Oct. 1, 1935. H. E. MORTON 2,015,955

DOUBLE RAM FLASH REMOVING MACHINE

Filed Jan. 20, 1934 4 Sheets-Sheet 1

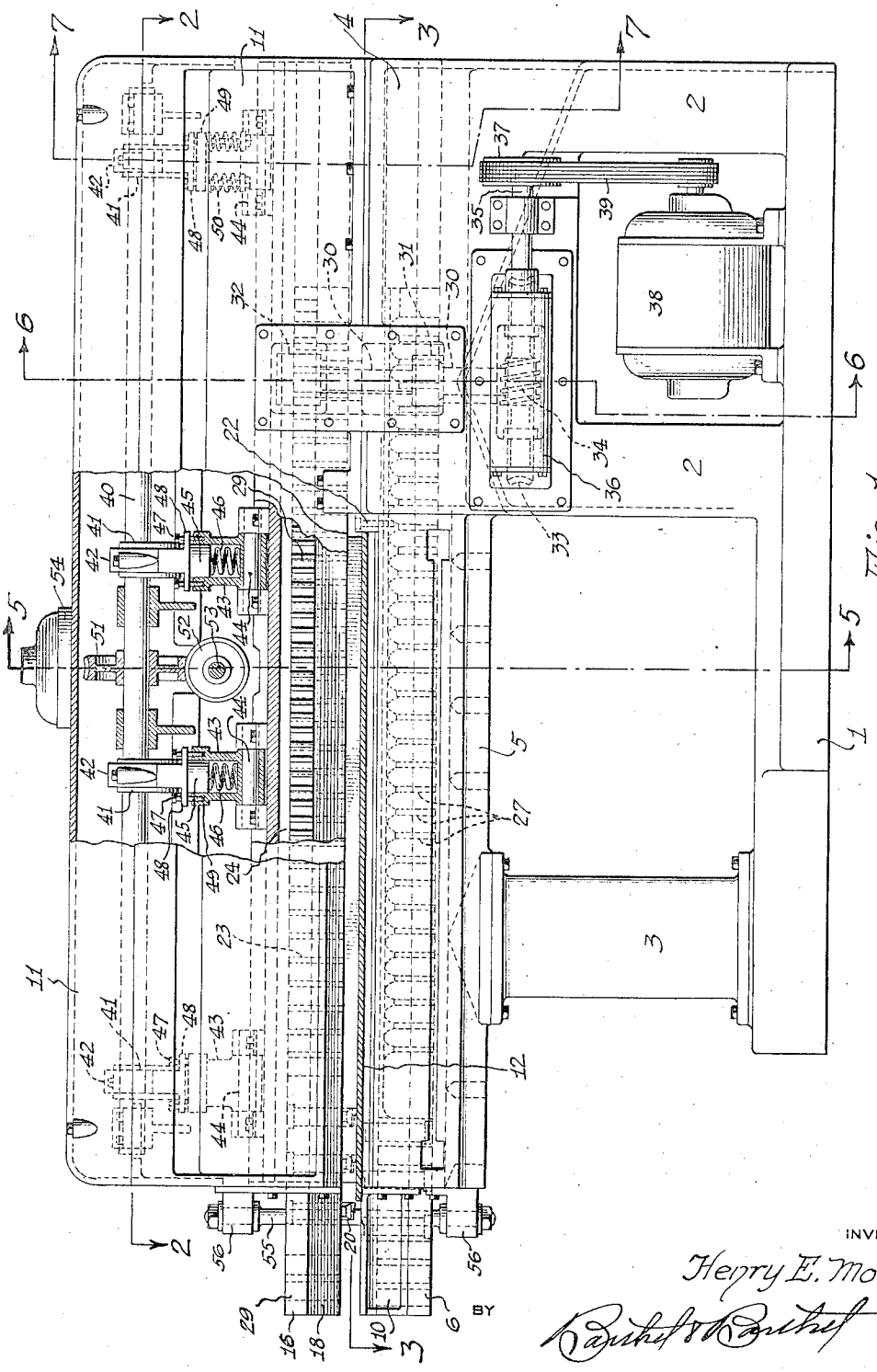


Fig. 1.

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DOUBLE RAM FLASH REMOVING MACHINE

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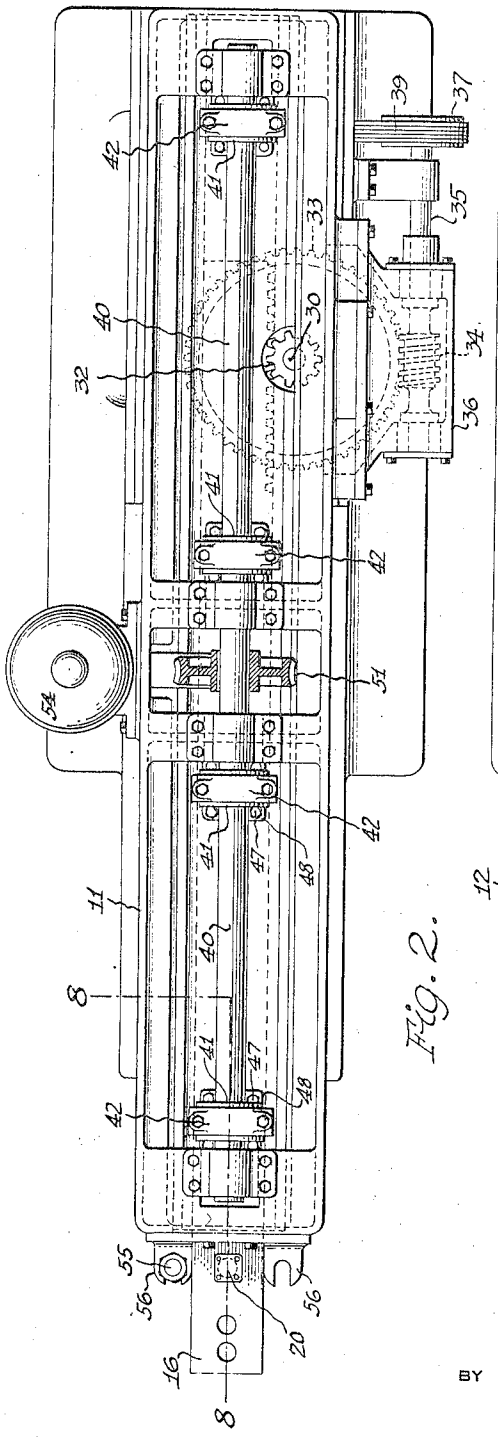


Fig. 2.

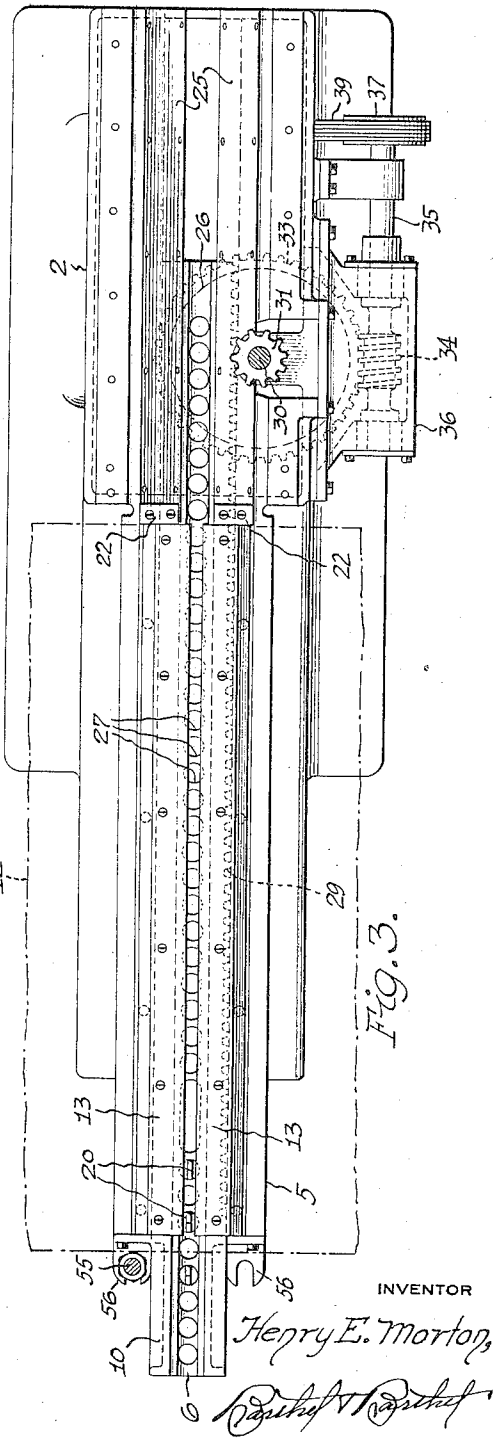


Fig. 3.

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DOUBLE RAM FLASH REMOVING MACHINE

Filed Jan. 20, 1934 4 Sheets-Sheet 3

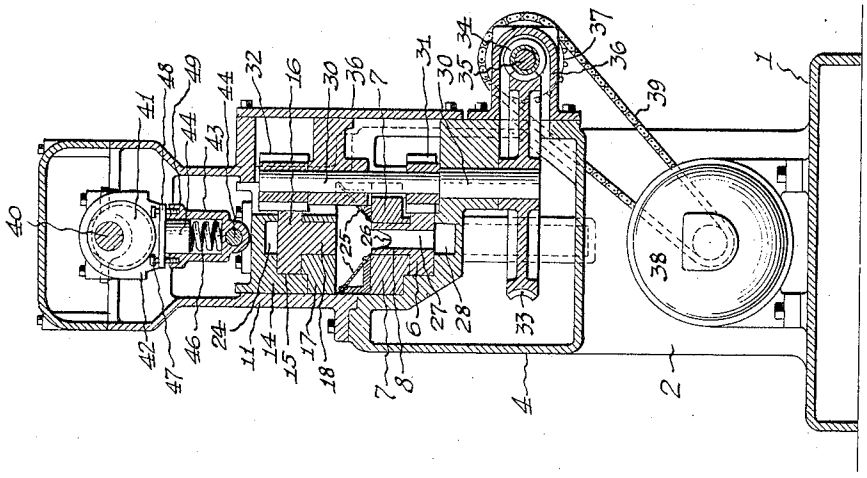


Fig. 6.

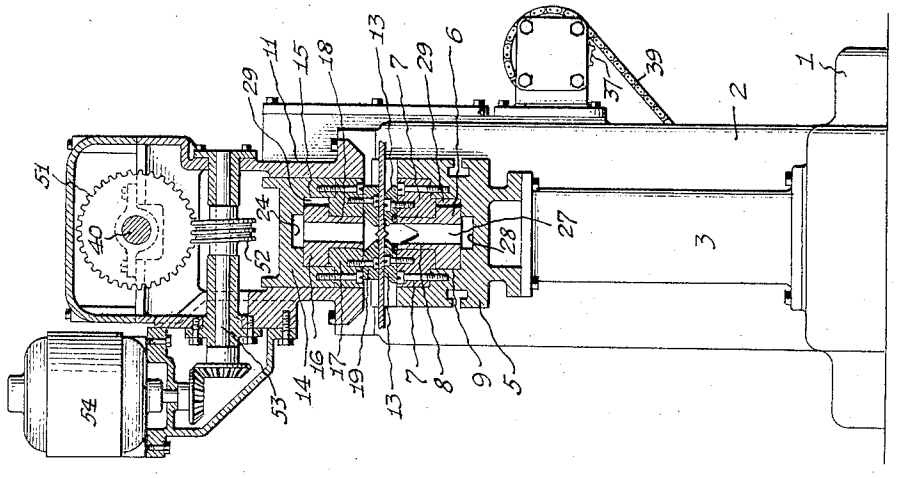


Fig. 5.

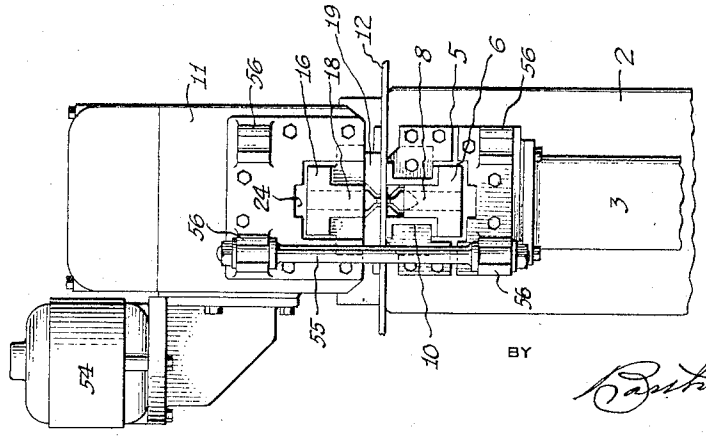


Fig. 4.

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DOUBLE RAM FLASH REMOVING MACHINE

Filed Jan. 20, 1934 4 Sheets-Sheet 4

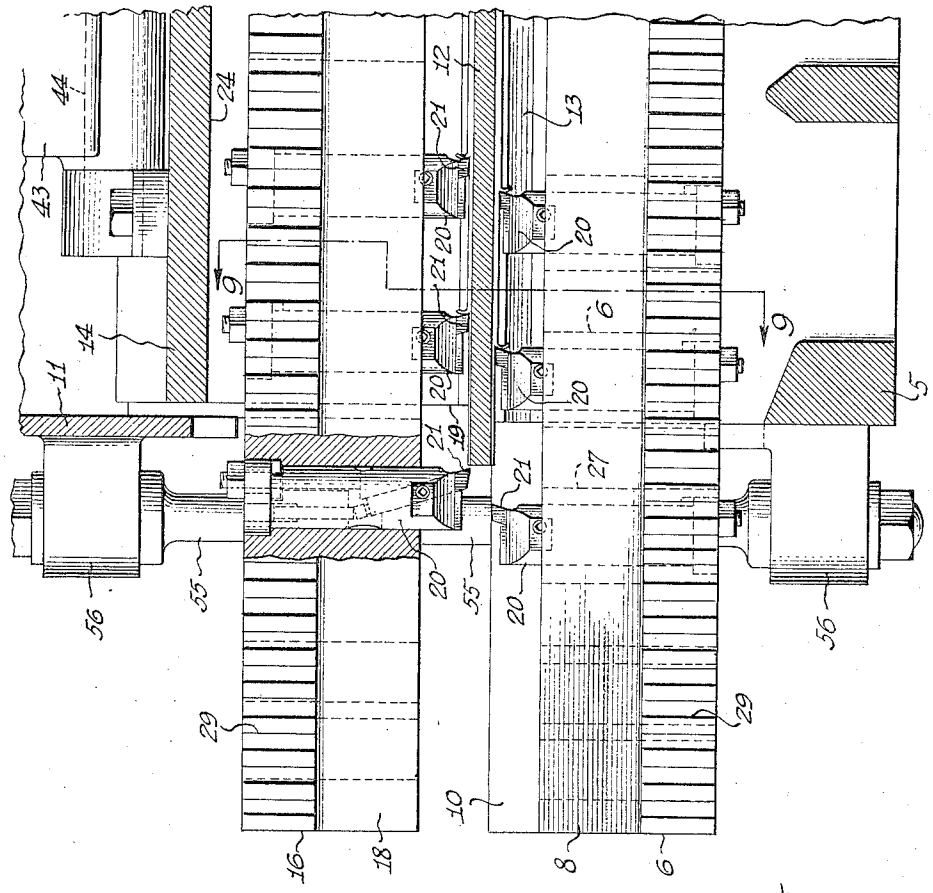


Fig. 8.

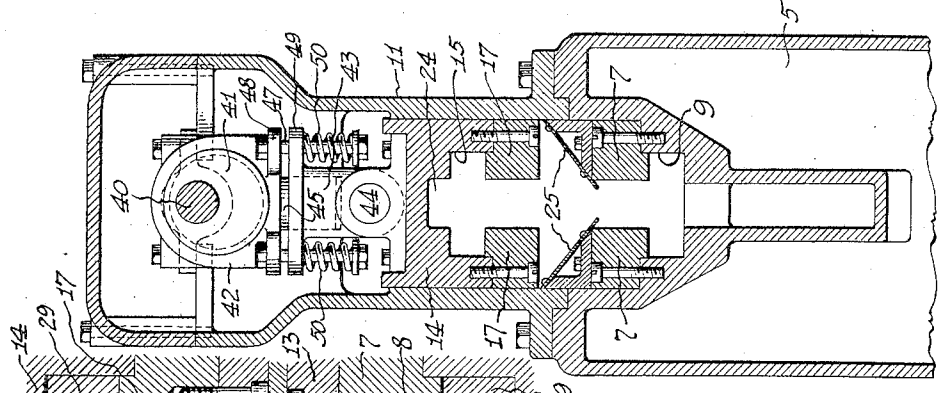


Fig. 7.

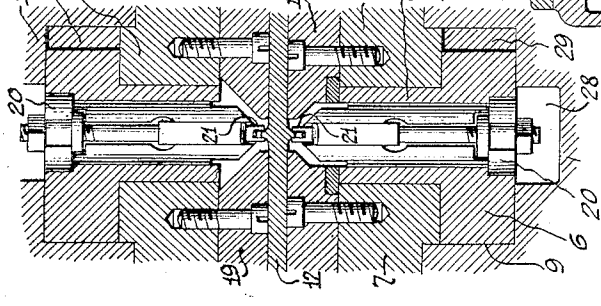


Fig. 9.

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Patented Oct. 1, 1935

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UNITED STATES PATENT OFFICE

2,015,955

DOUBLE RAM FLASH REMOVING MACHINE

Henry E. Morton, Muskegon Heights, Mich.

Application January 20, 1934, Serial No. 707,475

10 Claims. (Cl. 90—38)

This invention relates to a machine for removing the flash from an electrically butt welded seam of thin sheet metal work, and more particularly to a machine for simultaneously removing the flash from both sides of such work.

In machines of this character great difficulty has been encountered in properly disposing of the shavings, chips and other particles removed from the work and also in preventing the smaller particles from getting in between the bearing surfaces of the machine parts, causing injury to these surfaces and destroying the accuracy of the machine, and it is an object of the present invention to overcome these difficulties.

It is also an object to provide efficient means for positively holding, clamping and straightening the work throughout the length of the seam thereof, said means being positively operated and embodying a slightly yielding action to provide for variations in the gauge of the sheet metal forming the work.

It is also an object to provide, in a machine embodying upper and lower tool carrying longitudinally reciprocable rams, a movable carrier for one of said rams together with means for moving said carrier, whereby said rams may be moved relatively, one toward and from the other to permit the insertion of the work therebetween and its ready removal, and to effect a clamping of the work along opposite sides of the seam throughout its length between fixed shoes or clamping members and like members carried by said movable carrier.

A further object is to provide, in a machine of this type having longitudinally reciprocable rams, one of which rams is movable laterally toward and from the other, an arrangement affording a positive drive for the rams while providing for such lateral movement of one of the rams; and to provide a ram construction providing a longitudinal channel throughout its length and openings therethrough for the efficient disposal of metal particles removed from the work, together with means for effectually preventing fine particles from getting in between the ram bearing surfaces.

It is also an object to provide an efficient machine for the purpose, embodying certain other new and useful features in the construction, arrangement and combination of parts, all as hereinafter more fully set forth and illustrated in the accompanying drawings wherein—

Figure 1 is a side elevation of a machine illustrative of an embodiment of the present invention and showing portions broken away and in section to more clearly disclose the construction;

Fig. 2 is a plan view of the same with the top cover portion of the top enclosing housing removed and showing a horizontal section substantially upon the line 2—2 of Fig. 1;

Fig. 3 is a horizontal section substantially upon the line 3—3 of Fig. 1;

Fig. 4 is an end elevation of the forward end of the machine;

Fig. 5 is a transverse section substantially upon the line 5—5 of Fig. 1;

Fig. 6 is a transverse section substantially upon the line 6—6 of Fig. 1;

Fig. 7 is an enlarged transverse section substantially upon the line 7—7 of Fig. 1;

Fig. 8 is an enlarged longitudinal sectional detail substantially upon the line 8—8 of Fig. 2; and

Fig. 9 is a transverse sectional detail substantially upon the line 9—9 of Fig. 8.

As shown in the several drawings, 1 indicates a suitable base, integral with the rear end portion of which is a pair of spaced apart pedestals 2, and a third pedestal 3 is secured to the forward end of said base. Integral with the upper ends of pedestals 2 is a housing 4 formed with a forwardly extended horizontal extension 5 supported intermediate its ends by the pedestal 3, said housing and its extension being formed with an integral way for a longitudinally reciprocable ram 6 which is substantially of inverted T-shape in cross section and held within its way 9 by bars 7, one at each side of the central upstanding rib 8 of the ram and overlapping the laterally extending ribs thereof to hold the same down in its way, these guide bars 7 being seated upon shoulders at the opposite sides of said way 9 throughout the length of the way. An extension 10 for the way 9 is bolted to the end of the extension 5 of the housing 4, which housing and its extension is internally formed with said way which is open at each end of the machine to permit said ram, upon reciprocation, to project therefrom.

An upper housing 11 is rigidly secured to the upper end of the housing 4 and extends the full length of the housing extension 5 with its lower side spaced from the upper side of said extension 5, thus leaving an open slot or space the full length of said extension between it and the overhanging portion of the upper housing, said slot thus providing a space to receive the work 12 which, as shown, is formed of sheet metal plates electrically butt welded together at their adjacent edges, forming the seam from the upper and lower sides of which the flash is to be removed. Obviously the work may be of a form other than a flat sheet as shown, the work when in place, resting upon

hardened bars or shoes 13 secured in any suitable manner upon the guide bars 7 and extending the full length of the work to form fixed seats or clamping shoes, the inner or adjacent edges of these bars extending over the meeting side surfaces of the ram, rib 8 and bars 7 to prevent dust particles from getting in between these surfaces and being bevelled inwardly and upwardly to engage the work close to the seam at each side thereof throughout the length of the seam.

Within the upper housing 11 is a carrier member 14 which extends the full length of said housing and is internally formed with a longitudinal guideway 15 similar to the way 9, for an upper longitudinally reciprocable ram 16, which ram, like the ram 6, is of T-form in cross section and secured and guided within its way by guide bars 17 similar to the bars 7, secured in any suitable manner to the lower side of the carrier 14 at each side of the downwardly extending central longitudinal rib 18 of said ram 16. The ram carrier 14 fits closely between the side walls of the housing 11, which housing thus forms a guide or way within which the carrier may move laterally a limited distance, in an upward direction to move the said upper ram laterally, toward and from the lower ram and to bring parallel bars 19 forming movable clamping shoes, similar to the fixed bars or shoes 13, down upon the work to clamp the same rigidly between the movable shoes and said fixed shoes close to each side of the seam throughout the length thereof, the inner or adjacent edges of these clamping bars or shoes 19 being beveled downwardly from the carrier and toward each other to engage the work close to the sides of the seam and to form a V-trough to receive the chips formed by the cutting away of the flash at the upper side of the work.

Secured within a series of vertical bores in each of the rams 6 and 16 adjacent their forward ends, is a series of tool holders 20 of cylindrical form, these bores extending vertically through each bar and piercing the exposed surfaces of the central ribs 8 and 18 of said bars 6 and 16 respectively, so that the tools 21 projecting from the ends of said holders which project into the V-grooves formed between the adjacent inclined sides of the clamping bars or shoes 13 and 19 respectively, will be aligned with the seam and in position to successively operate to remove the flash flush with the surfaces of the plates upon reciprocation of the rams, the tools of each series being set to operate successively, the first of the series, to make a roughing cut and the last, a finishing cut, and preferably, the tools carried by the upper ram are set in staggered relation to those carried by the lower ram so that too great a strain will not be put upon the work at any one point by having the tools directly opposed. The tool holders 20 which are of a particular construction to adapt them to this particular type of machine, are the subject of a separate application for patent and are not, therefore, specifically described herein.

The working stroke of the rams is inward or toward the housing 4 and therefore, stop blocks 22 are secured to the extension 5 adjacent the inner ends of the clamping bars 13 and said housing, thus forming abutments for the plates forming the work when the same are in place upon said bars between the rams, and to provide space for the chips above the work in addition to that provided by the V-groove formed between said bars, said upper ram is formed with a series of spaced holes 23 throughout its length, which holes open into a longitudinal channel 24 formed in the carrier 14 above said ram, and within the lower part of the housing 11 below the plane of the lower face of the carrier 14 and its ram 16 are fixedly supported thin sheet metal deflector plates 25 within the space between the rams and extending from the stop blocks 22 to and through the rear end of the housing 11, these plates being supported with their upper edges against the walls of said housing forming the guide or way for the carrier and inclined inwardly and downwardly with their lower edges lying close to the upper surface of the upstanding rib 8 of the lower ram 6, within which surface throughout the length of the ram, is formed a longitudinal V-shaped groove 26, said plates thus together forming a V-trough open at its bottom into the V-groove in the top of the lower ram. Small dust-like particles formed in the removal of the flash, are thus deflected and directed into this V-groove in the lower ram from which they escape freely downward through holes 27 in the ram, opening into the bottom of said groove. These fine particles are thus prevented from working in between the bearing surfaces of the lower ram and are conducted downward through said lower ram and into a channel 28 at the bottom of the way for said ram. The lower ram is formed with these holes 27 throughout its length so that the chips removed from the lower side of the work may immediately drop through these openings and pass into the channel 28 which is open at its lower side at intervals throughout the length of the housing extension 5 and has an inclined bottom throughout the portion thereof located in the housing 4. The bearing surfaces of the rams are therefore adequately protected and free escape of chips etc. is provided to prevent clogging and injury to the machine parts.

To simultaneously reciprocate the rams 6 and 16, each ram is formed with rack teeth 29 throughout the length of one of the lateral or base flanges of each ram, both at the same side of the rams, and mounted in suitable bearings in the housings 4 and 11, is a vertical drive shaft 30 having secured thereon a pinion 31 to mesh with the rack teeth of the lower ram 6, and a pinion 32 of extended length in mesh with the rack teeth of the upper ram 16. Rotation of said drive shaft through the medium of a large worm gear 33 on its lower end will therefore effect reciprocation of said rams, said worm gear being driven by a worm 34 in mesh therewith, upon a horizontal worm shaft 35 mounted within bearings in a lateral extension 36 of the housing 4 which forms a tight enclosing casing for these worms to exclude all chips or particles and protect the driving parts from injury, the pinion 31 being also enclosed in this chamber. Secured to the outer end of this worm shaft 35, is a sprocket 37 and motion is transmitted from a reversible electric motor 38 to said sprocket, by a sprocket chain 39, said motor being preferably mounted upon the base 1 of the machine between the piers 2 where it is out of the way and protected by said piers and the housing above.

The pinion 32 for driving the upper ram, is elongated so that it will remain in mesh with the rack of said ram when said ram is moved upwardly by upward movement of its carrier 14 to raise said ram relative to the lower ram and permit the insertion or removal of the work from between said rams; and to so raise said carrier and to lower the same to bring the clamping bars or shoes 19 carried thereby into firm contact with the work

and clamp the same between said shoes and the stationary shoes 13 therebeneath, with sufficient force to straighten the work throughout the length of the seam thereof, a cam shaft 40, substantially coextensive in length with that of the carrier, is mounted in suitable bearings in the upper part of the housing 11 above said carrier, and on this shaft is secured a plurality of eccentrics 41 surrounded by straps 42, each connected to a cylinder 43, the lower ends of which cylinders are pivotally connected in any suitable manner, as at 44, to the upper side of the carrier 14. A loose connection is provided between each strap and the upper end of its cylinder, comprising a plunger 45 on each strap projecting into the upper end of the cylinder with a coiled compression spring 46 in the cylinder engaging the inner end of the plunger, and each strap connected to the upper end of its cylinder by bolts 47 passing through openings in a flange 48 on said strap and into screwthreaded openings in a flange or end 49 of the cylinder. At the rear end of the shaft, the connection between the strap of the eccentric adjacent said end of said shaft, includes springs 50 sleeved on said bolts 47 between said flange 49 and nuts on the lower ends of said bolts, to yieldingly support the rear end or overhang of the carrier when the rams are at the forward end of their stroke, which rear end portion of the carrier would otherwise be unsupported and might sag slightly.

When said cam shaft 40 is rotated through the medium of a worm wheel 51 thereon in mesh with a worm 52 on a transverse worm shaft 53 mounted in bearings on the housing 11 and driven by an electric motor 54 mounted upon a bracket on the side of said housing and connected to said worm shaft by bevel gears, said eccentrics 41 will operate to raise or lower said carrier in said housing, and upon down movement, the clamping shoes 19 will be forced into strong contact with the work close to each side of the seam thereof throughout its length to straighten and firmly hold the same, the slight yield provided by the springs 46 compensating for any slight variations in the gauge of the sheets, either in thickness or average taper.

With this arrangement the work is firmly clamped throughout its entire length and close to each side of the seam, thus not only rigidly holding the work to prevent buckling or tearing by the action of the tools, but also flattening and straightening the sheets along their welded edges so that the cutting tools may be accurately set to remove the flash flush with the surfaces of the sheets; and to prevent any springing of the overhanging end of the upper housing 11 away from the lower housing part 5 under such clamping strains or strains imposed by the tools in removing the flash, the free ends of these housings are detachably tied together by tie rods or bolts 55 applied to ears 56 projecting from the ends of these parts, or by any other suitable means.

This clamping and straightening of the work throughout the entire length thereof is very essential in a draw cut machine employing parallel tool carrying rams for removing flash from welded seams of sheet metal work, regardless of the shape of the work, and it is also very essential in such a machine, that adequate provision be made for disposing, quickly and effectively, of all shavings, chips and small particles removed by the cutting tools, and in a manner to insure that none of the finer particles can possibly work in between the bearing surfaces of the rams or into other parts of the mechanism.

Obviously changes may be made in the construction, arrangement and combination of parts within the scope of the appended claims, such changes being contemplated, and I do not, therefore, limit myself to the particular construction shown.

Having thus fully described my invention, what I claim is:—

1. A machine of the character described including a supporting structure providing a way, a tool carrying member of extended length reciprocable in said way and formed with a series of openings throughout its length transversely thereof, a tool carried by said member, a pair of members to engage the work along the entire length of the path of travel of said tool and at opposite sides thereof, said members projecting over the sides of said way and upper side of said tool carrying members therein, and forming between them a groove to receive material removed from the work by said tool and into which groove said openings in said tool carrying member open, said groove and openings being positioned ahead of said tool in the direction of its working stroke to conduct away said material, and means for reciprocating said tool carrying member.

2. A machine of the character described including a supporting structure providing ways, tool carrying members reciprocable in said ways with their adjacent sides spaced apart to receive work therebetween, tools carried by said members to engage opposite sides of the work, members to engage the work at opposite sides of the paths of travel of said tools throughout the length of said paths, said members projecting over the openings of said ways between the sides thereof and said tool carrying members and forming grooves between the adjacent sides of said members, grooves to receive material removed from the work by said tools and exclude the same from said way, and means for reciprocating said tool carrying members.

3. A machine of the character described including a supporting structure providing horizontally extending parallel ways, tool carrying members longitudinally reciprocable in said ways with their adjacent sides spaced apart to receive work therebetween, tools carried by said members, a member supported within the space between said members beyond the end of the work therein to cover the portion of the lower tool carrying member beyond the work and prevent particles removed from the work from getting in between the bearing surfaces of said way and member, and means for reciprocating said tool carrying members.

4. A machine of the character described including a supporting structure providing parallel, horizontally disposed ways, a pair of tool carrying rams reciprocable in said ways with their adjacent sides spaced apart to receive work therebetween having a welded seam, tools carried by said rams for removing flash from the upper and lower sides of said seam, means to engage the work at the upper and lower sides thereof adjacent said seam throughout the length thereof and forming grooves into which said tools extend, said lower ram having a longitudinal groove in its upper side opposite the groove formed by said work engaging means and openings through said ram opening into said groove, a trough within the space between said rams beyond the end of the work and open at its bottom into said groove

in said lower ram to conduct away material removed from the work by said tools, and means for reciprocating said rams.

5. A machine for removing the flash from a welded seam of sheet metal work and including a supporting structure having a way, spaced apart longitudinally reciprocable parallel tool carrying rams, a series of tools carried by each of said rams one reciprocable in said way for successively removing flash, the tools carried by one ram being in staggered relation to those of the other ram, spaced apart members for supporting work at one side thereof between said rams throughout the length of its seam and forming a channel therebetween throughout the length of said ways, a movable carrier to engage the other side of the work throughout the length of its seam and having a way within which one of said rams is reciprocable, means for moving said carrier toward said work supporting member to clamp the work therebetween and to move said ram carried thereby, toward and from the other ram, and means for reciprocating said rams.

6. In a machine for removing the flash from a welded seam, the combination of a supporting structure providing a way and a work support, a ram reciprocable in said way, a movable carrier providing a way, a second ram reciprocable in said way of said carrier, tools carried by said rams, means for moving said carrier toward said work support including a shaft above and extending longitudinally of said carrier, cams on said shaft and means connecting said carrier and cams and embodying springs to yieldingly clamp the work between said carrier and support, and means for reciprocating said rams.

7. In a machine for removing flash from a welded seam, the combination of a supporting structure providing a horizontal way and work supporting members extending along said way and forming a longitudinal channel, a ram reciprocable in said way and formed with a series of openings therethrough opening through the upper side thereof along its length into said channel formed by said members, a horizontal carrier above and coextensive with said ram and provided with a longitudinal way in its lower side and a longitudinal channel above said way, an upper ram reciprocable in said way of said carrier and provided with openings open at one end into said channel and at their other end through the lower side of said ram, clamping means on said carrier to engage the work throughout the length of the seam of the work to oppose said work supporting members and forming a longitudinal groove into which said openings in said ram open, tools carried by said rams, means for moving said carrier toward said work support to clamp the work between its support and said means on said carrier and to move said upper ram toward and from the work, and means for simultaneously reciprocating said rams.

8. In a machine for removing flash from a welded seam, the combination of a supporting structure providing a horizontal way and a work support extending along said way, a lower ram reciprocable in said way and formed with a series of openings therethrough opening through the upper and lower side thereof along its length, a horizontal carrier above and coextensive with said ram and provided with a longitudinal way in its lower side, an upper ram reciprocable in said way of said carrier and provided with openings opening through the upper and lower sides of said ram, parallel spaced apart clamping members on said carrier to engage the work at opposite sides of the seam thereof throughout the length of the seam and forming a channel to receive material removed from the work and into which said openings open, a tool carried by said upper ram and projecting into said channel between said clamping members to remove flash from the upper side of the seam, a tool carried by the lower ram to remove flash from the lower side of the seam, the removed material escaping through said openings in said ram, means for moving said carrier toward and from said work support, and means for reciprocating said rams.

9. In a machine for removing flash from a welded seam, the combination of a supporting structure providing a horizontally extending way, a lower ram reciprocable in said way and having openings extending vertically therethrough, spaced apart members on said structure forming a groove therebetween and extending along said way and projecting over said ram to support work adjacent opposite sides of the seam throughout its length, a tool on said ram projecting into the space between said supporting members to remove flash from the lower side of the seam, a carrier guided in said structure above the work and formed with a horizontal way, an upper ram reciprocable in said way, spaced apart clamping members on said carrier to engage the work along opposite sides of the seam adjacent thereto throughout the length thereof and forming a longitudinal groove therebetween, a tool on said upper ram projecting into said groove, for removing flash from the upper side of said seam, abutment members for the work at the ends of said clamping members, a trough between said rams beyond said abutments to receive material removed by the tool on the upper ram and discharge it into the openings in the lower ram, means for moving said carrier to bring said clamping members into clamping engagement with the work and to move said upper ram laterally toward and from the lower ram, and means for reciprocating said rams.

10. In a machine for the purpose described, the combination of a lower housing formed with a horizontal way extending throughout the length thereof, a lower ram reciprocable in said way and provided with a cutting tool, an upper housing secured throughout a portion of its length to said lower housing and spaced therefrom throughout the remaining portion, a ram carrier guided in said upper housing for movement toward and from said lower ram and formed with a longitudinal way in its lower side, an upper ram reciprocable in said way in said carrier and provided with a cutting tool, each of said rams being formed with rack teeth along one side thereof, a vertical drive shaft mounted in bearings in said housing and provided with gears engaging said rack teeth of said rams, the gear in engagement with the teeth of said upper ram being elongated to provide for upward movement of said ram with said carrier, means for rotating said drive shaft, said housings providing a closed chamber in which said means and gears are enclosed, a cam shaft mounted in bearings in the upper part of said upper housing and extending longitudinally of said carrier and provided with cams, means embracing said cams and connected to said carrier and embodying yieldable means, and means for rotating said cam shaft.

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