April 14, 1942. F. J. WOOD 2,279,608

BRUSHING APPARATUS

Filed March 31, 1938 4 Sheets-Sheet 1

Fig. 1

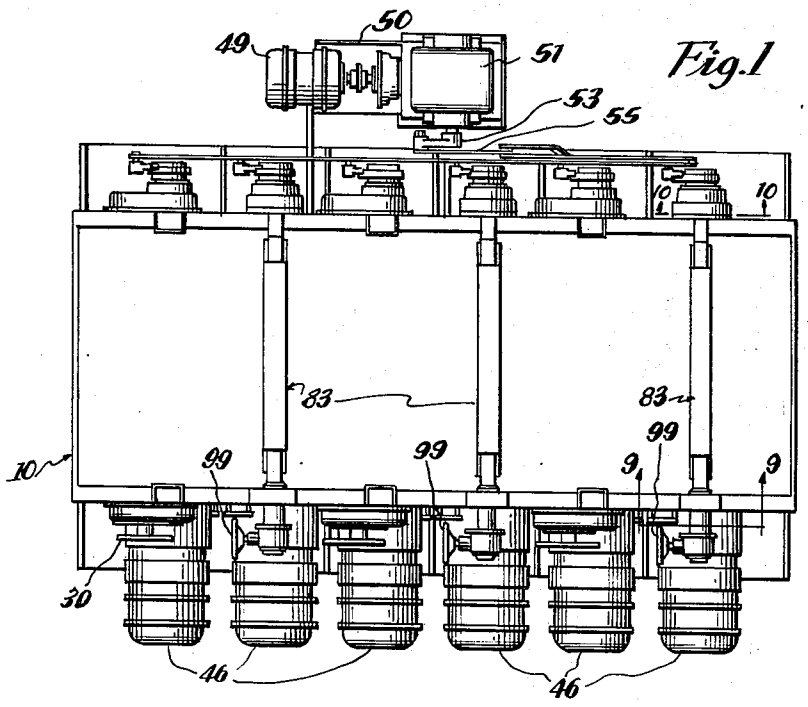
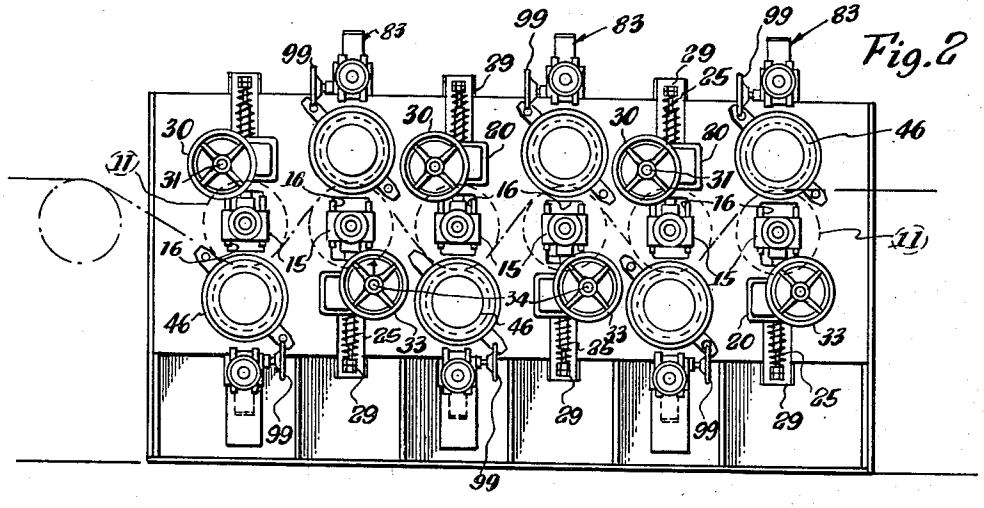


Fig. 2



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BRUSHING APPARATUS

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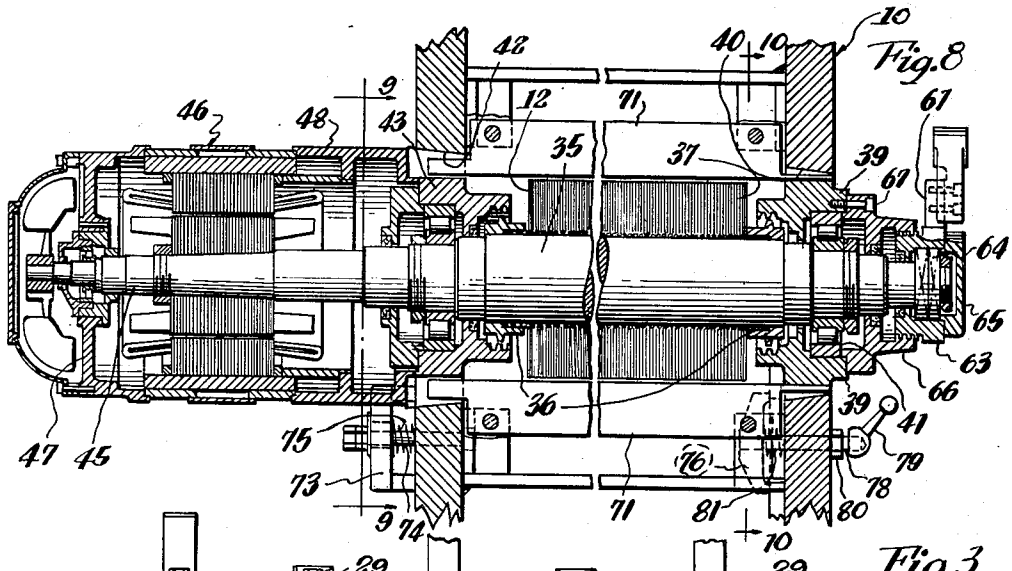

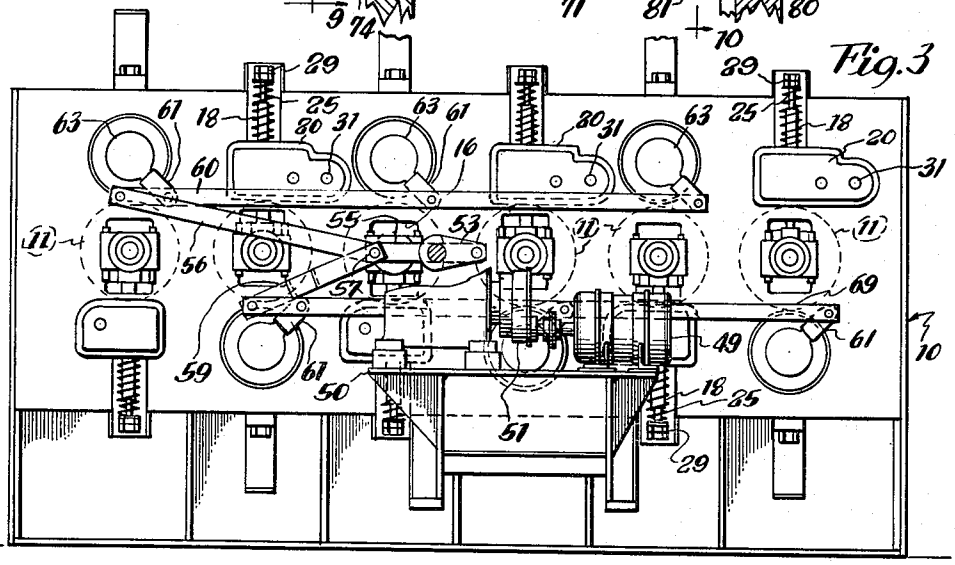

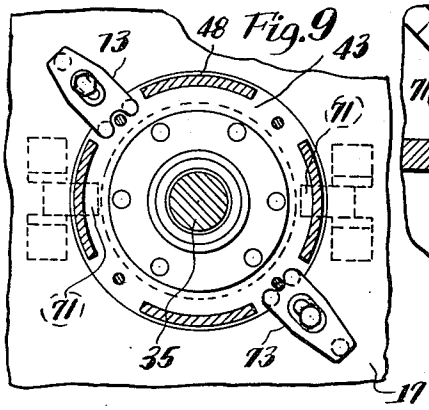

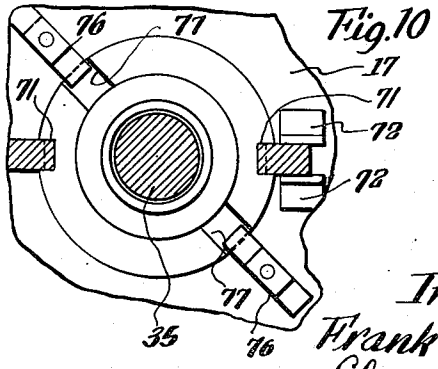

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BRUSHING APPARATUS

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Fig. 4

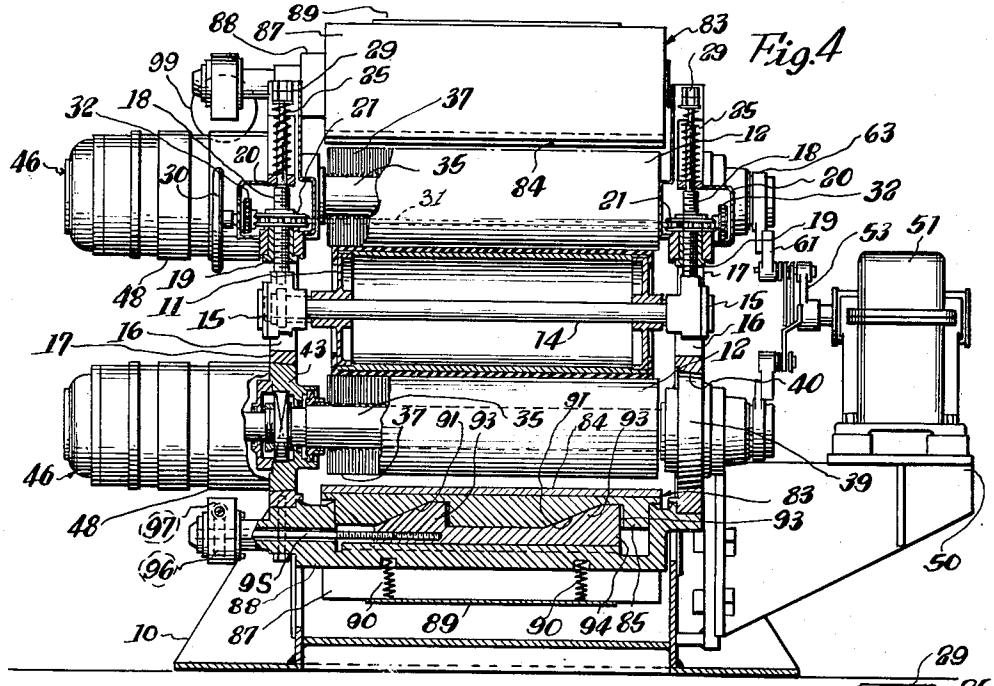


Fig. 5

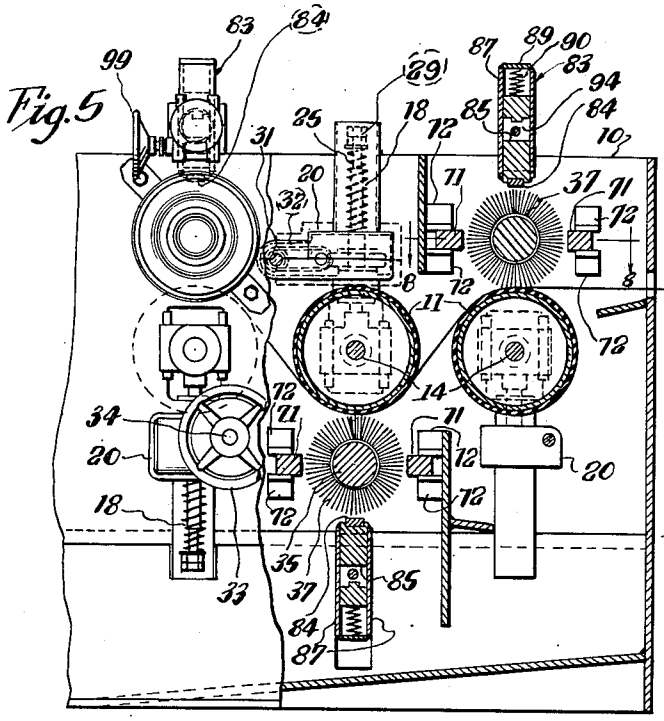


Fig. 6

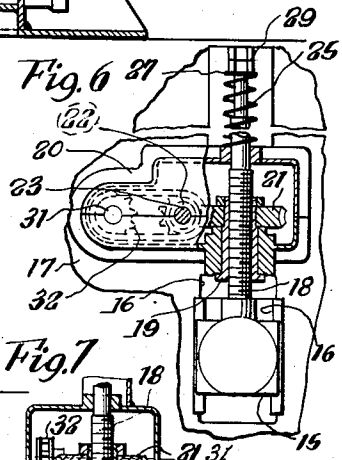
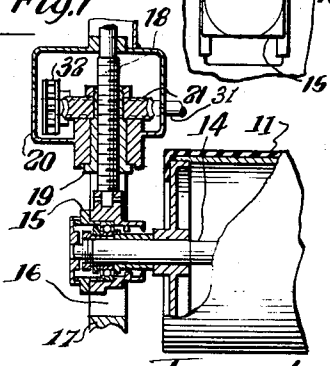


Fig. 7



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BRUSHING APPARATUS

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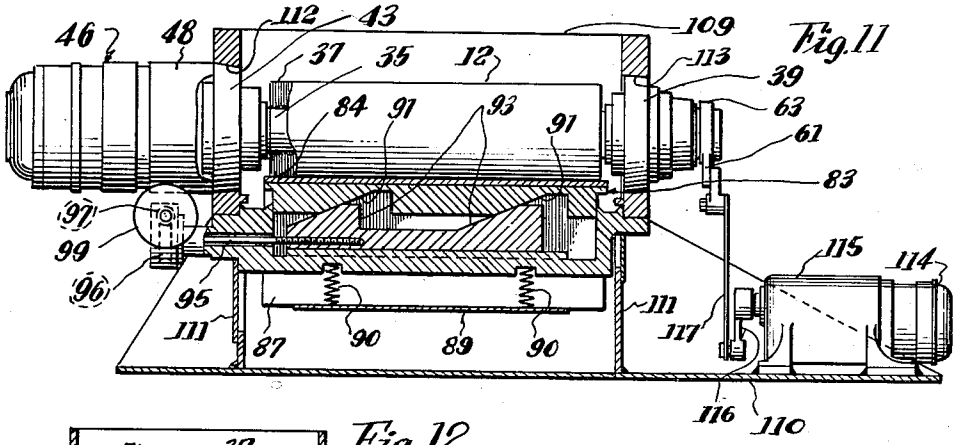

Fig. 11

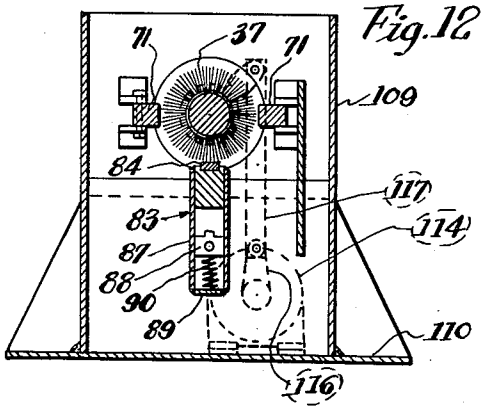

Fig. 12

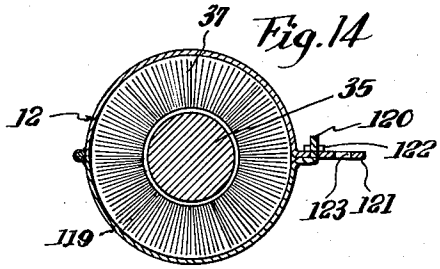

Fig. 14

Fig. 13

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UNITED STATES PATENT OFFICE

2,279,608

BRUSHING APPARATUS

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Application March 31, 1938, Serial No. 199,306

5 Claims. (Cl. 15—77)

This invention relates to improvements in brushing apparatus and more particularly relates to improvements in a wire brushing apparatus for putting a finish on both sides of continuous strips of sheet metal.

The principal object of my invention is to provide a new and improved wire brushing apparatus of the class described arranged to permit brushing of the metal to precision limits and to permit ready accessibility and removal of the parts of the apparatus.

Another object of my invention is to so arrange the apparatus that the means supporting the metal during brushing is adjustable to adjust the degree of brushing of the metal.

Another object of my invention is to provide a rotatable wire brush assembly and drive therefor so arranged that the brushes may readily be removed from or inserted into the apparatus as a unit without danger of damage thereto.

Another object of my invention is to provide a novel form of casing for the brushes to enclose the brushes and form a means whereby they may be lifted when out of the apparatus to permit their insertion or removal from the apparatus without danger of damage to the brushes.

Still another object of my invention is to provide a honing stand for grinding the brushes separate from the machine and to so arrange the brush assembly that the brushes may be ground separately from the machine on the same centers about which they rotate while in the machine.

Other objects of my invention will appear from time to time as the following specification proceeds.

My invention may be more clearly understood with reference to the accompanying drawings wherein:

Figure 1 is a top plan view of a brushing apparatus constructed in accordance with my invention;

Figure 2 is a side elevation of the apparatus shown in Figure 1;

Figure 3 is an enlarged side elevation of the apparatus shown in Figure 1, showing the opposite side of the machine than is shown in Figure 2;

Figure 4 is an enlarged transverse sectional view taken through the apparatus in order to show certain details of construction thereof;

Figure 5 is an enlarged fragmentary side elevation of a portion of the apparatus with certain parts broken away and certain other parts shown in substantially longitudinal section;

Figure 6 is an enlarged detail side view of the adjusting means for the supporting rollers for the metal, with certain parts shown in longitudinal section in order to show certain details of construction thereof;

Figure 7 is a detail view of the adjusting means for the rollers, drawn to the same scale as Figure 6, showing certain parts thereof in transverse section;

Figure 8 is an enlarged fragmentary transverse sectional view taken substantially along line 8—8 of Figure 5;

Figure 9 is an enlarged fragmentary sectional view taken substantially along line 9—9 of Figure 1;

Figure 10 is an enlarged fragmentary sectional view taken substantially along line 10—10 of Fig. ure 1;

Figure 11 is a transverse sectional view showing the brush mounted in a honing stand separate from the apparatus;

Figure 12 is an end view of the brush mounted in a honing stand, with parts shown in substantially longitudinal section;

Figure 13 is a transverse sectional view illustrating the means for inserting the brush in a honing stand; and

Figure 14 is a fragmentary sectional view taken substantially along line 14—14 of Figure 13.

Like reference characters refer to like parts throughout the various figures.

The embodiment of my invention illustrated in the drawings includes a frame 10 having a plurality of successively arranged aligned rollers 11, 11 rotatably mounted therein between opposite side walls thereof, and so arranged that the metal going through the machine alternately passes under one roller, and over the next successive roller to permit brushing of both sides of the metal. The engaging faces of said rollers are herein shown as being of a resilient material such as rubber, to prevent said rollers from damaging the metal as it passes through the machine.

Brushing of the metal is effected by means of a plurality of power driven rotary brushes 12, 12 alternately arranged along said frame so they may brush the metal as it passes over or under respective of said rollers. Said brushes are herein shown as being wire brushes mounted alternately towards the upper and lower sides of said frame so that certain of said brushes are disposed beneath the rollers having the metal passing thereunder and certain other of said brushes

are disposed above the rollers having the metal passing thereover. The sheet metal is threaded through the machine under and over alternate brushes 12, 12 through the discharge end of the machine and is pulled through the machine during operation by means outside of and separate from the machine (not shown). The means for pulling the metal through the machine may be of any type well known to those skilled in the art; such as, power driven pinch rolls engaging opposite sides of the sheet and is not herein shown or described since it is no part of my present invention.

With reference now in particular to the rollers 11, 11 and the means for adjustably mounting them in the frame 10, each of said rollers is mounted on a transverse shaft 14 which is journaled at its ends in bearing boxes 15, 15 which are slidably guided in vertically extending guides 16, 16 provided in opposite side walls 17, 17 of said frame. Since each of said rollers is of a similar construction and is mounted in the frame 10 in a similar manner, with the exception that the adjusting mechanism for the rollers disposed above the brushes 12, 12 is disposed at the upper side of said frame while the adjusting mechanism for the rollers disposed beneath the brushes 12, 12 depends from said rollers, the same part numbers will be applied to like parts of the rollers and the adjusting mechanism therefor, and the construction of the adjusting mechanism for one roller only need herein be described in detail.

A threaded member 18 is secured to each bearing box 15 and projects upwardly from the rollers having the metal trained thereunder and downwardly from the rollers having the metal trained thereover (see Figures 2, 4, 6, and 7). Said threaded member is threaded within a nut 19 herein shown as being a sleeve mounted in a housing 20, which is secured to and projects outwardly from the side wall 17 of the frame 10. Said sleeve is rotated by means of a worm gear 21 secured thereto and driven by a worm 22 on a transversely extending shaft 23. Said worm and worm gear are enclosed in the housing 20. In Figures 6 and 7, the threaded member 18 is shown as projecting above said housing and is encircled by a compression spring 25, one end of which spring abuts the upper outer side of said housing, and the opposite end of which spring abuts a collar 27. Said collar is held from upward movement with respect to said shaft by means of suitable lock nuts 29, 29. Said compression spring has as its function to take up any play which might be present between the threads of said nut and threaded member. Suitable hand wheels 30, 30 on the outer end of transverse shafts 31, 31 are provided to adjustably move the upwardly projecting threaded members 18. The shafts 31, 31 are mounted in opposite side walls 17, 17 and in the housings 20, 20 and are connected with the shafts 23, 23 on opposite sides of said frame by means of chain and sprocket drives disposed within said housings and generally indicated by reference characters 32, 32.

The depending threaded members 18 are vertically adjusted by means of hand wheels 33, 33 on the ends of transversely extending shafts 34, 34. Each of said shafts has the worms 22, 22 directly mounted thereon adjacent opposite ends thereof. The reason for the difference in arrangement of the adjusting mechanism between the rollers disposed above the brushes 12, 12 and beneath said brushes is to permit the transverse shafts 31, 31 to be offset from the respective rollers which they serve to adjust to permit all of the rollers to be lifted vertically from the frame 10.

It should be understood that the rollers 11, 11 are idler rollers only and rotate at a relatively slow rate of speed, forming a means for backing up the metal while it is being brushed by the brushes 12, 12 and forming a means for adjusting the depth of the brushing operation.

The brushes 12, 12, as herein shown, are of a usual construction and include wire bristles 37 spirally wound on a transverse shaft 35 and secured to said shaft by means of clamping members 36, 36 engaging the ends of a spiral wire from which said bristles project (see Figure 8). The transverse shaft 35 is journaled in one side frame member 17 in a bearing support member 39 on a roller bearing 41. The outer periphery of said bearing support member is of a frusto-conical formation and is adapted to engage an opening 40 of a similar formation, formed in one side wall 17. Said roller bearing is so constructed as to permit said shaft and the brush 12 to reciprocably move laterally with respect to the frame 10.

A bearing support member 43 is provided to journal the shaft 35 in the opposite side wall 17. Said bearing support member has an outer periphery of a frusto-conical formation which is adapted to engage a corresponding opening 42 formed in said respective side frame member. Said last named opening is of a larger diameter than said first named opening to permit the bearing support member 39 to pass therethrough. A roller bearing 44 is mounted in the bearing support member 43 and forms a bearing for said transverse shaft. Said roller bearing is likewise arranged to permit lateral movement of said shaft with respect to the frame 10.

A projecting end 45 of the transverse shaft 35 forms an armature shaft for a motor 46, which motor is provided to rotatably drive said brush. Said projecting end is journaled in an end plate 47 of a housing 48 for said motor to permit endwise movement with respect thereto, which housing is herein shown as being formed integral with the bearing support member 43.

The means for reciprocably moving the shafts 35, 35 and brushes 12, 12 laterally with respect to the frame 10 includes a motor 49 mounted on a bracket 50 projecting laterally from the side wall 17 opposite from the motors 46, 46 (see Figures 1 and 3). The motor 49, as herein shown, has direct connection with a speed reducer 51 for driving said speed reducer. A crank 53 is rotatably driven from said speed reducer and has a link 55 pivotally connected thereto. A link 56 is pivotally connected to said crank on a pivotal pin 57. Said link extends angularly upwardly from said link and crank and forms a means for reciprocably moving the upper brushes 12, 12 transversely of the frame 10. A link 59 is likewise pivotally connected to the link 55 on the pin 57 and extends angularly downwardly from said crank and forms a means for reciprocably moving the lower brushes 12, 12. The link 56 has pivotal connection with a link 60 which extends along the frame 10 and has a plurality of rocking arms 61, 61 pivotally connected thereto at intervals therealong.

Each arm 61, as herein shown, is secured to an externally threaded member 63 for rocking said threaded member. A bearing 64 is mounted in said threaded member and held from movement with respect thereto by means of a cap 65

in such a manner that movement of said threaded member in a lateral direction will move said bearing and the shaft 35 in a similar manner. The threaded member 63 is threaded within a member 66 which in turn is secured to the end bearing support member 39 by means of cap screws 67, 67 (see Figure 8). Thus rocking movement of the arms 61, 61 will rock the threaded members 63, 63 and cause said threaded members to move axially with respect to the members 66, 66, within which they are threaded. The pitch of the threads of said threaded members may be varied where it is desired to increase or decrease lateral movement of the brushes.

The link 59 has pivotal connection with an end of a link 69 extending longitudinally of the frame 10 and having pivotal connection with rocking arms 61, 61, for reciprocably moving the lower brushes in a manner similar to the manner in which the upper brushes are reciprocably moved. Thus as the brushes 12, 12 are rotatably driven by the respective motors 46, 46, they will be simultaneously reciprocably moved across the face of the metal to provide a more uniform brushing action on the surface of the metal and provide a more accurate means for surfacing the metal and attaining the desired finish.

With reference now in particular to the novel means for mounting the brushes 12, 12 in the frame 10 so they may readily be inserted or removed for inspection or repair without the danger of damaging the brushes while being inserted or removed from the machine, a pair of parallel spaced horizontal guide members 71, 71 are mounted at their ends in opposite sides of the apertures 40 and 42 and extend across the side frame members 17, 17 of the frame 10 (see Figures 5, 8 and 10). Each of said guide members is mounted in the frame 10 between a pair of spaced angles 72, 72 secured to and projecting inwardly from the inner sides of the side walls 17, 17.

The end bearing support member 39 is provided with a pair of oppositely disposed grooved guides which are adapted to engage the guide members 71, 71 so said guides may form a means along which said bearing support member may slide for guiding the brush as it is inserted in the frame, to permit its ready insertion, and to prevent dropping or injury to the brush during insertion or removal from the machine. The bearing support member 43 is likewise provided with a pair of oppositely disposed grooved guides adapted to have engagement with the guide members 71 for guiding said bearing support into the aperture 42 and preventing turning movement thereof.

The bearing support member 43 and motor 46 are held in position in the frame 10 by means of a pair of clamping members 73, 73 (see Figures 8 and 9) mounted on bolts 74, 74 projecting from the side frame member 17, adjacent the motor 46. Said clamping members extend within suitable openings formed in the casing 48 for the motor 46 and are adapted to engage the inner side of the bearing support member 43. A compression spring 75 encircles each bolt 74 and is interposed between the outer side of the frame 10 and the inner side of the clamping member 73 to tend to move said clamping member to a disengaged position with respect to said bearing support member. Suitable lock nuts are threaded on the ends of said rods for holding said clamping members in engagement with said bearing support member.

The bearing support member 39 is held in the opening 40 by means of clamping members 76, 76 mounted on the inner side of the side frame member 17 opposite from the motor 46, and engaging slotted guides 77, 77 formed in the inner face of said bearing support member (see Figures 8 and 10). Each of said clamping members is engaged with said bearing support member by means of a threaded rod 78 extending through the side frame member 17 and threaded in said clamping member (see Figures 8 and 10). A handle 79 is provided on the outer end of said rod, for rotating said rod, and a lock nut 80 is provided for locking said rod from rotation. A compression spring 81 is likewise interposed between the side frame member 17 and the clamping member 76 to tend to move said clamping member to a disengaged position with respect to said bearing support member upon rotation of the threaded rod 78 in a direction to release said clamping member.

Means are provided to hone the wire brushes 12, 12 and insure that the diameter thereof be uniform which as herein shown comprise hones 83, 83 (see Figure 4). Each of said hones includes a honing stone 84 formed of a suitable honing material such as an oil or carborundum stone, or any other such material. Said honing stone is mounted in and projects from an adjustable carrying member 85. Said carrying member is provided with spaced side wall members 87, 87 extending in a direction away from the honing stone and brush 12. The inner sides of said side wall members slidably engage opposite sides of a guide and support bracket 88. A connecting member 89 is provided to connect said side wall members together. Compression springs 90, 90 are interposed between said connecting member and said guide and support bracket in such a manner as to tend to move the honing stone 84 away from the respective brush 12.

The inner side of the member 85 is provided with a pair of spaced notches 91, 91 having inclined surfaces adapted to be engaged by projecting inclined surfaces 93, 93 of an adjusting member 94, which is guided between the side walls 87, 87 for lateral movement with respect to the support bracket 88. Said adjusting member has an outwardly projecting rod 95 threaded therein which has a worm gear 96 secured to its outer end. A worm 97 is meshed with said worm gear and is rotated by means of a hand wheel 99.

It will be obvious from the foregoing that rotation of said hand wheel and the rod 95 will move the adjusting member 94 laterally with respect to the frame 10 which in turn will elevate or lower the honing strone 84 by engagement of the inclined engaging surfaces 93, 93 with the corresponding inclined surfaces of the notches 91, 91 to bring said stone into engagement with the brush 12, for honing said brush.

In Figures 11 to 14, inclusive, a honing apparatus separate from the brushing machine is provided for honing the brushes 12 on the same centers as when in the machine. The details of the brush, and hone and support therefor, are the same as have hereinbefore been described, so the same part numbers will be applied to similar parts shown in these figures, as were applied in Figures 1 to 10, inclusive.

A honing stand 109 is provided which includes a base 110 and a pair of side frame members 111, 111 having frusto-conical apertures 112 and 113 formed therein for receiving the bearing support

members 39 and 43. The brush is removed from the brushing machine together with the motor 46 and said motor rotatably drives said brush during honing. Said brush is reciprocably moved during the honing operation by means of a motor 114 mounted on the base 110 and driving a speed reducer 115. A crank 116 is rotatably driven by said speed reducer and said crank reciprocates the brush by means of a link 117 having pivotal connection with the rocking arm 61. The honing stone is adjustably moved towards or away from the brush by means of the hand wheel 99. Since the brush 12 is mounted in the honing stand on the same bearing support member which supports it in the machine, it may be accurately ground in the honing apparatus, separate from the machine. With such an arrangement spare brushes may be ground and trued up and made ready to insert in the machine when necessary.

A suitable means is provided to protect the brushes 12, 12 when inserted in or removed from the frame 10 or honing stand 109, which comprises a hinged cylindrical casing 119 adapted to completely encase each brush (see Figures 13 and 14). Said casing, as shown in Figure 14, is provided with an outwardly and upwardly extending projection 120 from one side of said hinged casing which is adapted to extend through an outwardly projecting end 121 of the opposite side of said casing. A wedge 122 extending through an opening formed in the projecting end 120 and engaging the projecting end 121 of said casing is provided to lock said casing in a closed position. The projecting end 121 is provided with an opening 123 adapted to receive a hook for lifting said brush, as is best shown in Figure 13.

In removing the brush from the brushing machine or the honing stand, the clamping members 73, 73 and 76, 76 are released from the bearing support members 43 and 39 respectively, and a crane or other suitable lifting mechanism is connected to the motor 46 by means of a chain 124 passing around the underside of said motor, to hold said motor and brush in alignment with the guide members 71 during removal. The brush, together with said motor and bearing support members, is then slid out of the frame on said guide members.

When the end bearing support member 39 is at the outer end of the guide members 71, 71, but before said bearing support member is disconnected therefrom, the brush is covered by the hinged casing 119 in the hereinbefore described manner. Said casing is then closed and a chain 125 is connected to the projecting end 121 of said cover (see Figure 13). The entire brush may then be removed from the machine.

When inserting the brush in the machine or into a separate stand for honing, it is covered by the casing 119 until the guides in the end bearing support member 39 are engaged with the guide members 71, 71. The chain 125 is then disconnected from said casing and said casing is removed from the brush. The entire brush may then be slid into the machine or honing stand along the guides 71, 71.

It will be seen from the foregoing that a new and improved precision brushing apparatus has been provided for finishing continuous strips of sheet metal, that said brushing apparatus is so arranged that the brushes and their power drive units may readily be inserted or removed from the machine frame as units for inspection or repair, that the construction of the support means and their power drive units for said brushes is so arranged as to prevent damage to the brushes during insertion or removal from the frame, by providing guides for positively guiding the brushes into position and by providing a cover for the brushes upon removal from the frame, and that the brush assembly is so arranged as to permit honing or grinding of the brushes separate from the machine on the same centers about which they rotate while in the machine.

While I have herein shown and described one form in which my invention may be embodied, it will be understood that the construction thereof and the arrangement of the various parts may be altered without departing from the spirit and scope thereof. Furthermore, I do not wish to be construed as limiting myself to the specific embodiment illustrated, excepting as it may be limited in the appended claims.

I claim as my invention:

1. In a brushing apparatus for continuous strips of sheet metal, a rotatable wire brush, a frame including a pair of parallel spaced side frame members having aligned openings therein forming a support for said brush and permitting insertion or removal of said brush in an endwise direction, a shaft for said brush, a bearing on said shaft adjacent one end of said brush, another bearing on said shaft adjacent the opposite end of said brush, a pair of spaced apart guide members extending between said side frame members, adjacent said openings and having communication with said openings, said guide members forming a slidable supporting and guiding means for one of said bearing members to support said bearing member and an end of said brush between said side frame members during endwise movement into or out of said frame, to prevent damage to said brush during insertion or removal from said frame.

2. In a brushing apparatus for continuous strips of sheet metal, a rotatable wire brush, a frame including a pair of parallel spaced side frame members having aligned openings therein forming a support for said brush and permitting insertion or removal of said brush in an endwise direction, a shaft for said brush, a bearing on said shaft adjacent one end of said brush, another bearing on said shaft adjacent the opposite end of said brush, a pair of spaced apart guide members extending between said side frame members, adjacent said openings and having communication with said openings, said guide members forming a slidable supporting and guiding means for said bearing members to slidably support one of said bearing members during insertion in or removal from said frame and when between said side frame members and to guide said other bearing member into position into said other side frame member, to prevent damage to said brush during insertion or removal from said frame.

3. In a brushing apparatus for continuous strips of sheet metal, a rotatable wire brush, a frame including a pair of parallel spaced side frame members having aligned openings therein forming a support for said brush and permitting insertion or removal of said brush in an endwise direction, a shaft for said brush, a bearing on said shaft adjacent one end of said brush, another bearing on said shaft adjacent the opposite end of said brush, a pair of spaced apart guide members extending between said side frame

members, adjacent said openings and having communication with said openings, said guide members forming a slidable supporting and guiding means for said bearing members and having an inter-engaging connection with said bearing members to slidably support and guide one of said bearing members during insertion in or removal from said frame and when between said side frame members and to guide said other bearing member into position in said other side frame member, to prevent damage to said brush during insertion or removal from said frame.

4. In a precision brushing apparatus for continuous strips of sheet metal, a frame including a pair of parallel spaced side frame members having aligned openings therein, a rotatable brush including a shaft, a bearing support member adjacent one end of said shaft, a second bearing support member on said shaft and spaced from said first mentioned bearing support member, a motor connected to one of said support members, said shaft forming an armature shaft for said motor, each of said bearing support members having a pair of spaced apart guides formed in the periphery thereof, and a pair of spaced apart guide members extending across said openings and adapted to be engaged by said guides for guiding said bearing support members into their respective apertures, and guiding said brush and motor into position in said frame as a unit to permit ready insertion or removal thereof and to prevent damage to said brush during insertion or removal from said frame.

5. In a brushing apparatus for continuous strips of sheet metal, a frame including a pair of parallel spaced side frame members having aligned openings therein, a rotatable brush including a shaft, a bearing support member adjacent one end of said brush having a bearing mounted therein for rotatably supporting an end of said shaft, a second bearing support member adjacent the opposite end of said brush having a bearing mounted therein for rotatably supporting the opposite end of said shaft, each of said bearing support members being adapted to be mounted in said openings in said frame and having a pair of spaced guide grooves formed in the periphery thereof, and a pair of spaced apart horizontal guide members extending between said side frame members adjacent said openings and adapted to be engaged by said guide grooves for guiding said bearing support members and brush into position in said frame, to permit ready insertion or removal thereof and to prevent damage to said brush during insertion or removal from said frame.

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