May 12, 1931. H. C. BARNES ET AL 1,804,735

HYDRAULIC SCALER

Filed Oct. 2, 1929 4 Sheets-Sheet 1

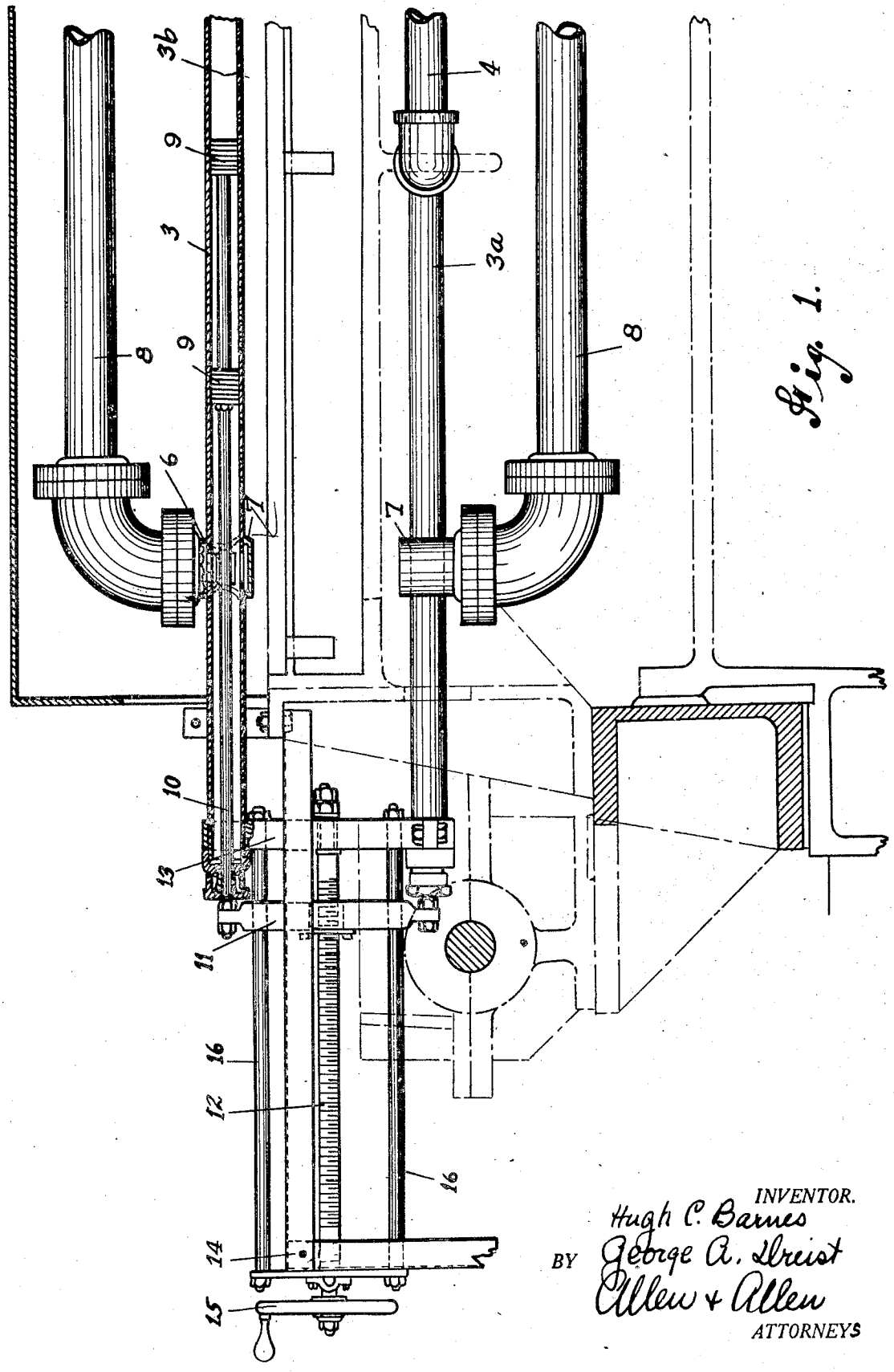


Fig. 1.

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HYDRAULIC SCALER

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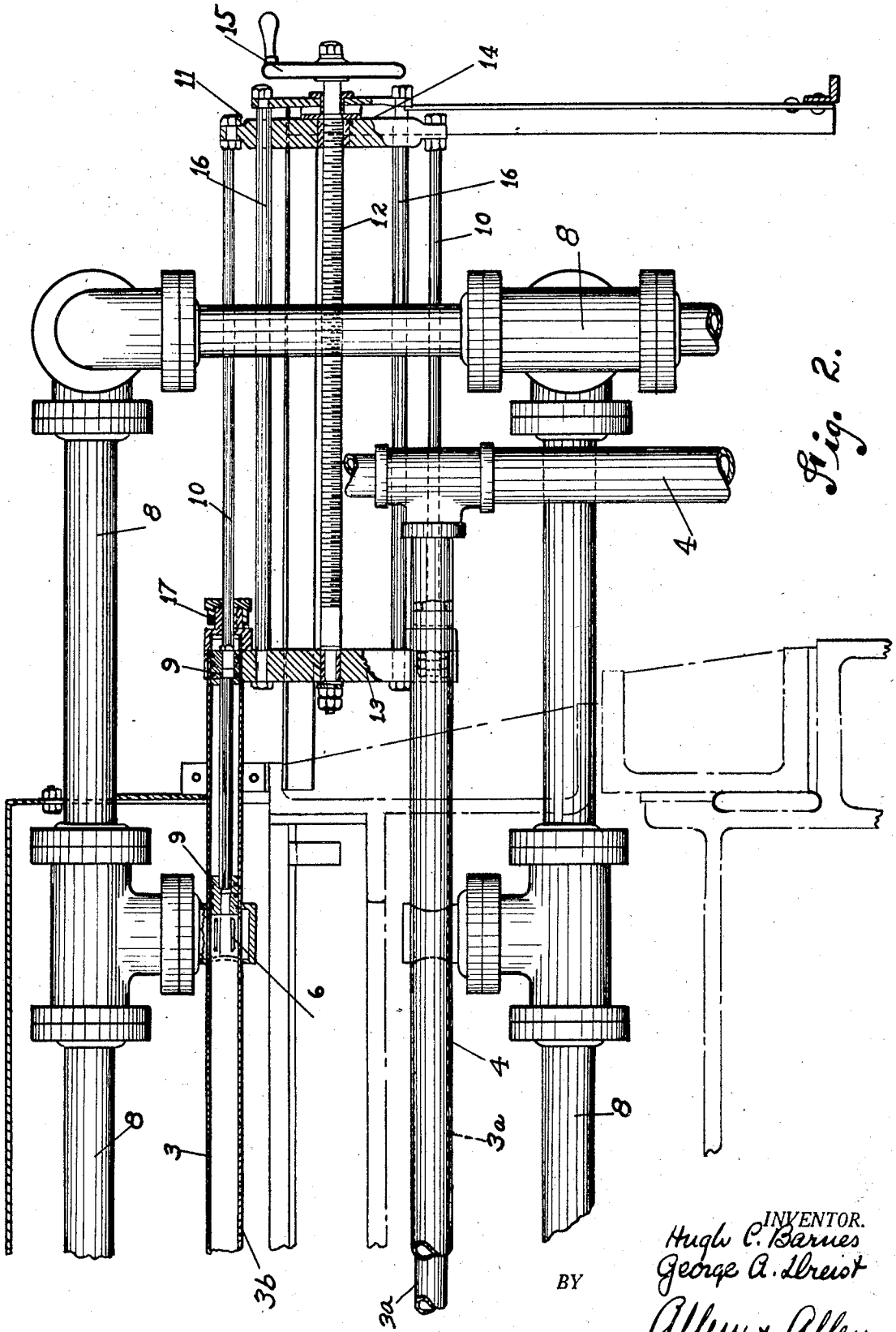


Fig. 2.

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HYDRAULIC SCALER

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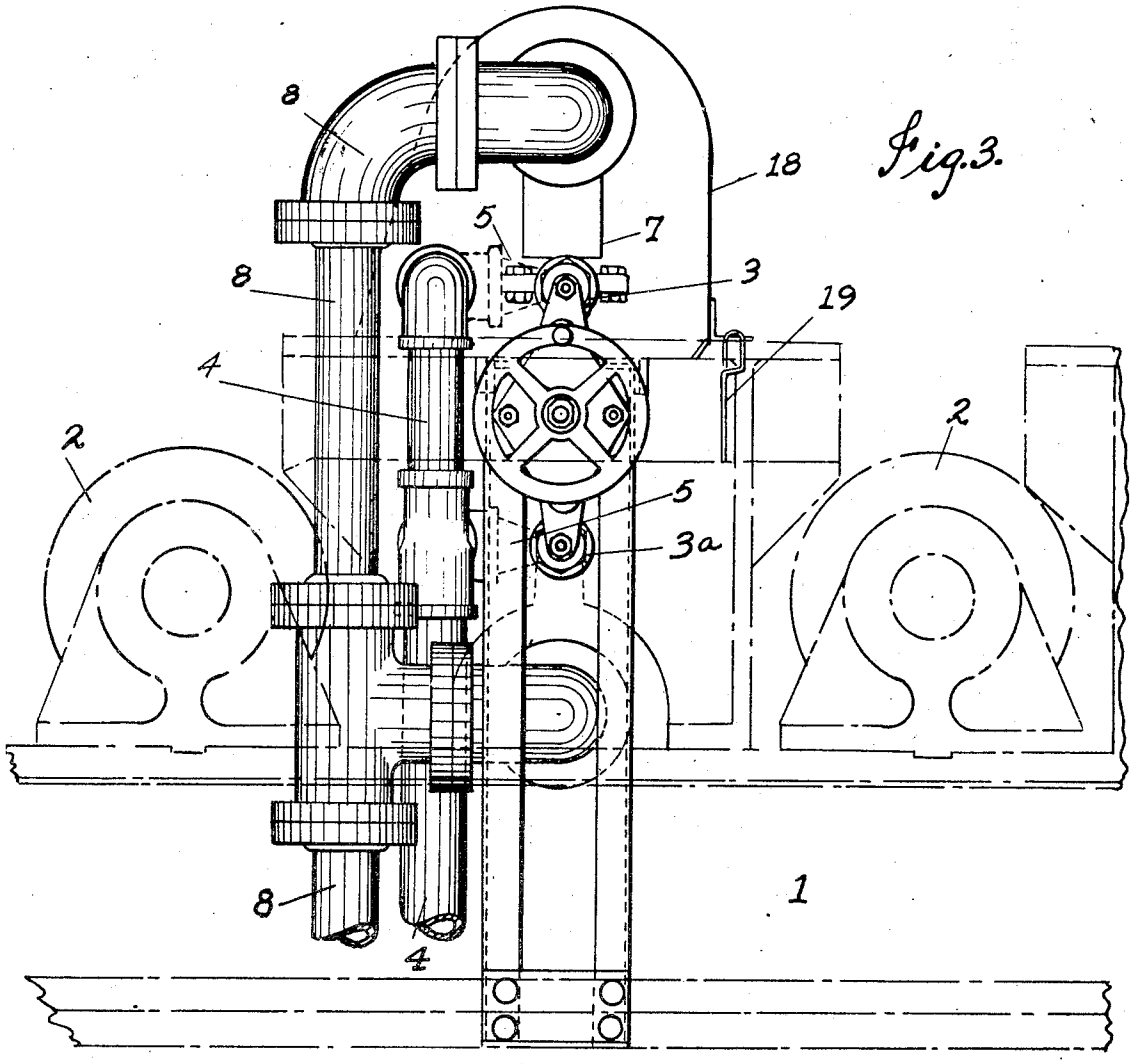


Fig. 3.

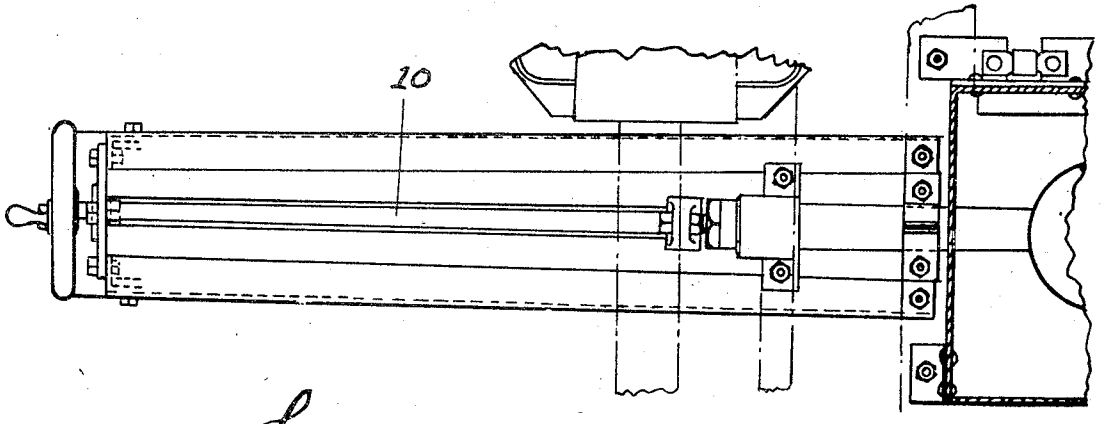


Fig. 4.

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HYDRAULIC SCALER

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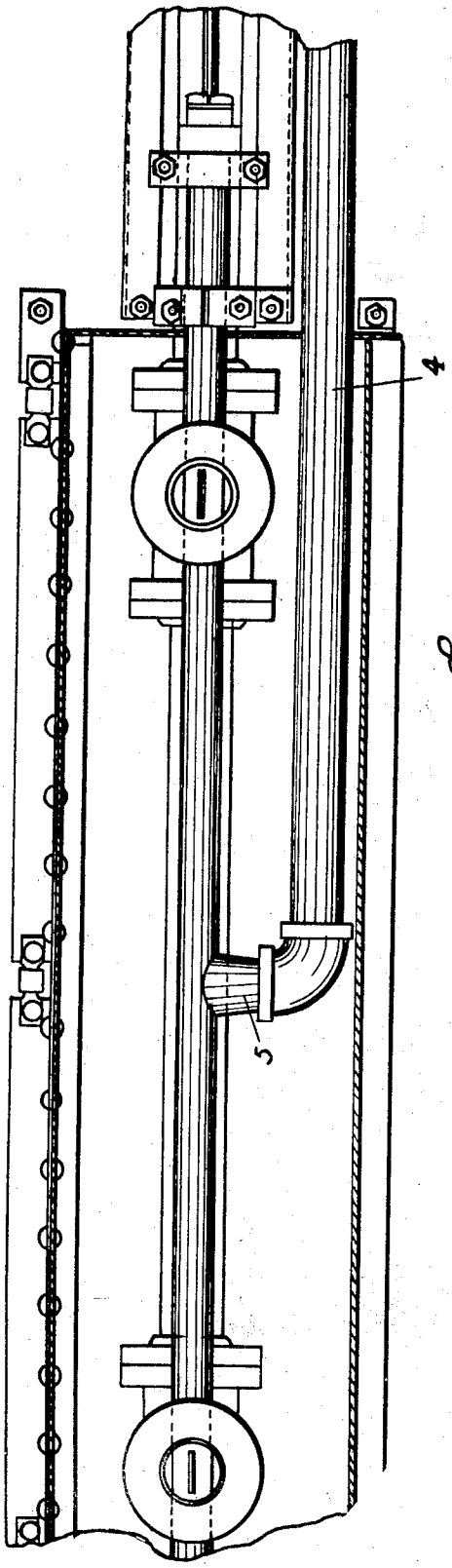


Fig. 5.

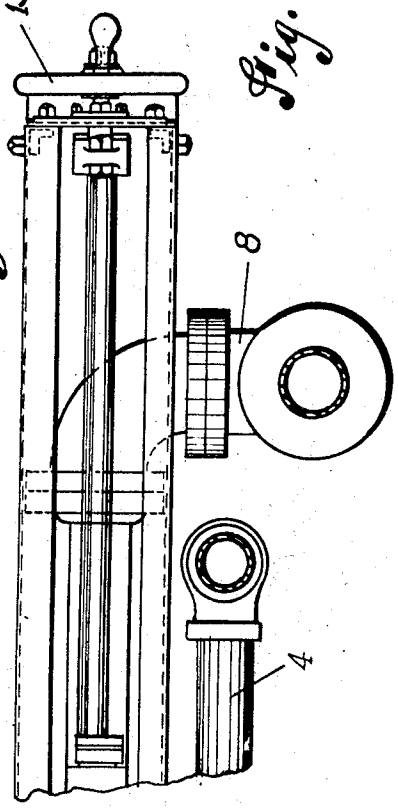


Fig. 6.

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UNITED STATES PATENT OFFICE

HUGH C. BARNES AND GEORGE A. DRIEST, OF MIDDLETOWN, OHIO, ASSIGNORS TO THE AMERICAN ROLLING MILL COMPANY, OF MIDDLETOWN, OHIO, A CORPORATION OF OHIO

HYDRAULIC SCALER

Application filed October 2, 1929. Serial No. 396,839.

Our invention has to do with hydraulic apparatus for removing scale from hot metal, for example, in the removal of air scale from strip steel. It has been proposed to remove scale from metal articles by directing upon their surfaces closely spaced blasts or jets of fluid under great pressure. This has necessitated the placing of pipes having jet forming members or a series of perforations for the same purpose, on either side of the metal articles across their path of travel as they are being carried along, say, by a roller conveyor. In order that the full effect of the hydraulic jets may be utilized, it is necessary to place the nozzles or the perforated pipe, quite close to the article being treated. The chief reason for the unsatisfactory result obtained with hydraulic scale removers has been due to the difficulty of keeping the hydraulic fluid delivery system in order. The perforated pipe or nozzles soon clog with oxide, and are rendered useless, inasmuch as it is necessary to keep a full, continuous and steady direction of the jets uninterruptedly across the surface of the articles passing through. There has, in the past, been no way, short of disassembling the apparatus, to keep the perforations or nozzles clean, or in any way to clean out the delivery pipes.

The primary object of our invention then, is the provision of a hydraulic scale removal system which may be kept continuously functioning, and which is not liable to the clogging which has rendered all hydraulic scale removal systems of which we have knowledge in the past, unsatisfactory in operation. Another object of our invention is the provision of means facilitating the cleaning out of the hydraulic delivery pipes without any but a momentary interruption of the device.

Still another object of our invention is the provision of means whereby the length of the hydraulic spray may be varied for sheets of differing widths.

These and other objects of our invention, which we may hereinafter point out, or which will be apparent to one skilled in the art upon reading these specifications, we accomplish by that certain construction and arrangement of parts of which we shall now describe a preferred embodiment, reference being had to the drawings which accompany these specifications.

In the drawings:—

Figures 1 and 2 are to be read together as showing a side elevation of our scale remover with parts in section.

Figure 3 is an end elevation.

Figures 4, 5 and 6 are to be taken together as showing a plan view.

What we do, in brief, is to provide perforated hydraulic delivery pipes located one on either side of the strip in its path of travel, with means for delivering water to them under heavy pressure at the center. This facilitates an even distribution of pressure in the jets. Then we provide a series of pistons, as will hereinafter be more fully described, operating in these delivery tubes, the function of which is first, to keep the perforations in the pipes clear of scale and sediment, second, to limit the length of the jet series in proportion to the width of sheet or strip being treated; and third, to enable us to open the hydraulic delivery pipes into washing pipes, so that any scale removed upon the interior of the hydraulic delivery pipes may be periodically washed therefrom. So that the pistons may readily be moved, but may nevertheless be held in place against the hydraulic pressure, we provide means acting upon the piston rods comprising screw means and convenient means for its operation. We have shown in Figure 3, mounted upon a suitable foundation 1, rolls 2 of a roller conveyor for metallic strips, bars, sheets, or the like, which follow a hori-

zontal path across the tops of these rolls. On either side of this path we locate hydraulic delivery pipes 3 and 3*a* which are provided with a series of perforations 3*b* in the portion next to the metallic pieces to be treated, so that a series of jets under heavy pressure may be caused to impinge upon both surfaces of the said metallic pieces. The delivery pipes 3 and 3*a* are affixed to the framework of the conveyor so as to be rigidly held in place. The feed pipes for conducting fluid under pressure to the delivery pipes are indicated at 4, and are connected to each delivery pipe in the center by a welded connection 5, so that the fluid enters the delivery pipes at the center thereof and flows therefrom outwardly toward each end. Beyond the point at which the edge of the sheets or strips to be treated will come along the delivery pipes 3 and 3*a*, we provide drainage or wash-out openings 6 which are conveniently in the form of elongated slots of substantial length and breadth. A fitting 7 surrounds the delivery pipes at this point, and is adapted to receive fluid leaving the pipes through the slots 6. The fitting is connected in any desired way, as by means of flanges, to wash-out pipes 8 for carrying away the wash water.

Within the delivery pipes 3 and 3*a* we provide pistons 9. It will be clear that such pistons, if moved along the perforated portions of the delivery pipes 3 and 3*a*, will serve to keep the jet perforations 3*b* clear and active and free from an accumulation of scale or sediment. It will also be clear that since the entrance of fluid into the delivery pipes is at the center thereof, these pistons, by being caused to approach the center from either side more or less as desired, will cause the effective width of the jet series to vary, so that the jets may be adapted to spraying the entire surface but not more than the entire surface of the metal pieces passing beween the delivery pipes 3 and 3*a*. Finally, it will be clear that if the pistons are moved back far enough to uncover the openings 6 in the delivery pipes 3 and 3*a*, these pipes may be washed out through the pipes 8, so as to remove from them any sediment or scale which has collected within.

By making it possible to adjust the length of the spray to the width of a strip or bar being rolled, instead of using a fixed blanket spray corresponding to the maximum width of the strip, we save water and reduce the splash which occurs from spray streams outside the steel.

We provide, preferably, long pistons of the balanced type to equalize the pressure on either side sufficiently to allow easy adjustment while in operation, and at the same time to keep the wash-out ports 6 effectively covered. To this end we provide two pistons interspaced and connected in tandem upon each of the piston rods 10, as clearly shown. The piston rods are connected to a yoke 11 on either end of the delivery pipes 3 and 3*a*. That is to say, the piston rod 10 in the upper delivery pipe and the piston rod 10*a* in the lower on each end will be interconnected by the said yoke; and the yoke is threaded to accommodate a threaded shaft 12 by which the pistons may be moved. This shaft is journaled at either end to fixed frame supports such as the yoke 13 affixed to the delivery pipes, and a frame member 14. The shaft will be rotatably mounted in its bearings; but means are provided to prevent its longitudinal motion. A handwheel 15 on the end of the shaft provides a convenient means whereby it may be rotated; and it will be seen that a movement of this handwheel in a clockwise direction in Figure 1 will draw the yoke 11 outwardly, thus moving the plungers 9 in the delivery pipes outwardly. A reverse movement will tend to thrust the plungers in the delivery pipes nearer the center thereof. For smoothness of operation, guide rods 16 may be employed, passing through holes in the yoke 11. Packing glands 17 surround the piston rods 10 and 10*a*, and close the ends of the delivery tubes 3 and 3*a*.

It will be understood how a manipulation of the handwheels 15 will serve to move the plungers from either end over the perforations in the delivery pipes 3 and 3*a* practically without interruption to the operation of the device, and very quickly. It will also be understood how the effective widths of the sprays may be varied by a manipulation of the handwheel in approaching or removing the pistons from the central point of the delivery pipes, and how sediment or foreign matter in the delivery pipes may be washed out by withdrawing the pistons to a point beyond the wash-out ports 6. In Figure 2 we have shown pistons in the wash-out position.

In order to minimize splashing, a hood 18 may be built over the apparatus and a swinging baffle plate 19 caused to approach very closely or even to contact the surfaces of the strips or bars being rolled.

Various modifications may be made in our invention without departing from the spirit of it.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent, is:—

1. In a hydraulic scale removing device, perforated delivery pipes to form a spray, means for introducing fluid under pressure at the center of the said pipes, and means for adjusting the effective width of the said spray, said means comprising pistons movable in said pipes to or over said central

openings and means for holding said pistons in place against hydraulic pressure.

2. In a hydraulic scale removing device, perforated delivery pipes to form a spray, means for introducing fluid under pressure at the center of the said pipes, and means for adjusting the effective width of the said spray, said means comprising pistons movable in said pipes to or over said central openings, wash-out ports remote from said central openings, said pistons movable to uncover said wash-out ports and means for holding said pistons in place against hydraulic pressure.

3. In a hydraulic scale removing device, perforated delivery pipes to form a spray, means for introducing fluid under pressure at the center of the said pipes, and means for adjusting the effective width of the said spray, said means comprising pistons movable in said pipes to or over said central openings, wash-out ports remote from said central openings, said pistons movable to uncover said wash-out ports, said pistons movable within said pipes so as to pass over all of the perforations therein to dislodge scale and sediment therefrom and means for holding said pistons in place against hydraulic pressure.

4. In a hydraulic scale removing device, perforated delivery pipes to form a spray, means for introducing fluid under pressure at the center of the said pipes, and means for adjusting the effective width of the said spray, said means comprising pistons movable in said pipes to or over said central openings, wash-out ports remote from said central openings, said pistons movable to uncover said wash-out ports, said pistons movable within said pipes so as to pass over all of the perforations therein so as to dislodge scale and sediment therefrom, and means for moving said pistons comprising piston rods extending beyond the ends of said pipes, and screw means to move said rods.

5. In a hydraulic scale remover, perforated delivery pipes located on either side of the path of travel of an article so as to cover it with a spray, central ports in said pipes, and means for delivering fluid under pressure to said ports, pistons operating in said pipes from either end, said pistons affixed to piston rods extending through glands in the ends of said pipes, opposite pairs of said rods attached to a yoke, and means for moving the said yoke comprising a threaded portion in said yoke, and a cooperating threaded shaft journaled to a fixed support, and means for turning said shaft.

6. In a hydraulic scale remover, perforated delivery pipes located on either side of the path of travel of an article so as to cover it with a spray, central ports in said pipes, and means for delivering fluid under pressure to said ports, pistons operating in said pipes from either end, said pistons affixed to piston rods extending through glands in the ends of said pipes, opposite pairs of said rods attached to a yoke, and means for moving the said yoke comprising a threaded portion in said yoke, and a cooperating threaded shaft journaled to a fixed support, and means for turning said shaft, said pistons being of the balanced type in tandem, wash-out ports in portions of said delivery pipes remote from the center, said pistons being movable to uncover said wash-out ports.

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