

May 20, 1930.

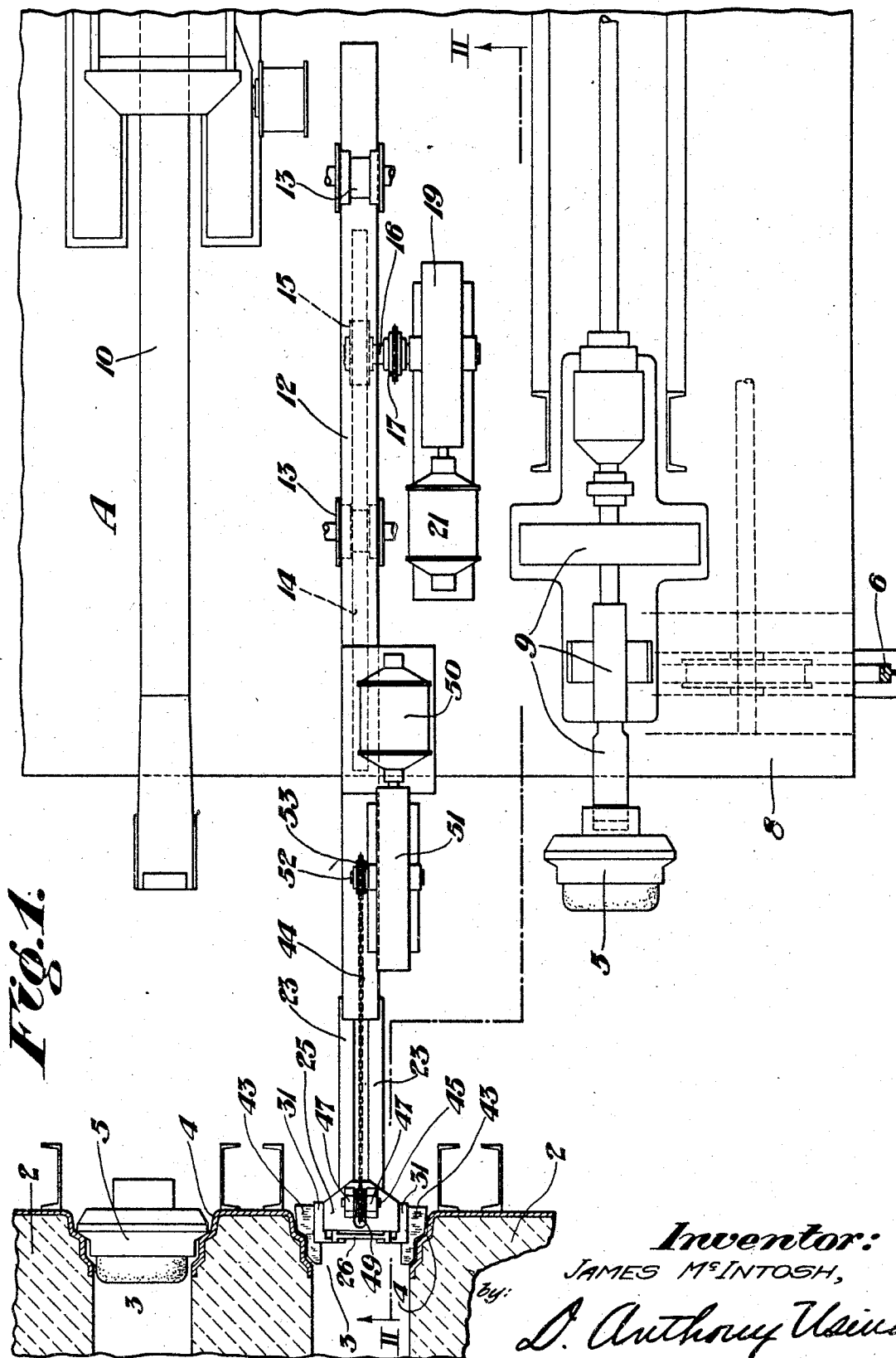
J. McINTOSH

1,759,015

DOOR FRAME CLEANING APPARATUS

Filed June 28, 1928

3 Sheets-Sheet 1



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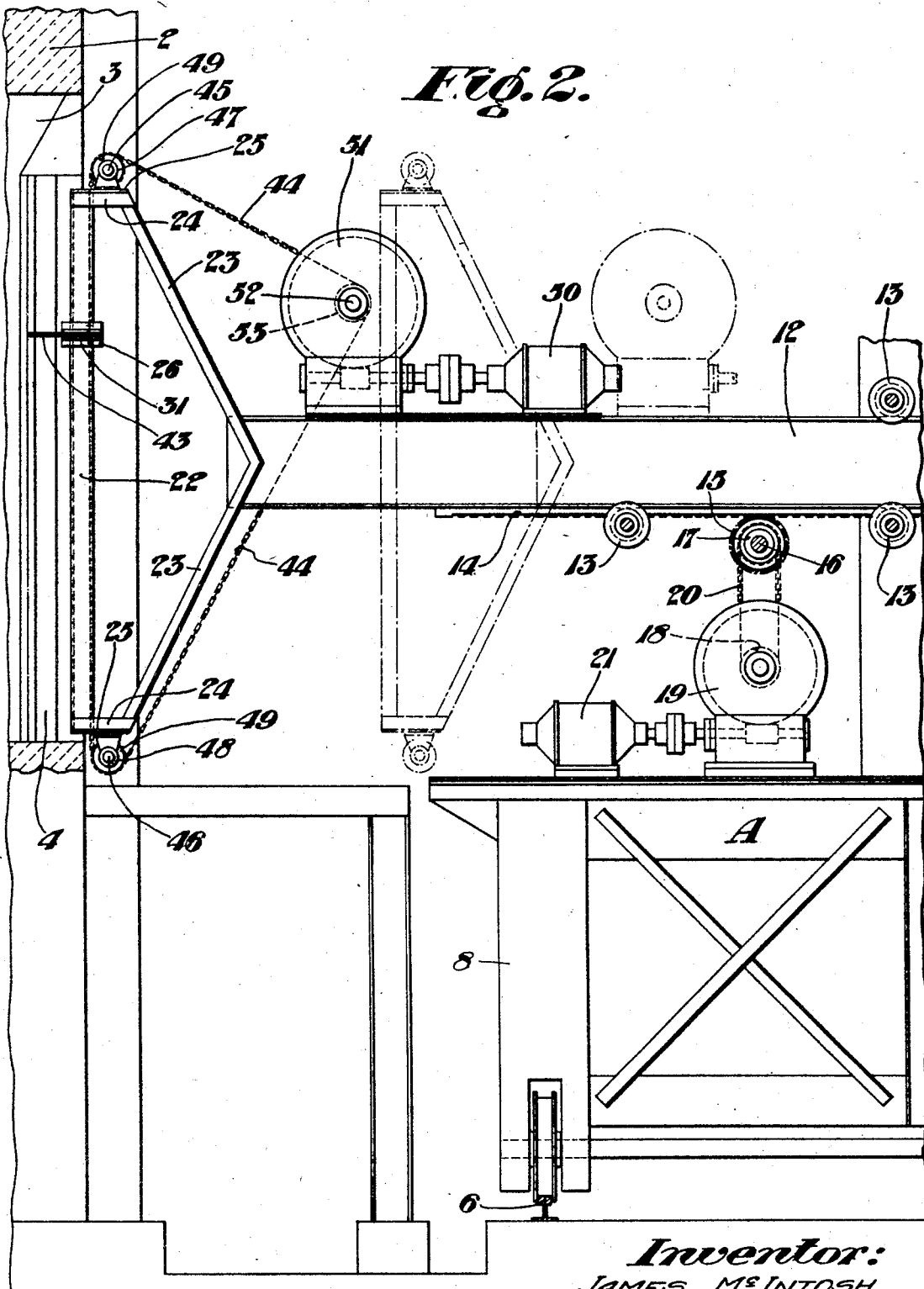
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DOOR FRAME CLEANING APPARATUS

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3 Sheets-Sheet 2



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3 Sheets-Sheet 3

Fig. 3.

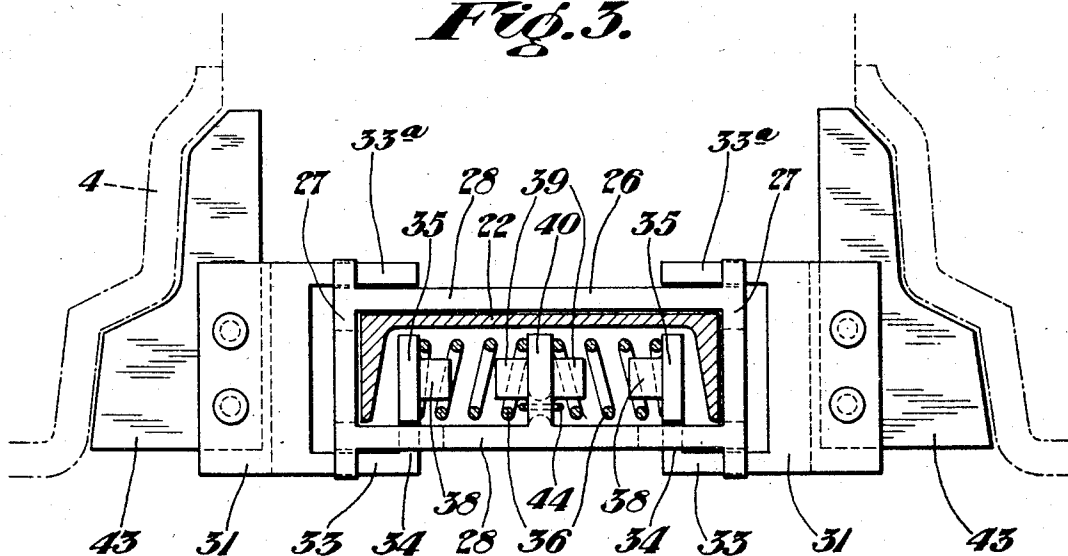


Fig. 4.

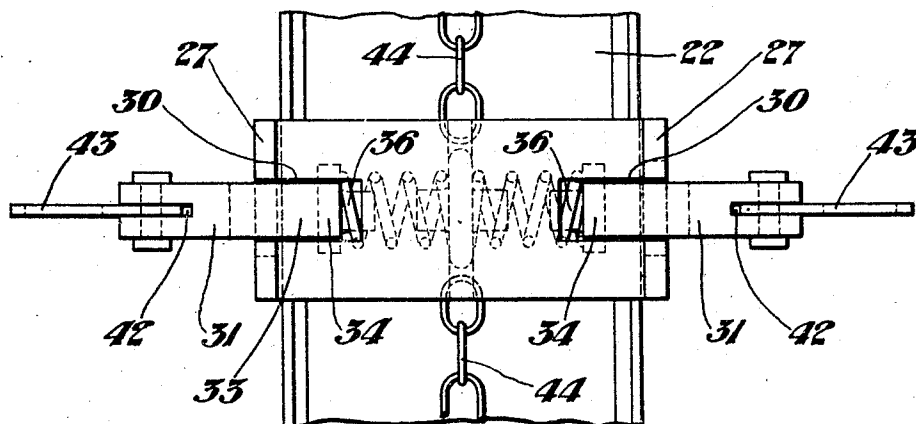
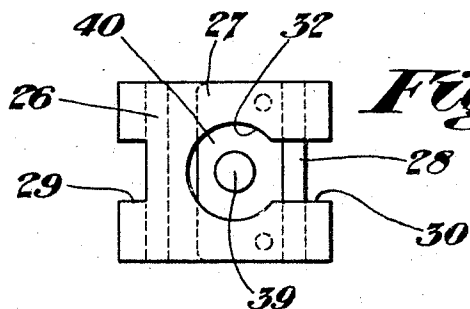


Fig. 5.



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UNITED STATES PATENT OFFICE

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DOORFRAME-CLEANING APPARATUS

Application filed June 28, 1928. Serial No. 288,832.

This invention relates to door-frame cleaning apparatus and, while not limited thereto, relates more particularly to apparatus for cleaning the sealing material and other foreign matter from the door-frames of by-product coke ovens and the like.

By-product coke ovens generally consist of a plurality of horizontal ovens arranged side-by-side in groups called batteries. The ovens or coking chambers vary in size for the different plants. One of the plants to which this invention has been applied has ovens of approximately 42 feet in length, 14 feet in height, and the width varies from 15½ inches at the pusher end to 17½ inches at the coke end. These dimensions, which vary at different plants, serve to indicate the general shape of the chambers in which coal is carbonized. Each oven is provided with a plurality of top openings or charging holes, having removable lids through which the coal to be coked is charged, and also is provided with a door way surrounded by a cast iron door-frame and closed by a removable cast iron, brick-lined door at each end, one doorway being for the purpose of permitting the discharge of the coke, and the other doorway being for permitting the entrance of a pushing ram to push out the coke.

The doors at each end of the coking chambers are adapted to be sealed in position with a mixture of clay and coke dust to prevent the escape of gases and vapors during the coking process. During the coking process some leakage of gas and vapors may occur through the seal, and the tar vapors condense and form a pasty mixture with the clay and coke dust, which mixture, when exposed to the heat of the ovens, becomes very hard and adheres tenaciously to the oven doors and door-frames. Unless the above described deposits are removed from the doors and door-frames each time the doors are removed from the oven, it soon builds up sufficiently to cause considerable difficulty in remounting the doors and prevents the forming of a tight seal.

Prior to this invention, these deposits were removed from both the doors and door-frames by hand tools and the removal re-

quired considerable hard labor under very difficult conditions and, at best, the deposits were only partly removed, due to the class of labor that is available for this class of work, and also due to the short time in which the doors remain off the oven.

In a co-pending application Serial No. 285,756, filed June 15, 1928, I have shown and described a novel form of mechanical scraping mechanism for scraping or cleaning the edges of the doors, and the present invention provides mechanical means for scraping or cleaning the seat portions of the door-frames so that the cleaned doors may be provided with a smooth seat on the door-frame.

In the drawings:

Figure 1 is a fragmentary plan of a standard coke pushing machine having the door-frame cleaning mechanism of this invention applied thereto.

Figure 2 is a side elevation thereof.

Figure 3 is a transverse sectional view through the head of the cleaning mechanism showing the scrapers in plan.

Figure 4 is an enlarged front elevation of the guide-block and scrapers.

Figure 5 is an end elevation of the guide-block.

In the drawings I have shown the door-frame cleaning mechanism mounted on the coke-pusher machine for purposes of illustration. It will be understood, however, that I do not wish to be limited to such a combination since the cleaning mechanism is also adapted to be mounted on the door machine for cleaning the door-frames on the coke side of the ovens or, if desired, such mechanism may be mounted on a suitable carriage independently of either the pusher or door machines.

Referring more particularly to the drawings, the numeral 2 designates the coke ovens, which are of standard design, and are provided with the usual doorways 3, surrounded by door-frames 4, and adapted to be closed by removable doors 5.

Since the present invention is applied to the pusher machine, only the pusher side of the ovens will be shown. A track 6 is arranged parallel to the pusher side of the

ovens on which the pusher machine A is adapted to travel.

The pusher machine, which is only shown in outline, is of the standard "Koppers" type and comprises a wheeled carriage 8 having the usual door removing apparatus 9 and coke-pusher ram 10 mounted thereon.

A horizontally disposed ram-member 12 is mounted on supporting rollers 13, on the carriage 8, and has a rack 14 which is meshed with a pinion 15 on a shaft 16. A sprocket 17 is secured to the shaft 16 and is connected with a drive-sprocket 18, of a speed reducing mechanism 19, by a drive-chain 20. The speed reducing mechanism 19 is coupled to a drive-motor 21.

A vertical head-member 22 is positioned in advance of the forward or free end of the ram-member 12 and is connected to said ram by diagonal struts 23 and short horizontal brace-members 24 which form a fixed connection between the head and ram. The head-member 22 is preferably formed from a section of rolled channel beam, and the short horizontal brace-members 24 are secured to the flanges of the head 22 by riveting or bolting. Top and bottom plates 25 are secured to the ends of the channel head-member 22 and to the brace-members 24 to stiffen the structure.

A guide-block 26, composed of two end flanges 27 and a pair of spaced web-members 28, is fitted around the head-member 22 so as to slide vertically thereon.

The block 26 has its flanges slotted, as at 29 and 30, to receive the leg portions 33 and 33^a, of yokes 31, which are mounted on each end of the block. The slots 30 are continued in one web-member and are enlarged, as at 32, in the flanges to permit the legs 33 of the yokes to pass within the block. The legs 33 of the yokes are provided with an extension 34 at right angles to the axis of the legs, which extension terminates in a disk-like seat 35 for coiled springs 36. When assembling the scraping mechanism, the yokes 31 are first mounted in position in the block 26 and the block 26 is then slid down into position on the channel-shaped head-member 22, with the seat portions 35 of the leg extensions 34 within the channel so that the flanges of the channel-shaped head will retain the yokes in position.

The seats 35 are provided with guide-pins or projections 38, which cooperate with guide-pins or projections 39 on a bracket-member 40 projecting inwardly from and formed integral with one of the web-members 28, to retain and guide the coiled springs 36, which are compressed between the seat portions 35 of the yokes and the bracket 40, so as to normally maintain the yokes 31 in extended position and, at the same time, form a yieldable mounting therefor.

The yokes have their closed ends or head

portions slotted horizontally, as at 42, to form pockets in which scraper blades 43 are mounted.

The guide-block 26 and its scraping mechanism is adapted to be bodily moved up and down on the vertical head 22 by a power operated chain 44. Shafts 45 and 46 are journaled in bearings 47 and 48, respectively, on the top and bottom plates 25, and sprockets 49 are secured to said shafts. A motor 50 is mounted on the ram 12 and is coupled to a standard speed reducing unit 51 which has its drive-shaft 52 provided with a drive-sprocket 53. The chain 44 is trained over the sprockets 53 and 49 and has its ends secured to the block 26. The motor 50 is of the reversing type, and is adapted to be controlled by suitable standard mechanism so as to permit the reversal of the motor either by manual operation or automatically as the block 26 reaches the ends of the head 22.

In operation, after the door 5 has been removed by the door removing ram 9, and either before or after the coke has been pushed out of the oven by the pushing ram 10, the pushing machine is spotted or moved so that the ram 12 is in alinement with the doorway 3 to be cleaned.

The motor 21 will then be energized to move the ram 12 forwardly so as to project the head 22 into the doorway and force the scraper blades 43 into contact with the sides of the door-frame 4. The motor 50 will then be energized to drive the chain 44, which will propel the scraper guide-block 26 and scraper blades 43 along the vertical head 22 to scrape the sides of the door-frame and remove any sealing material or other foreign matter therefrom. When the block 26 reaches either end of the head 22, the motor 50 may be reversed so as to reverse the direction of travel of the block and thus scrape the door-frame 4 in the reverse direction. This reversal of operation may be repeated as many times as necessary to clean the door-frame 4. However, two passages of the scraper blades 43, which necessitate one reversal of the motor 50, are generally sufficient to clean the door-frame.

It will be understood that while I have not illustrated any form of automatic control mechanism for the scraper motor 50, any standard form of automatic control mechanism may be applied thereto without departing from the scope of my invention.

While I have shown and described one specific form of my invention, it will be understood that I do not wish to be limited thereto since various modifications may be made without departing from the scope thereof as defined in the appended claims.

I claim—

1. A door-frame cleaning apparatus, comprising a horizontally reciprocable ram, a vertically disposed head-member fixedly secured

to the outer end of said ram, a guide-block slidably mounted for vertical movement on said head, a pair of yoke members mounted horizontally on said block and slidable relative thereto, means for yieldably forcing said yoke members outwardly from said block, scraper members carried by said yoke members, and means for moving said block vertically on said head.

2. A door-frame cleaning apparatus, comprising a wheeled carriage, a horizontally reciprocable ram, a vertically disposed head-member fixedly secured to the outer end of said ram, a guide-block slidably mounted on said head-member for vertical movement relative thereto, a pair of yoke members slidably mounted for horizontal movement on said block, said yoke members extending inwardly along said block from the opposite ends thereof, means for yieldably forcing said yoke members outwardly relative to said block, scraper blades secured to said yoke members, and power means for moving said block vertically on said head.

3. A door-frame cleaning apparatus, comprising a wheeled carriage, a horizontally reciprocable ram, a vertically disposed head-member fixedly secured to the outer end of said ram, a guide-block slidably mounted on said head-member for vertical movement relative thereto, a pair of yoke members slidably mounted for horizontal movement on said block, said yoke members extending inwardly along said block from the opposite ends thereof, means for yieldably forcing said yoke members outwardly relative to said block, scraper blades secured to said yoke members, sprockets journaled adjacent each end of said head, a motor carried by said ram, a gear reduction mechanism carried by said ram and coupled with said motor, a sprocket carried by said gear reduction mechanism, a chain trained about all of said sprockets and having its end connected to the opposite sides of said guide-block, whereby rotation of said sprocket on said gear reduction mechanism will drive said chain to cause a vertical movement of said block and scraper blades.

4. A door-frame cleaning apparatus comprising a reciprocable ram, a head member secured to the outer end of said ram, a vertically movable guide block on said head, horizontally movable scraping means carried by said block, means for forcing said scraping means outward against the frame, and means for moving said block and scraping means along the frame.

5. A door-frame cleaning apparatus comprising a horizontally reciprocable ram, a vertically disposed head on the outer end of said ram, scraper members mounted on each side of said head and movable vertically relative thereto, means for reciprocating said ram, and means for moving said scraper members.

6. A door-frame cleaning apparatus comprising a horizontally reciprocable ram, a vertically disposed head on the outer end of said ram, power means for reciprocating said ram, scraper members mounted on said head and projecting from each side thereof, said scraper members being movable vertically relative to said head, and reversible power means for moving said scraper members up and down relative to said head.

7. A door-frame cleaning apparatus comprising a horizontally reciprocable ram, a vertically disposed head on the outer end of said ram, power means for reciprocating said ram, scraper members mounted on said head and projecting from each side thereof, yieldable means tending to normally force said scraper members outwardly from said head, said scraper members being movable vertically relative to said head, and means for moving said scraper members upwardly and downwardly relative to said head.

In testimony whereof, I have hereunto set my hand.

JAMES McINTOSH.