June 16, 1964 L. P. CONOVER 3,137,105

EDGE CLEANER

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Fig. 1.

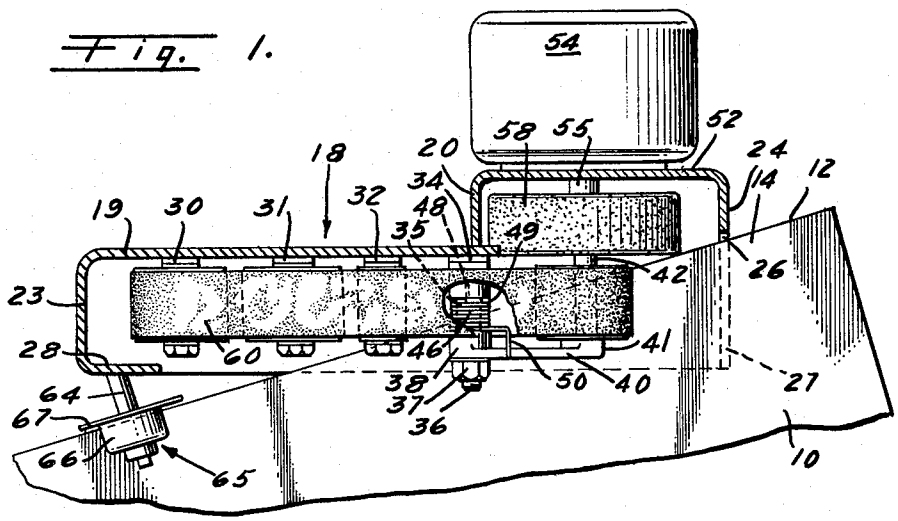
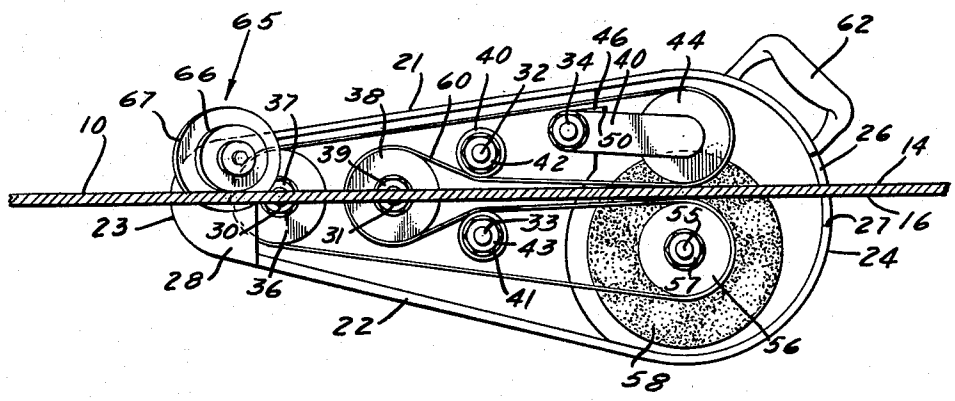


Fig. 2.



Loren Paul Conover,
INVENTOR.
WHANN & McMANIGAL
Attorneys for Applicant
by

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Fig. 3.

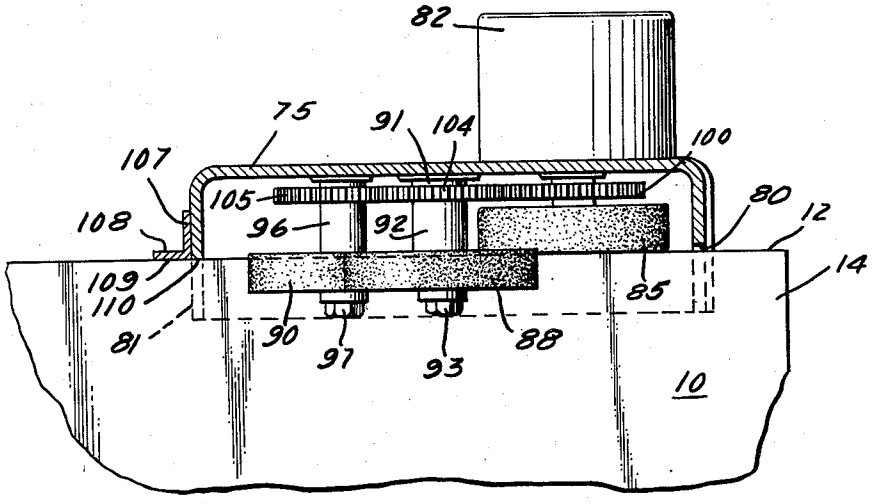
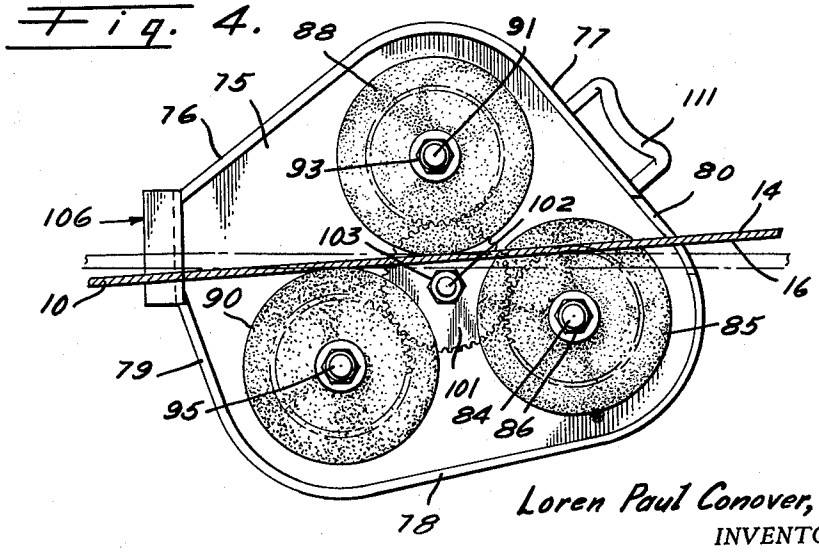


Fig. 4.



Loren Paul Conover,
INVENTOR.

WHANN & McMANIGAL
Attorneys for Applicant

by

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EDGE CLEANER

Loren Paul Conover, Glendora, Calif., assignor to Vinnell Steel, Irwindale, Calif., a corporation of California

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12 Claims. (Cl. 51—170)

This invention relates generally to surface cleaning apparatus and relates more particularly to apparatus for cleaning the opposite marginal surface portions of sheet metal and the like and the adjacent edges thereof.

While the invention has particular utility in connection with the cleaning of edges of sheet metal and the like, and the adjacent marginal surfaces, and is shown and described in such connection, it is to be understood that its utility is not confined thereto.

It is usually desirable, if not necessary, to remove surface scale and the like from parts of sheet metal to be welded in order to provide clean surfaces for the weld, and it is an object of the present invention to provide a device or apparatus for cleaning such surfaces to be welded.

It is another object of the invention to provide a device or apparatus of this character which will remove rust, grease and dirt, and the like, from the metal plates preparatory to welding.

It is still another object of the invention to provide a device of this character which will clean with one pass an edge and the marginal areas on each side of and adjacent to such edge.

It is a further object of the invention to provide a device or apparatus of this character which will reduce to a minimum the time required for cleaning such surfaces and edges.

It is a still further object of the invention to provide apparatus of this character which will eliminate the necessity of turning the material, as is required with present apparatus of which I am aware.

Another object is to embody the invention in a hand tool of this character which may be easily used by a single operator.

Still another object of the invention is to provide apparatus of this character with which the movement of the apparatus along a metal plate is easily controlled manually.

It is a further object of the invention to provide apparatus of this character that may be easily guided along the desired path.

It is a still further object of the invention to provide apparatus of this character which will automatically accommodate various plate thicknesses.

It is another object of the invention to provide apparatus of this character which will provide the proper pressure for dressing the opposite sides of the plate and adjacent edges thereof.

It is still another object of the invention to provide apparatus of this character that is relatively simple and rugged in construction.

It is a further object of the invention to provide apparatus of this character that is relatively inexpensive to manufacture.

The characteristics and advantages of the invention are further sufficiently referred to in connection with the following detailed description of the accompanying drawings, which represent certain embodiments. After considering these examples, skilled persons will understand that variations may be made without departing from the principles disclosed, and I contemplate the employment of any structures, arrangements or modes of operation that are properly within the scope of the appended claims.

Referring to the drawings, which are for illustrative purposes only:

FIG. 1 is a top plan view, partially in section, of a device or apparatus embodying the present invention;

FIG. 2 is a side view of same;

FIG. 3 is a top plan view, partially in section; of an alternative arrangement; and

FIG. 4 is a side view of the arrangement shown in FIG. 3.

Referring more particularly to FIGS. 1 and 2, there is shown a metal plate **10** having an edge **12** to be cleaned and welded. The adjacent top and bottom marginal edge portions **14** and **16**, FIG. 2, are also to be cleaned preparatory to the welding operation.

The cleaner device or apparatus comprises a housing, indicated generally at **18**, said housing having an outer side wall **19** that tapers inwardly from the rear toward the forward end. The housing has a hollow outwardly offset portion **20** at the rear and there are top and bottom walls **21** and **22**, a front end wall **23**, and a rear end wall **24**, which extend laterally at an angle normal to the wall **10** and in a direction opposite the housing part or portion **20**. The rear wall **24** is rounded and is provided with a notch **26** which extends from the inner or free edge **27** thereof to accommodate the adjacent edge portion of the piece of sheet metal **10**. It is to be noted that the inner side of the housing **18** is open except for the forward end portion which is closed by a short wall **28** which extends from the front wall **23** in parallel relationship to the outer side wall **19**.

There are a plurality of short shafts **30**, **31**, **32**, **33** and **34** having their outer ends secured by any suitable means to the wall **19**. Said shafts may be welded to the wall **19** or may have threaded outer end portions threadably received in tapped bores in the wall **19**, or said shafts may be otherwise secured to the wall **19**.

Shafts **30** and **31** are aligned longitudinally relative to the device and are spaced longitudinally apart. Shafts **32** and **33** are spaced rearwardly of the shaft **31** and are offset above and below a plane passing through the axes of said shafts **30** and **31**. Shaft **34** is spaced rearwardly of shaft **32** and somewhat above same, all of said shafts **30**, **31**, **32**, **33** and **34** having their axes in parallel relationship to each other.

A roller **36** is rotatably mounted on the shaft **30** and may have roller bearings, ball bearings, or any other suitable anti-friction arrangement relative to the shaft **30**.

Any suitable means may be used to operably secure the roller **36** on the shaft **30**, a nut **37** being shown as such retaining means. A roller **38** is operably mounted on the shaft **31** in a manner similar to the mounting of the roller **36** on shaft **30**, and a nut **39** secures the roller **38** on shaft **31**.

Shafts **32** and **33** are provided with rollers **40** and **41**, respectively, which are operably mounted thereon by any suitable means, and retained thereon by nuts **42** and **43**, respectively. The rollers **36** and **38** are of substantially the same diameter and rollers **40** and **41** are of substantially the same diameter but are of smaller diameter than the rollers **36** and **38**. Rollers **40** and **41** are spaced apart a greater distance than the thickness of the sheet to be cleaned.

Shaft **34** has a reduced diameter portion **35** from which a further reduced diameter portion **36** extends, the latter being externally threaded for reception of a nut **37**. On the reduced diameter portion **36** there is a collar **38** having an arm **40** which extends rearwardly from said collar and adjacent the open side of the housing. At the free end of the arm **40** there is an end part **41** from which a shaft **42** extends toward the outer side of the device and in parallel relationship to the shafts hereinabove described.

A roller 44 is rotatably mounted on the shaft 42 and is secured by any suitable well known means, not shown.

On the reduced diameter portion 35 there is a coil spring 46 having an end portion 48 projecting axially of said spring and received in a recess provided therefor in the adjacent shoulder 49 of the shaft 34. The opposite end of the spring 46 has a tangentially extending part with a lateral end portion 50 engaging the upper side of the arm 40, the spring being so arranged as to urge the arm 40 in a clockwise direction as viewed in FIG. 2.

To the outer side of the wall 52 of the housing portion 20, an electric motor 54 is secured by any suitable means, such as bolts or the like, not shown. The motor shaft 55 extends inwardly of the housing portion 20 and has a roller or pulley 56 secured thereon adjacent the inner free end by any suitable means, such as a nut 57, or the like. It is to be understood that the pulley 56 is secured against rotation of the shaft 55, said pulley or roller 56 comprising the driving pulley or roller. Between the pulley 56 and the wall 52 there is disposed within the housing portion 20 a grinding wheel 58 which is likewise secured to the shaft 55 for rotation therewith. The grinding wheel 58 may be secured to shaft 55 by any suitable means such as, for example, nuts on threaded portions of the shaft 55 at opposite sides of said grinding wheel 58, such attaching means not being shown.

It is to be noted that the rollers or pulleys 36, 38, 40, 41 and 56 are in operable alignment and on said rollers or pulleys is disposed an abrasive belt 60. The belt 60 passes about the driving pulley or roller 56 and at the bottom of said roller or pulley the belt extends forwardly and passes around the roller 36 and thence rearwardly and about the roller or pulley 44. The adjacent portions of the belt 60 extend forwardly from the adjacent parts of the rollers or pulleys 44 and 56 and about the roller 38.

Rollers 40 and 41 are so spaced with respect to each other and the roller 38 as to be operably engaged by the belt and space the adjacent parts of the belt closer together than the diameter of the roller 38.

A handle 62 is secured to the housing by any suitable well known means and there may be provided adjacent thereto a control switch, not shown, for the electric motor 54.

At the forward end of the device there is a shaft 64 which is inclined rearwardly and on the free end portion of which there is operably mounted a support and guide member, indicated generally at 65. The guide member 65 comprises a roller 66 rotatably mounted on the shaft 64 in any suitable well known manner and at the outer side of said roller there is a radially extending annular flange 67. The angularity of the shaft and the flange 67 is such that the inner side of the flange 67 will engage the plate edge to be cleaned and thereby provide a guide means for the forward end of the device. The roller portion 66 rests on the top surface of the plate 10 and helps support the forward end of the device as it is moved along the edge to be cleaned, as edge 12 for example.

The edge portion of the plate 10 to be cleaned extends into the notch 26 and the edge 12 is engaged by an inner peripheral edge portion of the abrasive wheel 58 which grinds the edge 12 and removes scale, dirt, grease and any other form of material thereon, thereby providing a clean surface for the weld.

As viewed in FIG. 2 the edge portion of the plate 10 adjacent the edge 12 extends between the rollers 44 and 56 and spring 46 urges the arm 40 in a clockwise direction to provide proper pressure of the rollers 44 and 56 relative to the plate 10, it being noted that the adjacent portions of the belt 60 are interposed between the respective top and bottom marginal edge portions to be cleaned. The facing surfaces of the belt 60 which engage the marginal edge portions 14 and 16 of the plate

10 carry the abrasive material and it will be apparent that not only the edge 12 is thoroughly cleaned but simultaneously the adjacent marginal edge portions 14 and 16 are thoroughly cleaned, the belt being driven by the roller or pulley 56.

It will be apparent from the foregoing that an edge and adjacent, opposite marginal edge portions of a plate, may be cleaned with one pass, the device being readily handled by a single operator.

Referring to FIGS. 3 and 4, the alternative arrangement disclosed therein also simultaneously cleans the edge 12 of a sheet of metal 10 and the adjacent marginal edge portions 14 and 16 on opposite sides of said sheet.

In the embodiment of FIGS. 3 and 4 there is a hollow housing having an outer wall 75 and a marginal flange at right angles to the wall 75 and turned in the same direction to provide an upper front wall 76, a rear upper wall 77, a lower rear wall 78, and a lower front wall 79, the various adjacent end portions of the walls 76, 77, 78 and 79 are connected together by arcuate portions. At the front of the housing there is a relatively wide notch 80 extending inwardly of the free edge of the wall 77 and at the opposite side of the housing there is a notch 81, said notches being for reception of edge portions of the sheets of material being cleaned.

Adjacent the rear of the housing there is an electric motor 82 attached to the outer side of the wall 75, said motor having a shaft 84 which extends into the housing. On shaft 84 there is secured a grinding wheel 85. The grinding wheel 85 is secured on the shaft by any suitable well known means, a nut 86 being shown as the securing means. It is to be noted that the free face of the grinding disc 85 is in a plane spaced outwardly of the plane of the inner ends of the notches 81, to thereby be effective for grinding the edge of a piece of sheet material disposed within said notches. It is also to be noted that the axis of the grinding wheel 85 is below the notches 80 and 81 and the grinding wheel is of such diameter as to extend upwardly to a position for effective contact with the edge 12.

Means for cleaning the upper and lower marginal edge portions adjacent the edge 12 are provided and comprise grinding wheels 88 and 90.

There is a shaft 91 for operable supporting the grinding wheel 88, said shaft being secured to the outer wall 75 by any suitable means, such as welding or the like. Shaft 91 may, alternatively, be secured to wall 75 by providing a tapped opening in said wall 75 and having an external thread on the outer end portion of said shaft 91 which end portion is screwed into the tapped opening.

Grinding wheel 88 has a hub 92 which has an axial bore therethrough for reception of the shaft 91 and said grinding wheel is secured on said shaft by means of a nut 93 or by any other suitable well known means.

Grinding wheel 90 is similarly supported on a shaft 95 secured to the outer wall 75 of the housing in any suitable well known means, such as described hereinabove in connection with shaft 91. Grinding wheel 90 is also provided with a hub, indicated at 96, having an axial bore in which the shaft 95 is received. The grinding wheel 90 is secured on shaft 95 by any suitable well known means, a nut 97 being shown as the securing means.

Motor shaft 84 has secured thereto a gear 100 which meshes with a gear 101 operably mounted on a shaft 102 having its outer end secured to the wall 75 in any well known manner, including the means described hereinabove in connection with the shafts 91 and 95. Gear 101 is retained on the shaft 102 by any suitable means, such as, for example, the nut 103. Secured to hub 92 of grinding wheel 88 is a gear 104 and secured to the hub 96 of grinding wheel 90 is a gear 105. Gears 104 and 105 are secured to the hubs 92 and 96, respectively,

by any suitable well known means such as a key, press fit, weld, or the like. Gears **104** and **105** are meshed with the gear **101** so that operation of the motor will effect rotation of the gears **104** and **105**, and hence the grinding wheels **88** and **90**, through the gear **101**.

The axis of grinding wheel **88** is disposed above and forwardly of the axis of the grinding wheel **85** and the axis of grinding wheel **90** is forwardly of the axis of the grinding wheel **88** and below same, as best shown in FIG. 4.

At the forward end of the housing and adjacent the junction of the walls **76** and **79** thereof there is a stop, indicated generally at **106**, said stop being an angle iron having a side **107** secured to the housing by any suitable means such as, for example, welding brazing, or the like. The other side **108** of the stop **106** extending forwardly at right angles to the side **107** with the face **109** of the side **108** at right angles to the direction of movement of the device and aligned with the inner end **110** of the notch **81**. The device is provided with a handle **111** and, using the device, it is placed on the edge portion of the sheet to be welded with the edge portion of said sheet disposed in the notches **80** and **81**.

In placing the device on the sheet it is initially positioned so that the edge portion of the sheet within the notch **80** is disposed adjacent the lower end of said notch and the side **108** of the stop **106** is disposed against the edge **12**. By thus positioning the device, the sheet will be readily received fully into the notch **81** and in abutment with the upper portion of the grinding wheel **85**, the plate being in the position shown in dotted lines in FIG. 4. By lowering the rear end of the device to the position shown in FIG. 4, the periphery of the grinding wheel **88** will operate on the marginal edge portion **14** and the periphery of the grinding wheel **90** will operate on the opposite marginal edge portion **16**. Thus, the edge **12** is cleaned by the grinding wheel **85** and the upper and lower marginal edge portions adjacent the edge **12** will be cleaned respectively by the grinding wheels **88** and **90**. A single path suffices to clean the edge **12** and the marginal portions **14** and **16**.

Control of the motor in the respective embodiments of the invention may be by a suitable electric switch, not shown, positioned adjacent the handle **52** in FIG. 2 and **111** in FIG. 4. It is to be understood of course that other power means may be used, such as an air motor, for example.

The invention and many of its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the form, construction and arrangement of the parts of the invention without departing from the spirit and scope thereof or sacrificing its material advantages, the embodiments hereinbefore described being merely for purposes of illustration.

I claim:

1. A device for cleaning the edges of sheet metal and the like, said device being adapted to be slipped laterally onto edge portions of the sheet to be cleaned, comprising: a hollow housing including an outer wall and front and rear walls, said housing being open at one side, there being a sheet receiving notch in said rear wall substantially wider than the thickness of a sheet of material to be cleaned; guide means at the front end of the housing and engageable with the adjacent edge of said sheet; power means secured to the housing adjacent the rear end thereof; said power means having a rotatable shaft extending into the housing; a grinding wheel attached to said shaft and rotatable therewith, said grinding wheel being so positioned as to grind the adjacent edge of a sheet of metal disposed in said notch and operably positioned by the guide means at the front of the housing, and abrasive means simultaneously engaging opposite sides of the sheet of material adjacent the edge ground by the abrasive wheel for cleaning by abrasive action the marginal edge portions along and adjacent to the edge engaged by the grinding wheel when said apparatus is moved along said edge of said sheet of material.

2. In a device for simultaneously cleaning edge and marginal edge portions of sheets of material: a frame; and three grinding wheels mounted on parallel shafts secured to the frame, one of said grinding wheels being positioned to grind the edge of the sheet of material, the other grinding wheels being opposed for grinding opposite marginal edge portions adjacent the edge ground by the edge grinding wheel, said other wheels having a fixed center distance and arranged so that rotation of the frame adjusts to the thickness of a sheet of material being operated upon.

3. In a hand tool device for cleaning edge portions of sheet metal and the like: a housing; and three abrasive elements operably mounted in said housing, one of said elements being positioned for cleaning an edge of said material, the other elements being in opposed relationship for cleaning opposite edge portions adjacent said edge, said other elements being operably positioned so that the device may be slipped laterally onto the edge of material to be cleaned.

4. The invention defined by claim 3 wherein there is a yielding means urging one of the opposed elements toward the other.

5. The invention defined by claim 3 wherein the housing may be rotated to adjust to the thickness of a sheet of material being operated upon.

6. A device for cleaning the edges of sheet metal and the like, comprising: a hollow housing including an outer wall and front and rear walls, said housing being open at one side, there being a sheet receiving notch in said rear wall substantially wider than the thickness of a sheet of material to be cleaned; guide means at the front end of the housing and engageable with the adjacent edge of said sheet; power means secured to the housing adjacent the rear end thereof; said power means having a rotatable shaft extending into the housing; a grinding wheel attached to said shaft and rotatable therewith, said grinding wheel being so positioned as to grind the adjacent edge of a sheet of metal disposed in said notch and operably positioned by the guide means at the front of the housing, and abrasive means simultaneously engaging opposite sides of the sheet of material adjacent the edge ground by the abrasive wheel for cleaning by abrasive action the marginal edge portions along and adjacent to the edge engaged by the grinding wheel when said apparatus is moved along said edge of said sheet of material, said abrasive means comprising an endless belt having abrasive material on one side, a pulley attached to the shaft of the power means; a second pulley disposed above the first mentioned pulley; means pivotally connecting the second pulley to the housing for pivotal movement toward and away from the first mentioned pulley; a third pulley rotatably mounted on a shaft attached to the housing adjacent the forward end thereof; a fourth pulley rotatably mounted on a shaft attached to the housing, said fourth pulley being spaced rearwardly of the third pulley; and a pair of vertically spaced pulleys each rotatably mounted on a shaft attached to the housing, said pair of pulleys being spaced rearwardly of the third pulley and spaced apart a distance less than the diameter of the third pulley, said belt being disposed on the first mentioned pulley, second pulley, third pulley and fourth pulley, so that the abrasive surface thereof, as the belt passes over the first and second pulleys, are facing each other, so that abrasive contact of the upper and lower marginal edge portions of the sheet is effected.

7. The invention defined by claim 6, wherein the second roller is yieldingly urged toward the first mentioned roller.

8. A hand tool for cleaning the edges of sheet metal and the like, comprising: a hollow housing including an outer wall and front and rear walls, said housing being

open at one side, there being a sheet receiving notch in said rear walls substantially wider than the thickness of the sheet of material to be cleaned; quide means at the front end of the housing comprising a shaft inclined rearwardly, and a rotatable guide element comprising a roller adapted to roll on the upper marginal edge portion of the sheet to support the front end of the device, and a flange at the outer end of the roller engageable with the adjacent edge of the sheet for positioning the front end of the device at an angle whereby said device may be operably moved along the edge portion of a sheet being cleaned; power means secured to the housing adjacent the rear end thereof; said power means having a rotatable shaft extending into the housing; a grinding wheel attached to said shaft and rotatable therewith, said grinding wheel being so positioned as to grind the adjacent edge of a sheet of metal disposed in said notch and operably positioned by the guide means at the front of the housing; and abrasive means simultaneously engaging opposite sides of the sheet of material adjacent the edge ground by the abrasive wheel for cleaning by abrasive action the marginal edge portions along and adjacent to the edge engaged by the grinding wheel when said apparatus is moved along said edge of said sheet of material.

9. A hand tool for cleaning the edges of sheet metal and the like, comprising: a hollow housing including an outer wall and front and rear walls, said housing being open at one side, there being a sheet receiving notch in said rear wall substantially wider than the thickness of a sheet of material to be cleaned; guide means at the front end of the housing and engageable with the adjacent edge of said sheet; power means secured to the housing adjacent the rear end thereof; said power means having a rotatable shaft extending into the housing; a grinding wheel attached to said shaft and rotatable therewith, said grinding wheel being so positioned as to grind the adjacent edge of a sheet of metal disposed in said notch and operably positioned by the guide means at the front of the housing, abrasive means simultaneously engaging opposite sides of the sheet of material adjacent the edge ground by the abrasive wheel for cleaning by abrasive action the marginal edge portions along and adjacent to the edge engaged by the grinding wheel when said apparatus is moved along said edge of said sheet of material, said abrasive means comprising a belt having an abrasive surface; means for operably mounting said belt in the housing, said means comprising a pair of rollers spaced apart vertically; and means yieldingly urging one of said rollers toward the other roller.

10. A hand tool adapted to be moved laterally onto an edge portion of a sheet of metal for cleaning the edges thereof, comprising: a hollow housing including an outer wall and front and rear walls, said housing being open at one side, there being a sheet receiving notch in said rear wall substantially wider than the thickness of a sheet of material to be cleaned; guide means at the front end of the housing and engageable with the adjacent edge of said sheet; power means secured to the housing adjacent the rear end thereof; said power means having a rotatable shaft extending into the housing; a grinding wheel attached to said shaft and rotatable therewith, said grinding wheel being so positioned as to grind the adjacent edge of a sheet of metal disposed in said notch and operably positioned by the guide means at the front of the housing, abrasive means simultaneously engaging opposite sides of the sheet of material adjacent the edge ground by the abrasive wheel for cleaning by abrasive action the marginal edge portions along and adjacent to the edge engaged by the grinding wheel when said apparatus is moved along said edge of said sheet of material, said abrasive means comprising a pair of grinding wheels rotatably mounted in the housing and arranged in substantially the same plane relative to each other, one of said grinding wheels being displaced rearwardly relative to the other, the peripheries of said grinding wheels being engageable simultaneously with opposite marginal edge portions along the edge cleaned by the first mentioned grinding wheel; and means connecting said grinding wheels together for operation by the power means.

11. A hand tool for cleaning the edges of sheet metal and the like, comprising: a hollow housing including an outer wall and front and rear walls, said housing being open at one side, there being a sheet receiving notch in said rear wall substantially wider than the thickness of a sheet of material to be cleaned; guide means at the front end of the housing and engageable with the adjacent edge of said sheet; power means secured to the housing adjacent the rear end thereof; said power means having a rotatable shaft extending into the housing; a grinding wheel attached to said shaft and rotatable therewith, said grinding wheel being so positioned as to grind the adjacent edge of a sheet of metal disposed in said notch and operably positioned by the guide means at the front of the housing, abrasive means simultaneously engaging opposite sides of the sheet of material adjacent the edge ground by the abrasive wheel for cleaning by abrasive action the marginal edge portions along and adjacent to the edge engaged by the grinding wheel when said apparatus is moved along said edge of said sheet of material; and means for maintaining operable contact by said abrasive means with said marginal edge portions at opposite sides of the sheet adjacent the edge being cleaned.

12. A device for cleaning the edges of sheet metal and the like, comprising: a hollow housing including an outer wall and front and rear walls, said housing being open at one side, there being a sheet receiving notch in said rear wall substantially wider than the thickness of a sheet of material to be cleaned; guide means at the front end of the housing and engageable with the adjacent edge of said sheet; power means secured to the housing adjacent the rear end thereof; said power means having a rotatable shaft extending into the housing; a grinding wheel attached to said shaft and rotatable therewith, said grinding wheel being so positioned as to grind the adjacent edge of a sheet of metal disposed in said notch and operably positioned by the guide means at the front of the housing, abrasive means simultaneously engaging opposite sides of the sheet of material adjacent the edge ground by the abrasive wheel for cleaning by abrasive action the marginal edge portions along and adjacent to the edge engaged by the grinding wheel when said apparatus is moved along said edge of said sheet of material; and means yieldingly urging the abrasive means into operative contact with said marginal edge portions.

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