

March 25, 1941.

M. W. HAZELTON

2,236,193

SHEARING MACHINE

Original Filed July 12, 1940

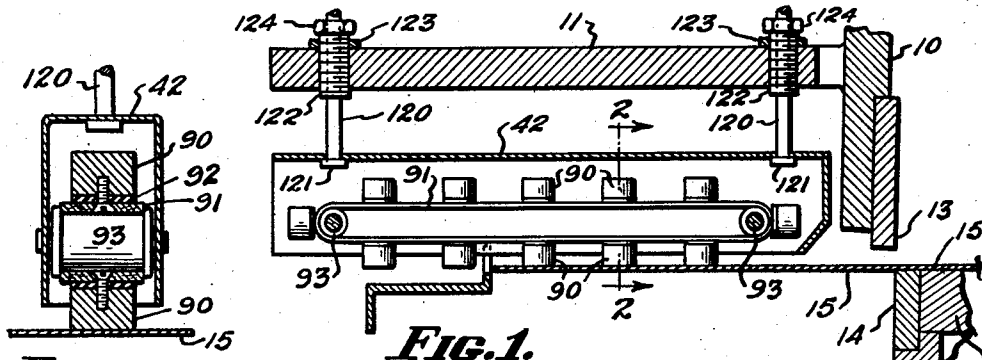


FIG. 1.

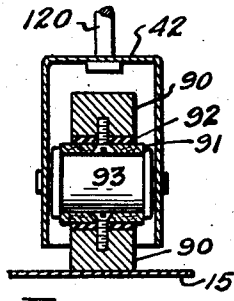


FIG. 2.

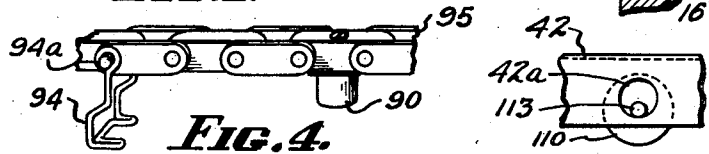


FIG. 4.

FIG. 13.

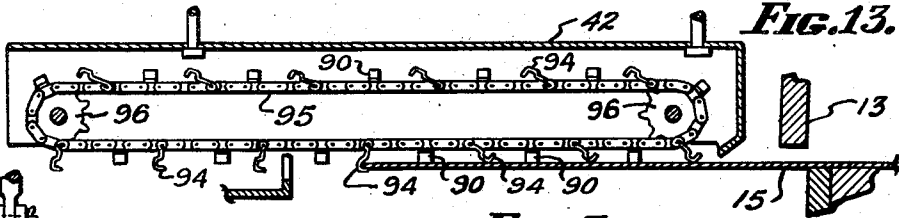


FIG. 3.

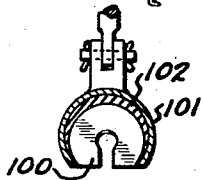


FIG. 6.

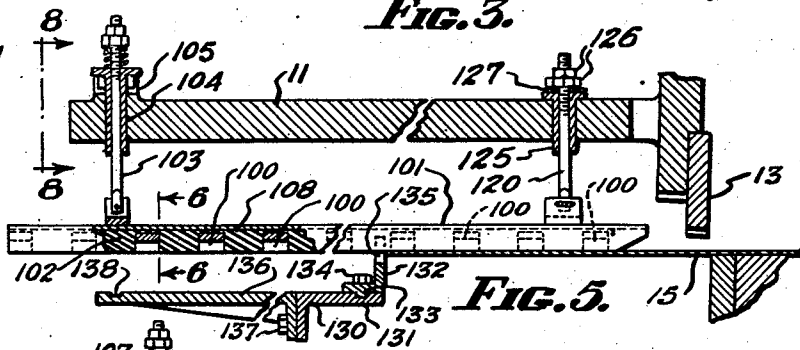


FIG. 5.



FIG. 7.



FIG. 8.

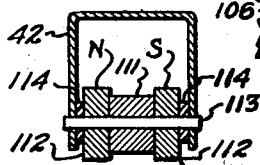


FIG. 11.

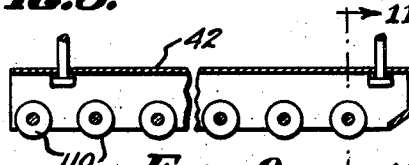


FIG. 9.

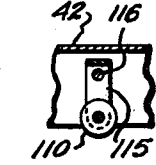


FIG. 12.

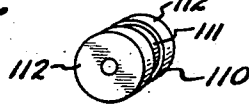


FIG. 10.

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UNITED STATES PATENT OFFICE

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SHEARING MACHINE

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Original application July 12, 1940, Serial No.
345,196. Divided and this application July 12,
1940, Serial No. 345,197

10 Claims. (Cl. 164-49)

This invention relates to shearing machines of the type used for shearing sheet metal and is a division of my copending application Serial No. 345,196, filed of even date herewith. In that application I have disclosed magnetic holding means to hold up the portion of a sheet beyond the shears. The holding means were electromagnets and means were provided for controlling the magnetic force on the sheet so that the sheet even though gripped by the magnet bars could be moved in its plane for adjustment in relation to a back gauge.

It is an object of the present invention to provide magnetic holding means of the permanent magnet type which are simpler and less likely to get out of order than the electromagnetic type. It is another object of my invention to provide permanent magnet holding means which permit the sheet, when held by the magnets to be moved in its plane even though the magnetic force of permanent magnets cannot be altered. These and various other objects of my invention which will be pointed out hereinafter or which will be apparent to one skilled in the art upon reading these specifications, I accomplish by that certain construction and arrangement of parts of which I shall describe several exemplary embodiments. Reference is now made to the drawing forming a part hereof and in which:

Figure 1 is a longitudinal cross section through a magnet bar with just enough of the shearing machine shown to indicate the relation.

Fig. 2 is a cross sectional view on an enlarged scale taken on the line 2-2 of Fig. 1.

Fig. 3 is a view similar to Fig. 1 showing a different type of magnet bar.

Fig. 4 is a partial perspective detail view of the chain shown in Fig. 3.

Fig. 5 is a view similar to Figs. 1 and 3 showing another modification.

Fig. 6 is a cross sectional view on an enlarged scale taken on the line 6-6 of Fig. 5.

Fig. 7 is a perspective view of one of the permanent magnets used in the device of Figs. 5 and 6.

Fig. 8 is an elevational view of the adjustment for the rear end of the magnet bar taken on the line 8-8 of Fig. 5.

Fig. 9 is a cross sectional view of still another type of magnet bar.

Fig. 10 is a perspective view on an enlarged scale of one of the permanent magnets used in the device of Fig. 9.

Fig. 11 is a cross sectional view on an enlarged scale taken on the line 11-11 of Fig. 9.

Fig. 12 is a fragmentary view showing a modification in the mounting of the magnets of Fig. 9.

Fig. 13 is a fragmentary side elevation showing another modification in the mounting of the magnets of Fig. 9.

Briefly, in the practice of my invention I provide, as described in my copending application above referred to, a series of magnet bars disposed in parallel relation transversely of the shear blades and to the rear thereof. According to this invention the magnet bars comprise a plurality of magnets of one or another form and I provide means whereby the sheet may be gripped by the magnets and yet moved in its plane for alignment with a back gauge.

The shearing machine to which these magnet bars are applied may be of any type as, for example, the machine described in my copending application above referred to. In the present application I have shown only so much of this shear as is necessary for an understanding of the invention and so much of the shear as is shown bears the same reference numerals as in said copending application. In Fig. 1, I have shown the front table 16 in which is mounted the fixed shear blade 14 and I have indicated a part of the ram assembly at 10 provided with the brace plate 11 and carrying the movable shear blade 13. The sheet to be sheared is indicated at 15.

According to Figs. 1 and 2, a number of permanent magnets 90 are screwed to a conveyor belt 91 from which they are insulated by insulating strips 92. The belt 91 travels over pulleys 93 which are suitably mounted in the walls of the magnet bar casing 42. In this embodiment as soon as the end of the sheet 15 comes within the sphere of influence of one of the permanent magnets 90, it clings to it and upon further movement of the sheet toward the left in Fig. 1, the belt will travel in a clockwise direction and additional magnets will pick up the sheet end.

In Figs. 3 and 4, I have shown an arrangement which may be desirable where extra heavy sheets are to be sheared which sheets might be heavier than the weight for which the magnet bars were designed. In this embodiment I have shown a number of hook elements 94 which may be pivoted to the sprocket chain 95 as shown at 94a. These hook elements 94 are disposed between the permanent magnets 90 which may be fixed to the chain and insulated therefrom in any suitable manner. The chain 95 travels over sprockets 96 suitably mounted in the magnet bar casing 42. With this device the end of the sheet 15 can be supported by means of one of the hooks

94, which hook alone or with the assistance of the magnets 90 will serve to support the sheet, as in Fig. 3. When the sheet is pushed towards the left in Fig. 3, the sprocket chain 95 will travel in a clockwise direction. By virtue of the pivoted mounting of the hook members 94 subsequent of the members 94 will not interfere with the proper gripping of the sheet.

In Figs. 5 to 8, inclusive, I have shown another modification in which a number of permanent magnets 100 of horse shoe shape are retained in a shell 101 from which they are insulated by insulating material 102. Blocks 103 of insulating material are provided between the adjacent magnets 100. Since the permanent magnets are not movable in this device, means must be provided for diminishing the pull of the magnet bars so that the sheet may easily be adjusted in the case of light material. The rear ends of the magnet bars are supported as shown in detail in Figs. 5 and 8 by means of a rod 103 passing through a sleeve 104 in the brace plate 11. A slotted boss 105 is provided on the brace plate 11 and the sleeve 104 is provided with blades 104a. It will be observed that the boss 105 is provided with diametrically opposed relatively deep slots 106 and diametrically opposed relatively shallow slots 107 half-way between the slots 106. It will now be clear that by raising the sleeve 104 and turning it through 90° the blades 104a will engage in the slots 107 thus holding the rear ends of the magnet bars up. Thus, when it is desired to shear very thin sheets and it becomes necessary to decrease the attractive force upon the sheet, any suitable number of the magnet bars may be rendered ineffective by raising them up as just described. In some cases every other bar will have to be raised or every third bar. This will, of course, be done in the judgment and the experience of the operator.

In Figs. 9 to 12, inclusive, I have shown still another arrangement in which a plurality of permanent magnets in the form of small rollers indicated generally at 110 are mounted in the magnet bar casing 42. These rollers are shown in more detail in Figs. 10 and 11. They comprise a core portion 111 of magnetic material such, for example, as "Alnico"; adjacent the core portion 111 and on each side thereof are provided steel rollers 112 which may be of cold rolled steel or of similar material. The assembly is mounted upon a shaft 113 of brass or other non-magnetic material, which shaft 113 is journaled in the casing 42. The discs 112 are preferably spaced from the casing 42 by the washers 114. The operation of this form of magnet bar is clear in that, as the sheet is gripped by the magnets and pushed toward the left in Fig. 9, each of the permanent magnet elements 110 will simply roll along the sheet rotating in a clockwise direction.

In Fig. 12, I have shown a slight modification in the mounting of the rollers 110 in which the rollers are rotatably mounted in U shaped brackets 115, which brackets are pivoted as at 116 in the casing 42. The purpose of this modification is to render all magnets useful in supporting the sheet in cases where the sheet is uneven or wavy. Thus, individual members 110 may yield to permit adjacent members 110 to grip the sheet even if it is not flat.

In Fig. 13 the casing 42 has in its side walls oversize holes 42a in which the shafts 113 of the magnets 110 are retained. This arrangement has the advantages of that of Fig. 12 but is simpler in construction.

The mounting of the magnet bars is somewhat similar to that disclosed in my copending application above referred to but is simpler. Magnet bars in the present case are supported by rods 120 having heads 121 disposed within the magnet bar casing 42. The rods pass through sleeves 122 which are threaded into the brace plate 11 and are held in position when properly adjusted by means of the lock nuts 123. Nuts 124 are threaded onto the end of the rods 120 and these bearing against the top face of the sleeve 122 support the magnet bars in position. It will be observed that the magnet bars descend with the shear, there being no lost motion arrangement as described and claimed in my copending application. I have found that in this type of construction the impact of the upper shear blade against the sheet 15 serves to knock the sheet loose from the magnet bars.

In Fig. 5, I have shown a slight modification in the mounting of the front end of the magnet bar in which a plain flanged sleeve 125 is provided in the brace plate 11. The rod 120 passes through the sleeve 125 and is supported by means of lock nuts 126 bearing against a spring 127 which rests on the flange of the sleeve 125. The spring 127 is conical and is shown in its compressed condition. The adjustment is preferably such that the compression of the spring when fully compressed substantially biases the weight of the front ends of the magnet bars. Thus, if a thicker sheet is to be sheared, the front ends of the magnet bars under the action of the spring 127 will rise on very slight pressure to permit the sheet to pass.

In Fig. 5, I have also shown a back gauge of unusual construction. The back gauge indicated generally at 130 is slotted as at 131 and a gauge element 132 is provided with a key 133 arranged to engage in the slot 131. The member 132 is held in position by means of bolts 134 and is cut away at intervals as indicated at 135 to accommodate the magnet bars. A rear extension piece 136 is bolted or otherwise fastened to the member 130 as at 137 and it carries a slot 138. The center lines of the slots 131 and 138 are some distance apart, say, 36 inches and it will be clear that with the member 132 in the position shown, the range will be from 0 to 36 inches and with the member 132 disposed in the slot 138, the range will be from 36 to 72 inches. The means for adjusting the back gauge 130 may be of any desired type such as, for example, are shown in my copending application above referred to. The adjustment, per se, constitutes no part of the present invention.

It will be clear that numerous modifications will suggest themselves to one skilled in the art and, therefore, I do not wish to limit myself except as to the claims which follow.

Having thus described my invention what I claim as new and desire to secure by Letters Patent, is:

1. In combination with a shear having blades for cutting sheet metal, magnetic means for holding up the unsupported portion of a sheet beyond the blades and means to render said magnetic means effective in holding up a sheet while permitting movement of a sheet in its plane.

2. In combination with a shear having blades for cutting sheet metal, magnetic means for holding up the unsupported portion of a sheet beyond the blades and means to render said magnetic means effective in holding up a sheet while permitting movement of a sheet in its plane, said

magnetic means comprising permanent magnets mounted for movement of their sheet contacting surfaces in the plane of the sheet.

3. In combination with a shear having blades for cutting sheet metal, magnetic means for holding up the unsupported portion of a sheet beyond the blades and means to render said magnetic means effective in holding up a sheet while permitting movement of a sheet in its plane, said magnetic means comprising a plurality of magnet bars disposed side by side transversely of said shear blades and permanent magnets mounted in said magnet bars for movement of their sheet contacting surfaces in the plane of the sheet.

4. In combination with a shear having blades for cutting sheet metal, magnetic means for holding up the unsupported portion of a sheet beyond the blades and means to render said magnetic means effective in holding up a sheet while permitting movement of a sheet in its plane, said means comprising a plurality of magnet bars disposed side by side transversely of said shear blades and means for selectively rendering ineffective any number of said magnet bars.

5. A device according to claim 4 in which said last mentioned means comprise means for elevating individual of said magnet bars.

6. In combination with a shear having blades for cutting sheet metal, magnetic means for holding up the unsupported portion of a sheet beyond the blades and means to render said magnetic means effective in holding up a sheet while permitting movement of a sheet in its plane, said magnetic means comprising a plurality of magnet bars disposed side by side transversely of said shear blades, each of said magnet bars containing a freely traveling belt and a plurality of permanent magnets mounted on said belt with their contacting faces substantially in the plane of sheet movement.

7. In combination with a shear having blades for cutting sheet metal, magnetic means for holding up the unsupported portion of a sheet beyond the blades and means to render said magnetic

means effective in holding up a sheet while permitting movement of a sheet in its plane, said means comprising a plurality of magnet bars disposed side by side transversely of said shear blades, each of said magnet bars containing a freely movable sprocket chain, a plurality of permanent magnets mounted on said sprocket chain and a plurality of pivoted hook elements mounted between said permanent magnets, the contact faces of said magnet bars being substantially in the plane of sheet movement and said hook elements extending somewhat below said plane.

8. In combination with a shear having blades for cutting sheet metal, magnetic means for holding up the unsupported portion of a sheet beyond the blades and means to render said magnetic means effective in holding up a sheet while permitting movement of a sheet in its plane, said magnetic means comprising a plurality of magnet bars disposed side by side transversely of said shear blades, each of said magnet bars containing a plurality of permanent magnets in the form of rollers mounted transversely with respect to said magnet bars substantially tangent to the plane of sheet movement.

9. A device according to claim 8 in which the independent magnets are mounted for pivotal movement also with respect to said magnet bars.

10. In combination with a shear having blades for cutting sheet metal, magnetic means for holding up the unsupported portion of a sheet beyond the blades and means to render said magnetic means effective in holding up a sheet while permitting movement of a sheet in its plane, said magnetic means comprising a plurality of magnet bars disposed side by side transversely of said shear blades, each of said magnet bars comprising a casing substantially crescent shape in cross section, a plurality of generally horse shoe shaped permanent magnets disposed in said casing and insulated from said casing and from each other and means for elevating selectively any of said magnet bars to render them ineffective.

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