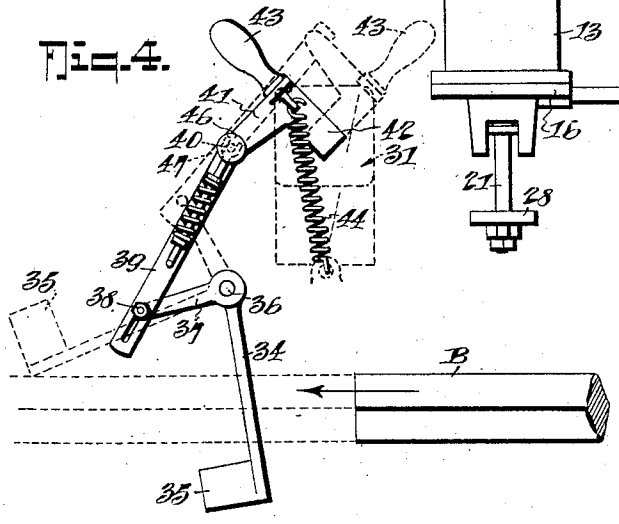


Fig. 5.

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3 SHEETS—SHEET 2.

Fig. 2.

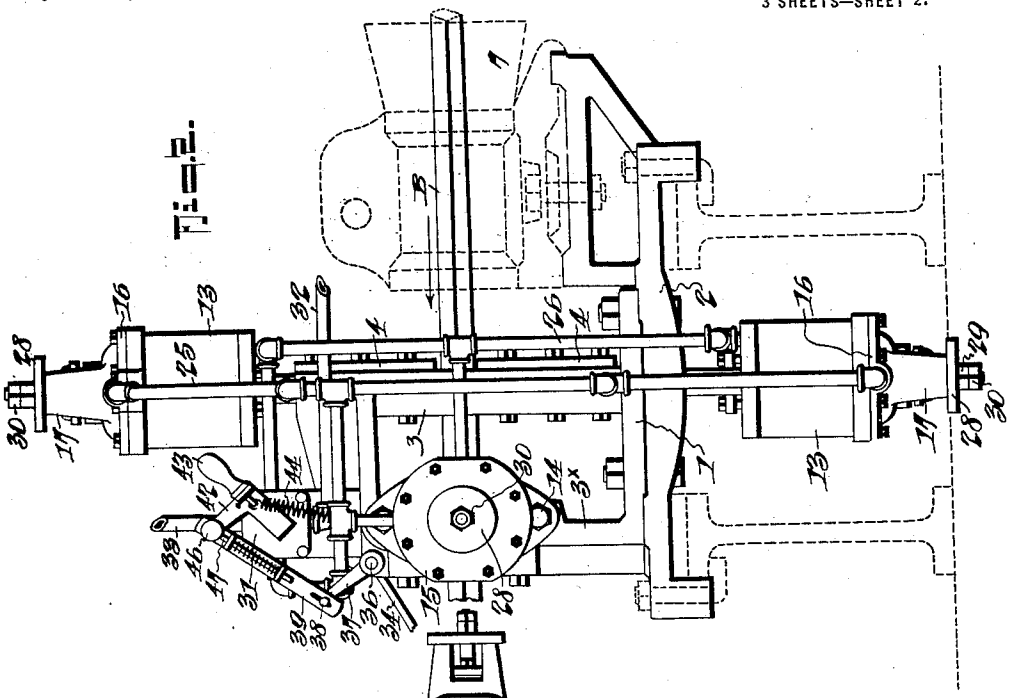
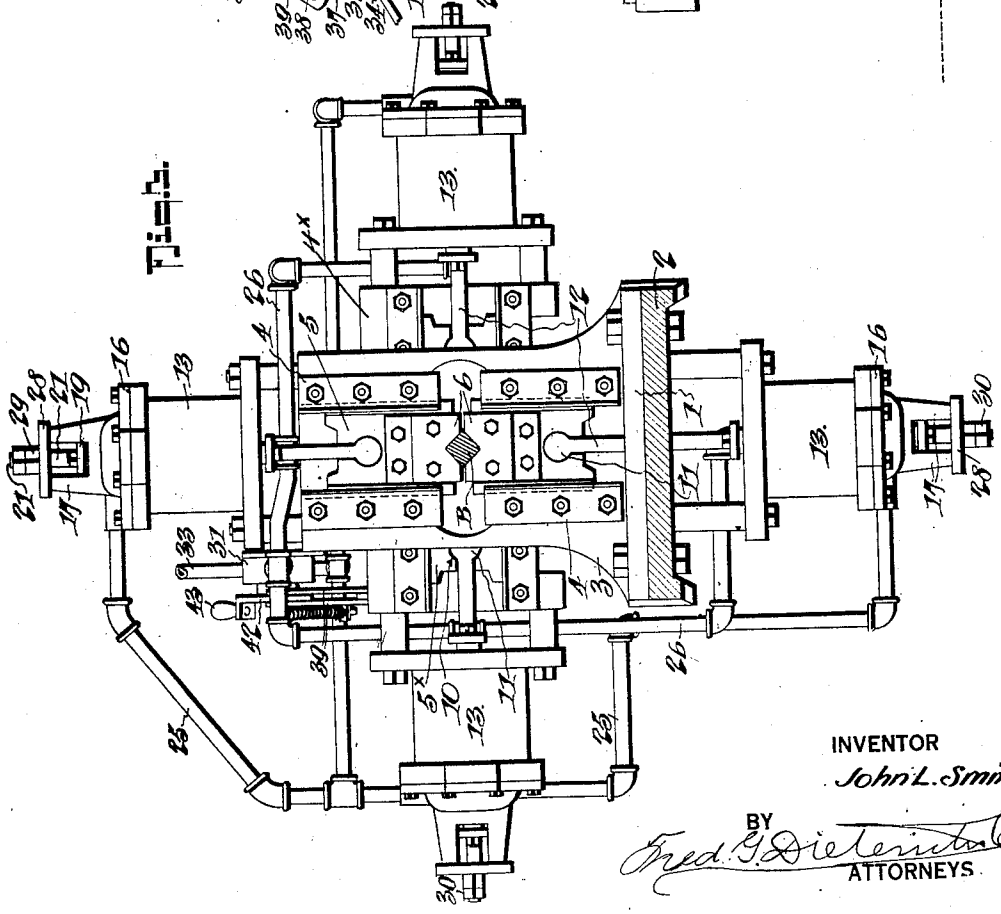


Fig. 4.



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3 SHEETS—SHEET 3.

Fig. 5.

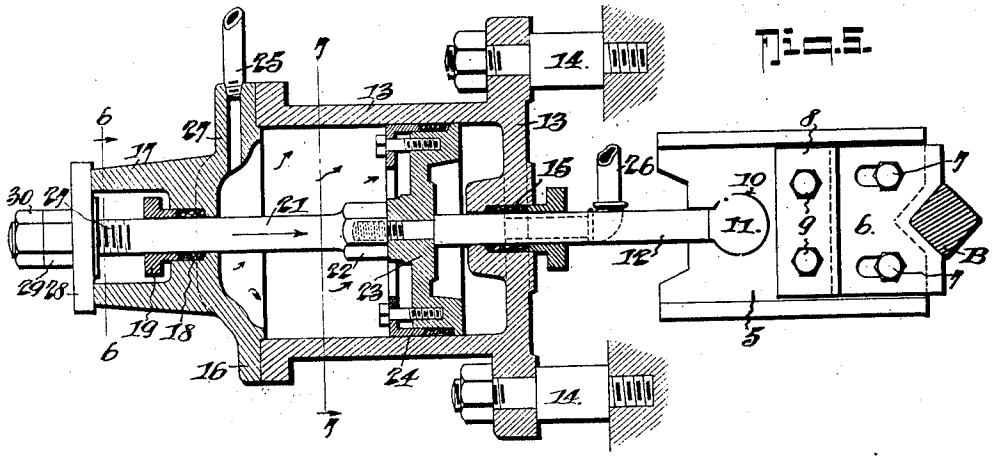


Fig. 6.

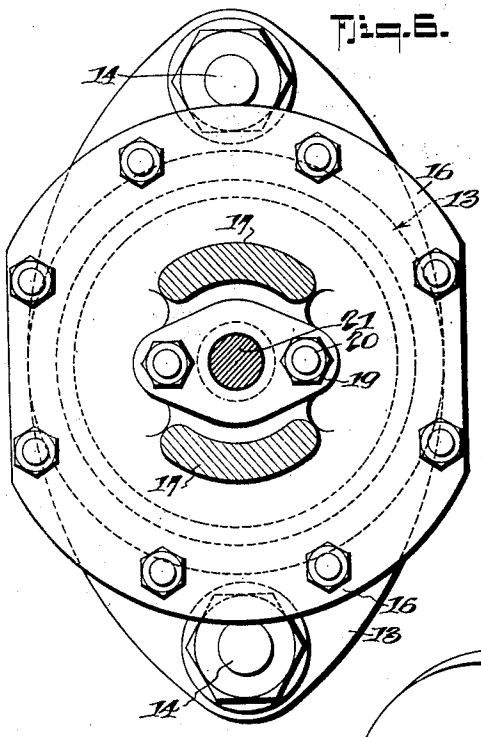


Fig. 7.

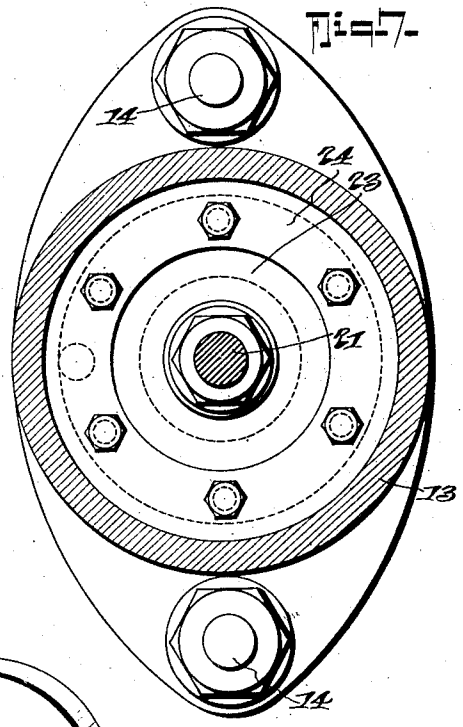
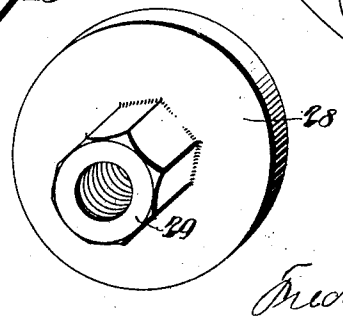


Fig. 8.



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UNITED STATES PATENT OFFICE.

JOHN L. SMITH, OF HAMILTON, ONTARIO, CANADA.

DEVICE FOR REMOVING FLAWS FROM STEEL BILLETS WHILE HOT.

1,380,430. Specification of Letters Patent. **Patented June 7, 1921.**

Application filed January 16, 1920. Serial No. 351,863.

To all whom it may concern:

Be it known that I, JOHN L. SMITH, a citizen of the Dominion of Canada, residing at Hamilton, in the Province of Ontario, Dominion of Canada, have invented certain new and useful Improvements in Devices for Removing Flaws from Steel Billets While Hot, of which the following is a specification.

My invention relates to the art of rolling steel billets. In rolling billets of steel, flaws appear on the surface of the billet, the same being caused by cracks in the ingot, inequality in the steel, etc.

In my Patent No. 1,317,049 issued September 23, 1919, I have disclosed an apparatus for the purpose of removing flaws from billets and the present invention is an improvement on the apparatus disclosed in the said patent.

My present invention has for its object to provide a device of the general character shown and described in my said patent in which, however, provision is made for the use of independent pressure cylinders in cooperation with the various scrapers and the provision for adjusting the stroke of the various pistons independently so as to control the scrapers from cutting into the billet too deep or taking off too much steel from the billet.

Another object of the invention is to provide an apparatus which will permit the carrying of a high pressure of air, steam or water to operate the pistons in such manner as to remove all flaws and yet not cut into the billet too far so as to cause a cobble.

Again it is the object of the present invention to provide means, governed by the passing billet, for setting the scrapers against the billet while the billet is passing through the apparatus, and for retracting the scrapers after the billet has passed them.

The invention also resides in those novel details of construction, combination and arrangement, all of which will be first fully described, then be specifically pointed out in the appended claims and illustrated in the accompanying drawings, in which:

Figure 1 is a rear elevation showing the gate down in the position it normally assumes before it has been engaged by an approaching billet.

Fig. 2 is a detail side elevation showing the valve operating parts in the position they assume when the billet is passing through.

Fig. 3 is a front elevation of the apparatus, the billet being shown in cross section and a portion of the base being also shown in cross section.

Fig. 4 is a diagrammatic side elevation of the valve shifting parts shown in Fig. 1.

Fig. 5 is an enlarged detail section and part elevation of one of the scrapers and the piston mechanism for operating the same.

Fig. 6 is a cross section on the line 6—6 of Fig. 5.

Fig. 7 is a cross section on the line 7—7 of Fig. 5.

Fig. 8 is a detail perspective view of one of the adjusting attachments carried by the piston rod for adjusting the penetration of the scraper.

Fig. 9 is a detail view of the pivot pin retainer on the valve shift arm.

In the drawing, in which like numerals of reference indicate like parts in all of the figures, 1 represents the base which is suitably mounted on standards (see dotted lines Fig. 2) and which carries the base 2 of the flaw removing device.

3—3 designate a pair of vertical standards which are provided with slideways in which the scraper carriers 5 are mounted for reciprocating movement, the carriers being held in the guides by plates 4.

There are a pair of scraper carriers 5—5 mounted in the vertical guides of the supports 3, one above and one below the line of travel of the billet.

In back of the vertical supports 3 are transverse supports $3^{\times}$—$3^{\times}$ which are also provided with ways for horizontal scraper carriers $5^{\times}$ and plates $4^{\times}$ for holding the carriers in the guides.

As the construction of each scraper carrier and its operating instrumentality are the same, a detailed description of one will suffice.

By referring especially to Figs. 3 to 6 inclusive, it will be seen that each scraper carrier is provided with a scraper 6 that is adjustably secured to the carrier by set screws 7 and cleats 8, the latter being secured to the carrier or slide by set screws 9.

The carrier or slide has a circular recess 10 to receive the head 11 of the connecting rod 12 which passes through a stuffing box 15 in the cylinder 13, the latter being secured to lugs 14 set in the supports 3.

Each cylinder 13 is provided with a removable cylinder head 16 that has projecting stops or arms 17. The cylinder head is also provided with a stuffing box 18 which has a plate 19 secured by studs and bolts 20 to the cylinder head so that the stuffing box packing may be taken up when worn. 21 designates a rod secured at 22 to the rod 12 on which the piston 23 is secured and which passes through the stuffing box 18 and is threaded at its end as at 27 to receive the stop disk 28 which has a nut portion 29 so that it may be screwed onto the rod 21 and held by a jam nut 30 so as to adjust the stroke of the piston 23.

The piston 23 is provided with a stout packing arrangement 24 to make a fluid tight joint.

It will thus be seen that by my present invention, I have made provision for the adjustment of the penetration of the various scrapers each independently of the other and as the scrapers wear they may be advanced in the carriers 5 by substituting cleats 8 of greater width to take up the wear and advancing the scrapers 6 in the holders or carriers 5.

In operation, the motive fluid is delivered through pipes 25 to the various cylinders 13 to drive the pistons 23 forwardly and thereby bring the scrapers 6 into engagement with the billet B.

The degree of penetration of the scrapers into the surface of the billet is adjusted by adjusting the stop disks 28 to decrease or increase the forward movement of the pistons 23 as may be desired.

The pistons are moved on their return stroke to move the scrapers out of engagement with the billet by motive fluid passed through pipes 26 into the cylinders 30 at the side of the piston opposite that with which the pipes 25 communicate.

In order to automatically apply the scrapers to the billet and to retract the scrapers from their operative position, I have provided mechanism, governed by the passing billet to effect the desired result.

This mechanism comprises a four way valve mechanism 31, which is designed to alternately direct the motive fluid from the inlet pipe 32 to the delivery pipes 25 and 26 and direct the exhaust from said pipes 25 and 26 to the exhaust pipe 33 accordingly as the valve is in one position (Fig. 2) or the other (Fig. 4).

The valve is normally held to effect communication between the source-of-supply pipe 32 and the system of pipes 26 (which deliver the fluid into the cylinders to withdraw the scrapers), by means of a gate 34 which is weighted at 35 and hinged at 36 to lie in the path of the approaching billet.

The gate is fastened to the hinge pin 36 and the latter has an arm 37 which is pin and slot connected at 38 to the push and pull bars 39 that are hinged at 40 to the arm 41 of the valve lever 42.

The lever 42 has a handle 43 by which the valve may be manually operated, if desired.

The valve is held to its different positions and given a quick throw over past the central position by a spring 44, as shown, and the hinge pin 40 is provided with a collar 45 and a head 46 and is removably held in place by a spring fork latch 47. By removing the pin 40, the automatic control of the valve may be dispensed with.

From the foregoing description taken in connection with the accompanying drawings, it is thought the complete construction, operation and advantages of my invention will be readily understood by those skilled in the art.

What I claim is:

1. In a device for removing flaws from billets as they are being rolled, a support, billet scrapers, fluid actuated piston devices for moving the scrapers into and out of operative position and a device for limiting the movement of the piston in a direction to advance the scraper, said device comprising a rod carried by the piston and an adjustable stop device on the rod.

2. A device for removing flaws from billets as the billets are being rolled, said device comprising a support, scraper ways on the support, scraper carriers movable in the ways, scraper plates mounted on the carriers, devices for operating each scraper to move the scraper into and out of engagement with the billet and means governed by the passing billet for controlling the operation of the scrapers.

3. A device for removing flaws from billets as the billets are being rolled, said device comprising a support, scraper ways on the support, scraper carriers movable in the ways, scraper plates mounted on the carriers, cylinder and piston devices for operating each scraper to move the scraper into and out of engagement with the billet, means for adjusting the penetrating movement of the scraper carriers to thereby adjust the degree of penetration of the scraper and means engaged by the passing billet for controlling the operation of the scrapers substantially as shown and described.

4. In a device for removing flaws from billets, a support, a scraper mounted for reciprocating movement in said support, a cylinder and piston device for operating said scraper, said cylinder and piston device comprising a cylinder, a piston mov-

able within the cylinder, a connecting rod between said piston and scraper, fluid pressure conducting means leading to the ends of the cylinder whereby fluid may be admitted to and from the cylinder to move the piston and a device independent of the connecting rod for limiting the movement of the piston in a direction to advance the scraper.

5. In a device for removing flaws from billets, a support, a scraper mounted for reciprocating movement in said support, a cylinder and piston device for operating said scraper, said cylinder and piston device comprising a cylinder, a piston movable within the cylinder, fluid pressure conducting means leading to the ends of the cylinder, whereby fluid may be admitted to and from the cylinder to move the piston, a device for limiting the movement of the piston in a direction to advance the scraper, said device comprising a rod carried by the piston and an adjustable stop device on the rod.

6. A device for removing flaws from billets as the billets are being rolled, said device comprising a support, scraper ways on the support, scraper carriers movable in the ways, scraper plates mounted on the carriers, separate cylinder and piston devices for operating each scraper to move the scraper into and out of engagement with the billet, and means governed by the passing billet for controlling the operation of the scrapers.

7. A device for removing flaws from billets as they are being rolled, said device comprising a support, billet scrapers, fluid actuated piston devices for moving the scrapers into and out of operative position, a control valve for said devices, and mechanism operated by the passing billet for actuating said valve.

8. A device for removing flaws from billets as they are being rolled, said device comprising a support, billet scrapers, fluid actuated piston devices for moving the scrapers into and out of operative position, and means governed by the passing billet for controlling the operation of said piston devices.

9. A device for removing flaws from billets as they are being rolled, said device comprising a support, billet scrapers, means for moving said scrapers into and out of operative position, and means governed by the passing billet for controlling the operation of said scrapers.

10. A device for removing flaws from billets as the billets are being rolled, said device comprising a support, scraper ways on said support, scraper carriers movable in said ways, scraper plates mounted on the carriers, separate cylinder and piston devices for operating each scraper to move the scrapers into and out of engagement with the billet, and a single controlling means for all of said cylinder and piston devices.

11. A device for removing flaws from billets as the billets are being rolled, said device comprising a support, scraper ways on said support, scraper carriers movable in said ways, scraper plates mounted on the carriers, separate cylinder and piston devices for operating each scraper to move the scrapers into and out of engagement with the billet, a single controlling means for all of said cylinder and piston devices, and separate means for independently adjusting the penetration of each scraper.

JOHN L. SMITH.