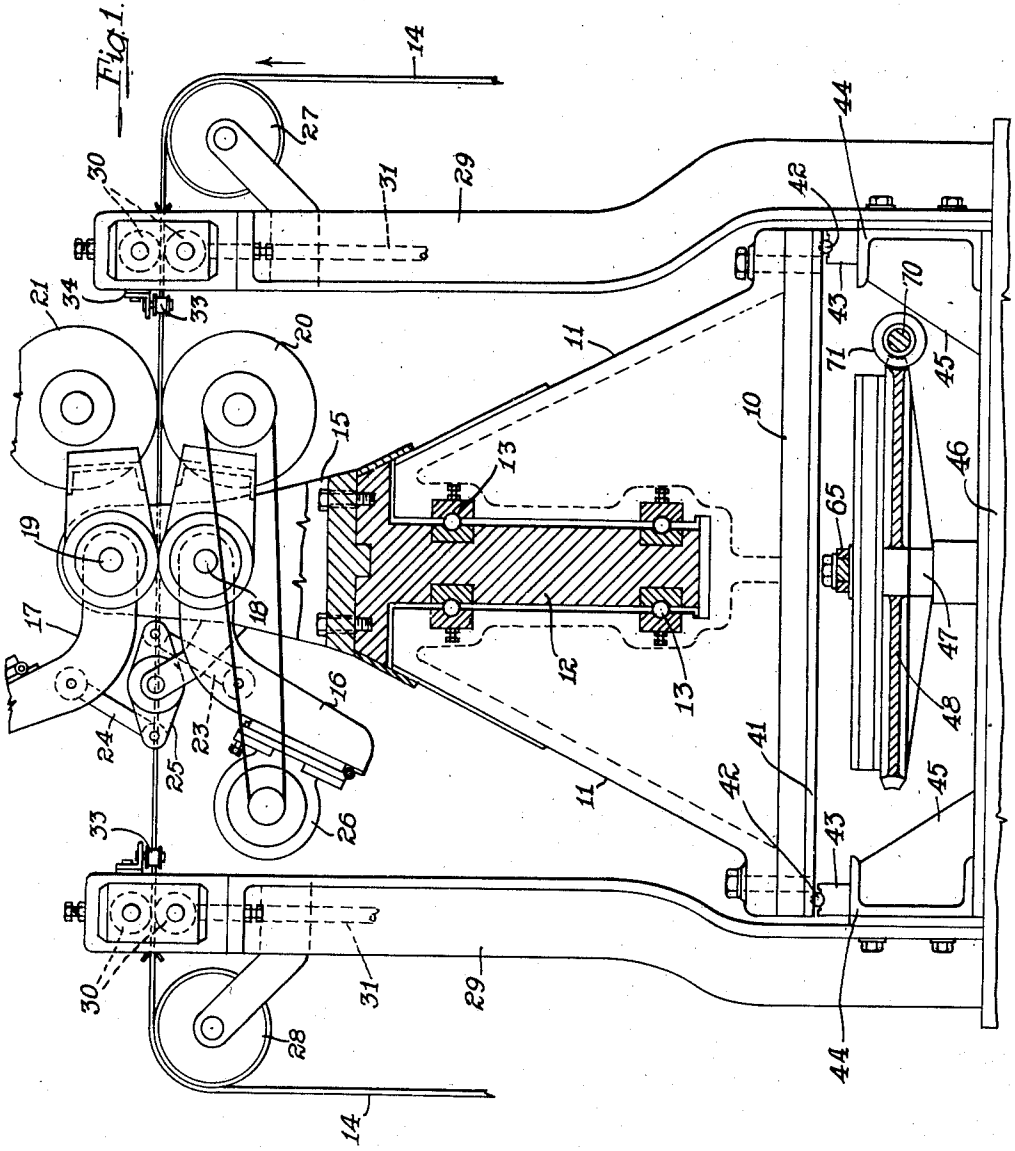
Nov. 17, 1942. A. E. HAMILTON 2,302,120

GRINDING AND POLISHING APPARATUS

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Fig. 1.



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GRINDING AND POLISHING APPARATUS

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Fig. 2.

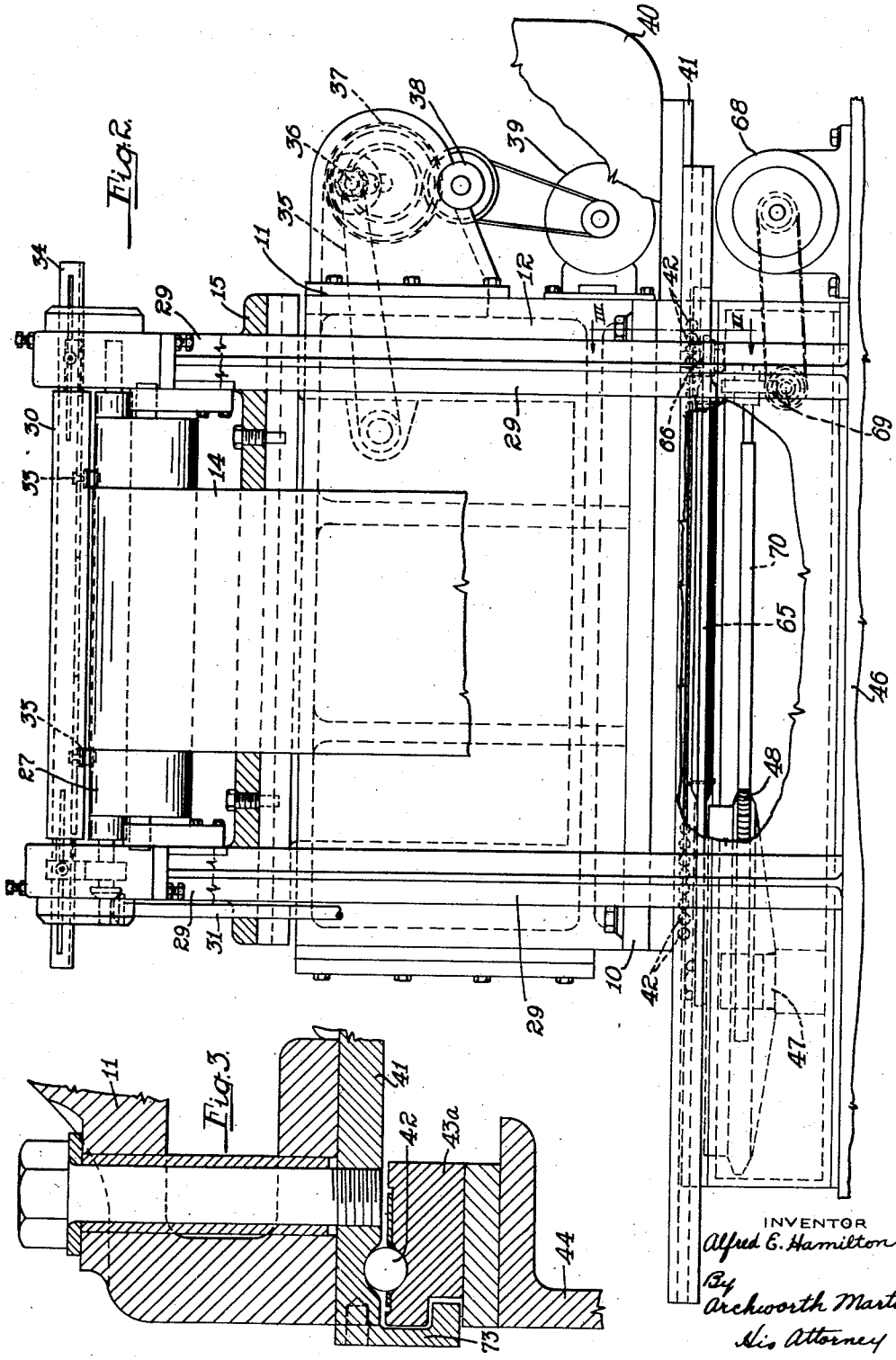


Fig. 3.

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GRINDING AND POLISHING APPARATUS

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Fig. 4

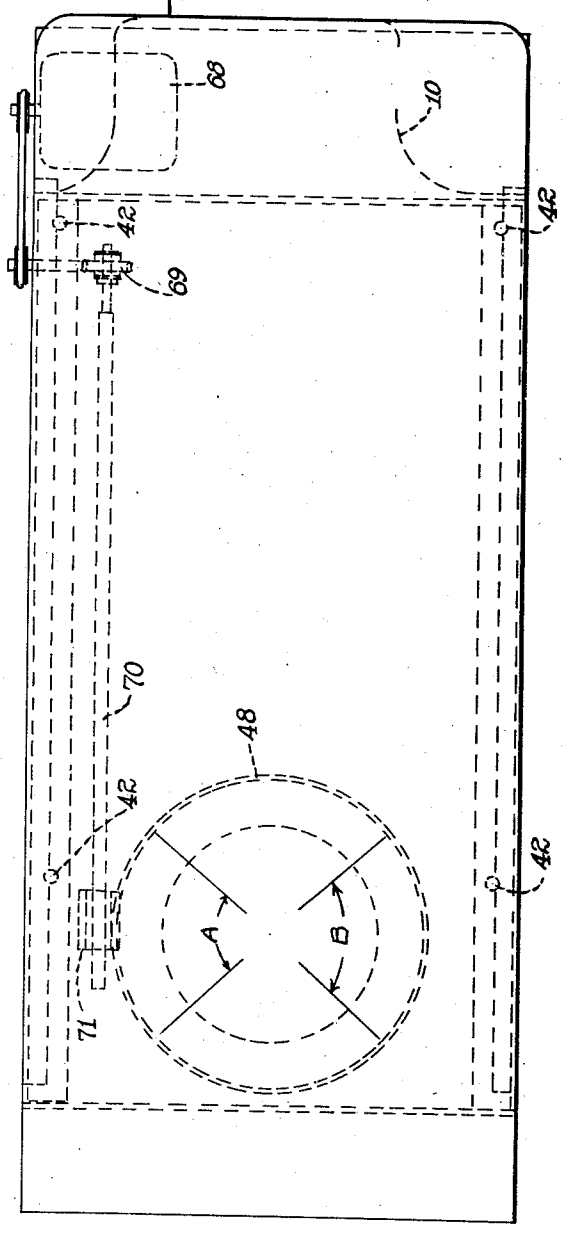
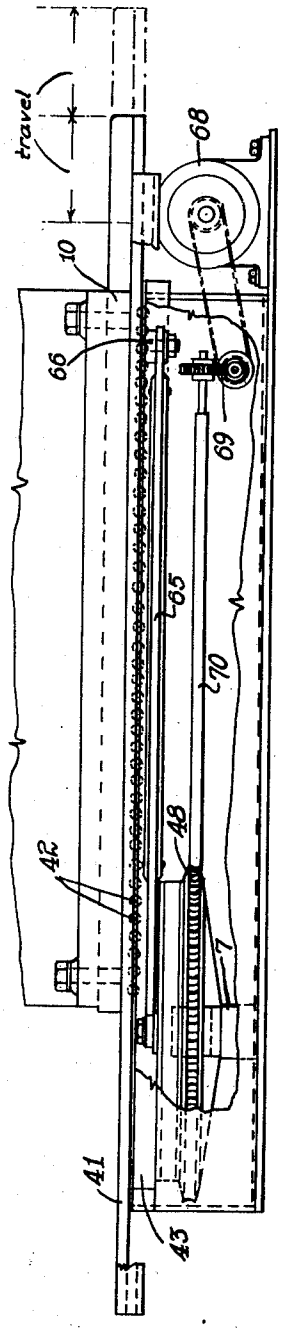


Fig. 5



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GRINDING AND POLISHING APPARATUS

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Fig. 6.

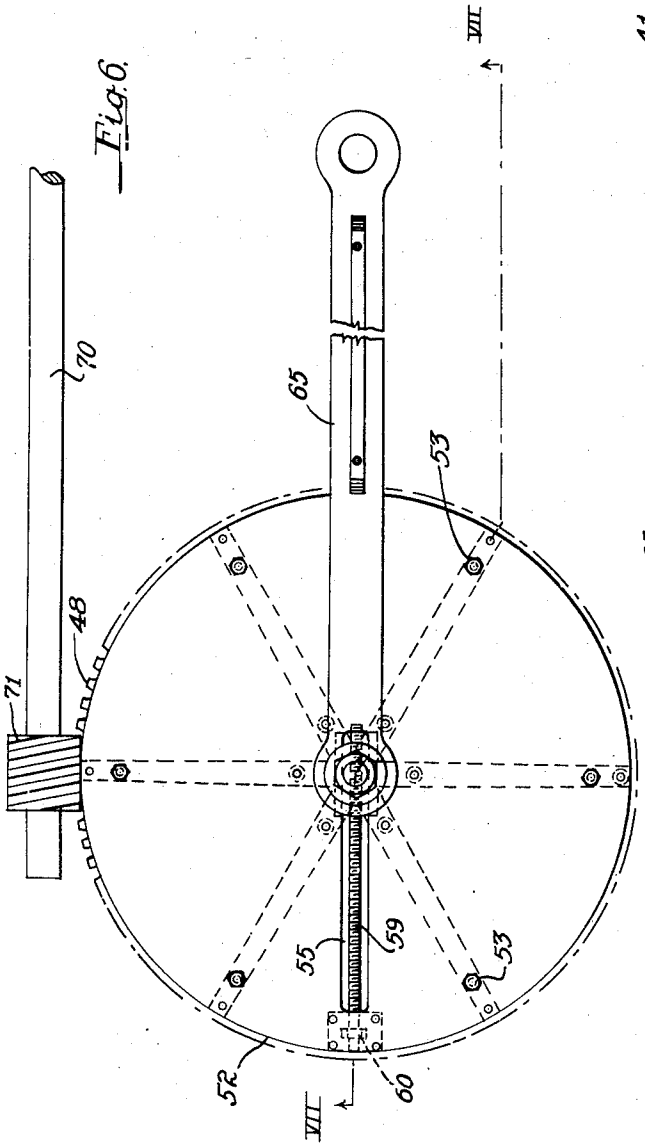


Fig. 7.

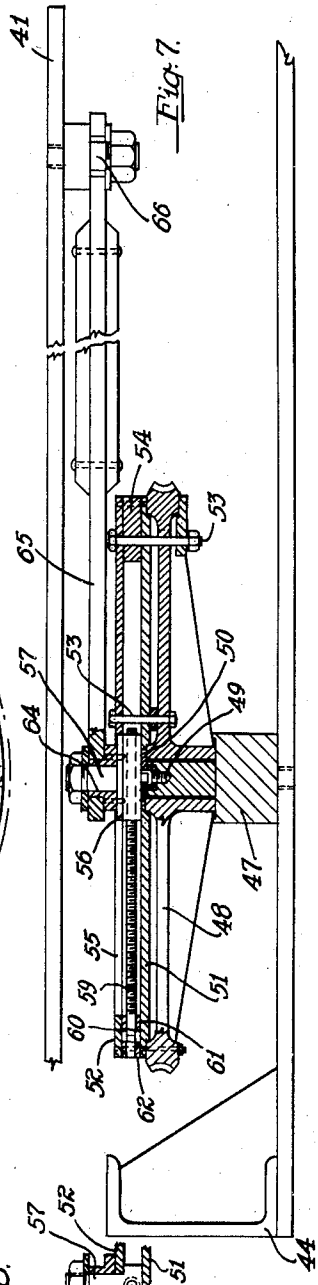
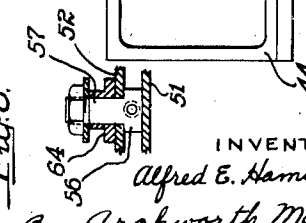


Fig. 8.



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UNITED STATES PATENT OFFICE

2,302,120

GRINDING AND POLISHING APPARATUS

Alfred E. Hamilton, Pittsburgh, Pa.

Application March 7, 1941, Serial No. 382,189

5 Claims. (Cl. 51—40)

My invention relates to grinding and polishing apparatus and is especially suitable in the grinding and polishing of strip material and sheets of material, including steel strip produced on continuous mills, and large metal sheets, and comprises an improvement upon and an addition to the invention of my application Serial No. 295,765, filed September 20, 1939 (Patent No. 2,269,197).

In the grinding and polishing of sheet and strip material by moving the work past abrasive and polishing rolls or blocks, there is waste or loss of abrasive because in many cases the width of the steel strip or other work piece is considerably less than the length of the surfacing rolls, so that there are unusued areas of abrasive in zones adjacent to the ends of the rolls. Again, steel strip of a given width may be passed through the rolls, to be followed by another steel strip of somewhat greater width. Heretofore, such a change in width of the work piece required change of abrasive elements because the first strip will have worn away a relatively narrow circumferential zone of abrasive, with the result that if a wider work piece is passed through the rolls without substituting new abrasive surface, the wider piece would be unevenly surfaced. There would be a similar result in the case of buffing rolls, since the felt or other buffing material would be compressed, condensed and worn near the middle of the rolls by the narrower steel strips, and would not be so effective thereafter at the midportions thereof to polish wider sheets as at the end zones.

One of the objects of my invention is to provide means for subjecting the surfacing elements to uniform wear throughout substantially the entire length of the rolls, no matter whether narrow or wide material is surfaced.

Another object of my invention is to provide means for reciprocating surfacing rolls in directions parallel to their axes, in combination with means for effecting oscillatory movements in such directions, independently of the reciprocatory movements.

Still another object of my invention is to provide means for slowly reciprocating surfacing rolls in directions longitudinally of their axes, in such manner that the movements are more rapid at points adjacent to the midpoints of the paths of travel than at points adjacent to the ends of said paths.

In the accompanying drawings Figure 1 is a side elevational view, partly in section, of a machine embodying my invention; Fig. 2 is an end elevational view thereof, partly in section; Fig. 3 is an enlarged sectional view of a portion of the base structure, taken on the line III—III of Fig. 2; Fig. 4 is a plan view showing the driving arrangement for the reciprocating apparatus in the underside of the machine; Fig. 5 is a longitudinal sectional view of the apparatus of Fig. 4; Fig. 6 is an enlarged plan view of a portion of the apparatus of Fig. 5; Fig. 7 is a view taken on the line VII—VII of Fig. 6; and Fig. 8 is a sectional view of a crank pin mounting of Fig. 7.

In its upper portion the machine is constructed substantially as described in my said application, and comprises a base plate 10 on which are mounted frame members 11. A slide member 12 is supported in the frame members 11 by antifriction bearings 13, for oscillatory movements therein, transversely of the path of travel of the steel strip 14. A bracket 15 is mounted upon the slide member and serves as a support for rocking frame members 16 and 17 that are pivotally connected to the bracket at 18 and 19 respectively. These bracket members carry the surfacing rolls 20 and 21, respectively, which may have sleeves of abrasive or polishing material, such as sandpaper, emery or felt. The rocker members 16 and 17 are connected through links 23 and 24 with a counter-balancing lever 25, which is pivotally supported upon the bracket 15. The surfacing roll 20 is driven by a motor 26 which is carried by the member 16, and the roll 21 similarly driven by a motor mounted on the member 17.

The steel strip 14 or other work piece is fed across guide rollers 27 and 28 that are mounted upon fixed uprights 29, the strip ordinarily being drawn from a supply reel and coiled upon a take-up reel after it passes through the machine. Pinch rollers 30 driven from any suitable source of power, through vertical shafts 31, feed the strip 14 past the surfacing rolls. Guide rollers 33 are provided for engaging the edges of the strip and are independently adjustable on a bar 34 which is in turn adjustable on the uprights 29, so that the strip will be held against deflection during axial vibrations and oscillation of the polishing rolls.

The slide member 12 and the surfacing rolls carried thereby are oscillated transversely of the machine and of the path of travel of the steel strip, by a pitman arm 35 which is pivotally connected at one end to the slide 12 and at its other end has connection with a crank pin 36 that has connection with a gear wheel 37 driven from a gear wheel 38 that is in turn

driven from a motor 39. An enclosing casing is fragmentarily indicated at 40, for the motor and the oscillating mechanism driven thereby.

The parts heretofore specifically described correspond to similar parts which are described more in detail in my said application, to which reference may be made for a more specific description.

The present invention comprises the addition to the machine of my said application of means for imparting slow reciprocatory movements to the said machine, in directions transversely of the steel strip. To this end, I mount the base 10 upon a hardened wear plate 41, that has ball recesses formed in its lower face for engagement with balls 42 that are supported in grooved bearing members 43 which extend transversely of the machine and are supported upon beams 44, having stiffening webs 45. The uprights 29 are also fastened to these beams.

On a foundation base or plate 46 is secured a stub shaft 47 on which a worm gear 48 is rotatably supported. The worm gear is held in place on the shaft 47 by a screw 49 and a washer 50 (Fig 7), the washer being recessed or countersunk for the reception of the screw 49, and the screw 49 having a squared recess in its head for the reception of a wrench. A plate 51 and a plate 52 are supported upon the gear wheel 48 and connected thereto by bolts 53, a spacer ring 54 being interposed between the plates.

The plate 52 has a radially-extending slot 55 (Figs. 6 and 7) through which the upper edge of a crank-pin slide 56 extends. This slide carries a crank pin 57 and has a threaded hole therethrough for the reception of an adjusting screw 59. Near its outer end the screw has a shoulder or rigidly fixed collar 60 rotatably supported between stop shoulders 61 and 62 that are carried by the plates 51 and 52. The outer end of the screw 59 is formed to receive a wrench whereby it may be rotated to adjust the crank pin 57 radially of the worm gear 48.

A bushing 64 surrounds the crank pin 57 to receive one end of a pitman 65 whose other end is pivotally connected at 66 with one end of the plate 41, so that when the screw 59 has been turned to shift the crank pin 57 from its coaxial position on the worm gear 48, rotation of the worm gear will effect reciprocation of the plate 41 and the machine carried thereby, in a direction transversely of the strip 14. The worm gear is driven from a motor 68 through a worm reduction unit 69, a shaft 70 and a worm 71. The two worm gear reductions are such that the polishing machine is reciprocated quite slowly. Thus, it may suitably be moved back and forth across the path of the strip 14 at an average rate of perhaps only 18 inches per minute, although the peripheral speed of the surfacing rolls may be 3500 feet per minute. The adjustment of the crank pin 57 radially of the worm gear 48 will be different for different widths of steel strip. For a wide strip it will be shifted only a slight distance from its coaxial position of Fig. 7, since only a short reciprocatory travel will be required For narrower strips the adjustment will be made to a somewhat greater distance from the center of the worm gear, so that a greater length of reciprocatory travel will be had.

Thus, if the width of the steel strip is approximately 18 inches less than the length of the surfacing rolls, the reciprocation will be for a distance of 9 inches in each direction from the longitudinal center line of the strip, the crank pin 57 in that case being set 9 inches from the axis of the gear wheel 48.

In Fig. 3 the bearing plate 41 is shown as having a bar 73 secured thereto at its upper edge and with its lower edge turned laterally into a recess beneath a bearing block or bar 43a, which is suitably secured to the beam 44. A similar retaining flange is provided at the other longitudinal edge of the machine so as to prevent accidental displacement of the parts during operation. These flanges also serve as guards to keep dust out of the bearings.

When the crank pin is passing through the zones between the line A—A and B—B (Fig. 4), the transverse movement of the machine will be at a faster rate than at other points in the annular path of travel of the crank pin, so that the machine will be reciprocated more rapidly and the wear on the surfacing rolls distributed more evenly. That is, those areas of the rolls adjacent to the ends will remain in working engagement with the steel strip for a longer period of time than if the reciprocation by the link or pitman 65 were always at a uniform rate. The wear on the mid portions of the rolls will be correspondingly reduced.

I claim as my invention:

1. Surfacing apparatus comprising means for imparting traveling movement to strip material and the like, a surfacing element positioned for engagement with the material and to extend crosswise of the material a distance substantially greater than the width thereof, a bracket supporting the surfacing element, a base for the bracket, a foundation having trackways extending transversely of the material and supporting the base, means for imparting combined reciprocatory and vibratory movements to the said bracket, in directions generally transverse to the path of travel of the material, and means for simultaneously reciprocating the base longitudinally of the trackways, the range of movement of the reciprocating means for the base being adjustable in accordance with widths of material to be surfaced.

2. Apparatus for surfacing strip material and the like, comprising means for imparting traveling movement to the material, a base provided with a slideway, a roll-supporting bracket reciprocable in the slideway in directions transversely of the path of the material, a surfacing roll carried by the bracket on an axis extending crosswise of the said path and in position to engage the material, a motor on the bracket for rotating the roll, means on the base for imparting reciprocatory and vibratory movements to the bracket, transversely of said path, a foundation having trackways extending parallel to the said slideway and supporting the base, and means for reciprocating the base longitudinally of the said trackways during rotative and oscillatory movements of the roll, the range of movement of the reciprocating means being adjustable in accordance with widths of material to be surfaced.

3. Apparatus for surfacing strip material and the like, comprising means for imparting traveling movement to the material, a base provided with a slideway, a roll-supporting bracket reciprocable in the slideway in directions transversely of the path of the material, a surfacing roll carried by the bracket on an axis extending crosswise of the said path and in position to engage the material, means for rotating the roll, means on the base for imparting reciprocatory and vibratory movements to the bracket, trans-

versely of the said path, a foundation having trackways extending parallel to the said slideway and supporting the base, and means for reciprocating the base longitudinally of the said trackways during rotative and oscillatory movements of the roll, the range of movement of the reciprocating means being adjustable in accordance with widths of material to be surfaced.

4. Surfacing apparatus comprising means for imparting traveling movement to strip material and the like, a surfacing element positioned for engagement with the material and to extend crosswise of the material a distance substantially greater than the width thereof, a bracket supporting the surfacing element, a base for the bracket, a foundation having trackways extending transversely of the material and supporting the base, means for imparting combined reciprocatory and vibratory movements to the said bracket, in directions generally transverse to the path of travel of the material, and means for simultaneously reciprocating the base longitudinally of the trackways, the last-named means being disposed below the said base.

5. Surfacing apparatus comprising means for imparting traveling movement to strip material and the like, a surfacing element positioned for engagement with the material and to extend crosswise of the material a distance substantially greater than the width thereof, a bracket supporting the surfacing element, a base for the bracket, a foundation having trackways extending transversely of the material and supporting the base, means for imparting combined reciprocatory and vibratory movements to the said bracket, in directions generally transverse to the path of travel of the material, and means for simultaneously reciprocating the base longitudinally of the trackways, the last-named means being disposed below the said base and comprising a crank device rotatable on a vertical axis and having connection with the said base.

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