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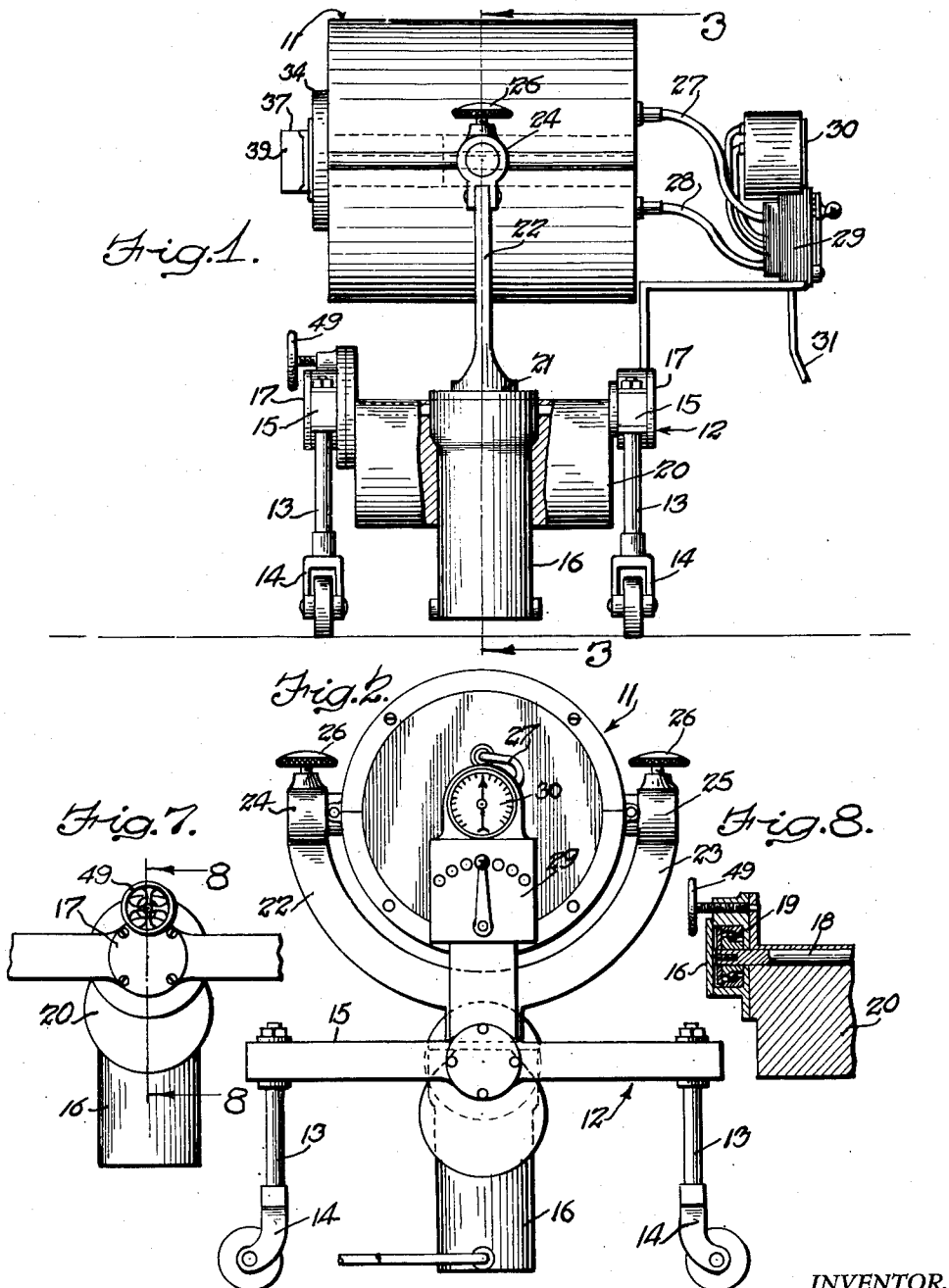
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2,510,253

MECHANISM FOR REMOVING DENTS

Filed Sept. 29, 1947

2 Sheets-Sheet 1



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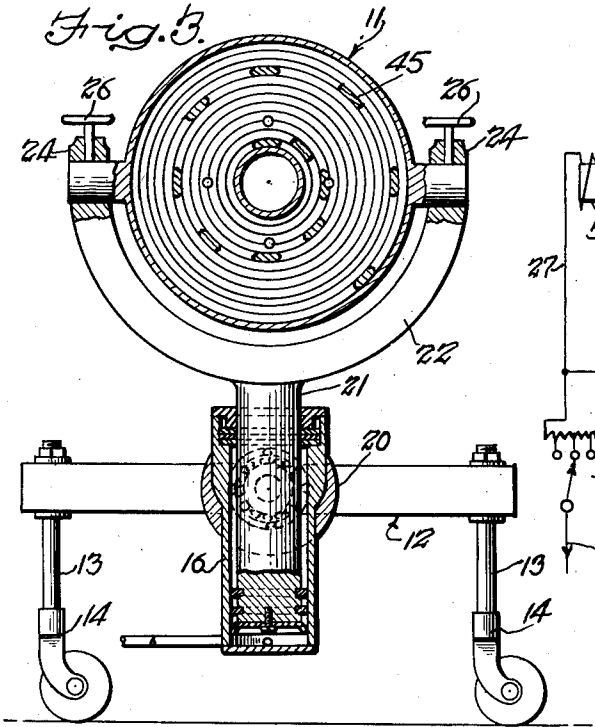
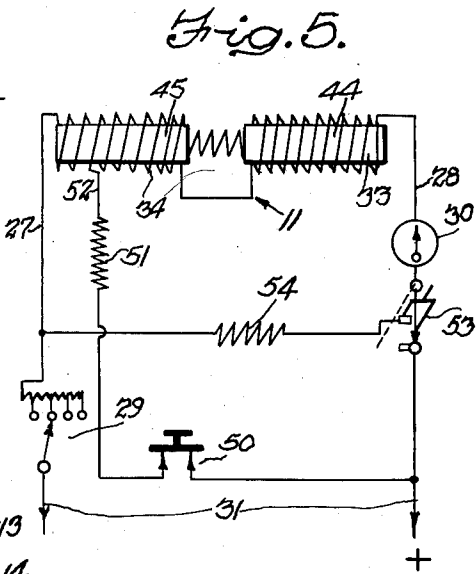
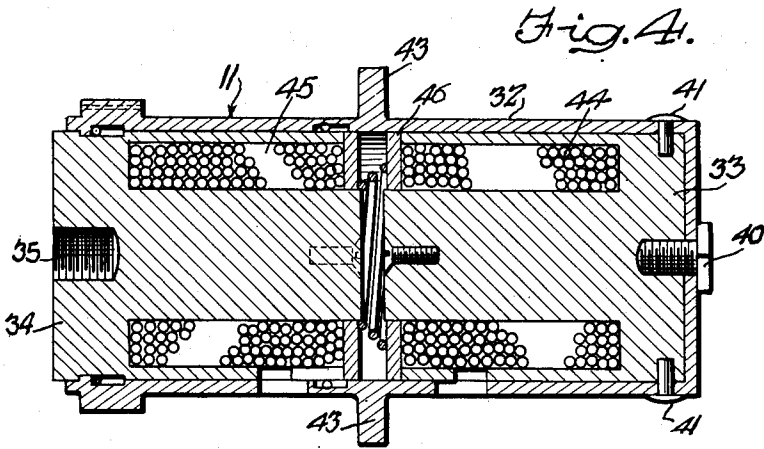
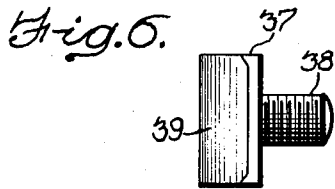
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MECHANISM FOR REMOVING DENTS

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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MECHANISM FOR REMOVING DENTS

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3 Claims. (Cl. 153—32)

1

The present invention relates to electromagnetic apparatus for removing dents from automobile bodies or fenders or from other articles constructed of similar magnetic sheet material.

An object of the invention is to provide an electromagnetic apparatus which, when properly positioned, will remove a dent from a sheet metal object upon energization of the electromagnetic means.

A further object of the invention is to provide a device of this character which is portable and which may be readily positioned for the removal of a dent.

Still another object of the invention is to provide an electromagnetic apparatus of this type in which the dent removing portion thereof may be provided with any one of a series of interchangeable matrices, each matrix being of a general shape for the most effective removal of a dent of specific shape and dimensions.

It is another object of the invention to provide the electromagnet with energization means disposed for operation at both a high and a low intensity, the high intensity being for use in the actual removal of dents and the low intensity being suitable for holding the device in position preliminary to the dent removing operation.

It is a feature of the invention that power operated means such as a hydraulic lift is provided for the raising and lowering of the relatively heavy electromagnet. The entire assembly is mounted on a dolly so that it may be readily moved about, and the structure is balanced so that angular adjustments may be easily made.

Other and further objects will become apparent upon reading the following specification together with the accompanying drawing forming a part hereof.

Referring to the drawing;

Fig. 1 shows a side view in elevation of an embodiment of the invention, partly broken away.

Fig. 2 shows a rear view in elevation of the embodiment shown in Fig. 1.

Fig. 3 is a sectional view taken along the line 3—3 of Fig. 1, looking in the direction of the arrows.

Fig. 4 is a sectional view through an electromagnet which forms a part of the embodiment shown in Fig. 1.

Fig. 5 is a diagrammatic representation of the electrical circuits.

Fig. 6 is a side view of a matrix for use with the electromagnet of Fig. 4.

2

Fig. 7 is a fragmentary view of a locking device.

Fig. 8 is a sectional view taken along the line 8—8 of Fig. 7, looking in the direction of the arrows.

Referring to Fig. 1, an electromagnet designated generally as 11 is mounted on a dolly designated generally as 12. Dolly 12 comprises four vertically extending legs 13 each equipped at its lower end with a caster 14. Supported on the four vertical legs 13 are a pair of cross members 15 which support a hydraulic cylinder 16 pivotally mounted in trunnions 16 and 17 being carried by a shaft 18 supported ball bearings 19 one of which may be seen in Fig. 8.

A counter-weight 20 is shown as being generally cylindrical in shape and tends to keep the hydraulic cylinder 16 in a vertical position. The plunger 21 of hydraulic cylinder 16 extends upwardly and is bifurcated to provide two arms 22 and 23 which carry at their extremities additional trunnions 24 and 25 which are provided with locking screws 26. Electromagnet 11 is rotatably supported by trunnions 24 and 25.

Current for the energization of the electromagnet 11 is supplied by conductors 27 and 28 and the intensity of the current is controllable by means of a rheostat 29, the amount of current flow being indicated by an ammeter 30. A pair of conductors 31 extends to a suitable source of electric current for the energization of the electromagnet 11.

Electromagnet 11 consists of a shell portion 32 in which is mounted a fixed magnetic core 33 and a movable magnetic core 34. Movable core 34 is provided with a tapped hole 35 adapted to receive a matrix such as 37 shown in Fig. 6, the matrix 37 being provided with a threaded shank 38 permitting it to be inserted in tapped hole 35 and with a face portion 39 which is shaped for engagement with the work. For different types of dents, different shapes will be provided for the face portion 39 of the matrix 37.

Fixed core 33 is secured by bolt 40 and is prevented from loosening by rivets 41 extending laterally from shell 32. Shell 32 is provided with a pair of supporting shafts 33 which engage trunnions 24 and 25.

Fixed core member 33 is provided with an energizing coil 44 and movable coil member 34 is provided with an energizing coil 45. A compression spring 46 tends to keep movable coil 34 spaced from fixed core 33. The movable core 34 is slidably mounted within the shell 32.

Referring to Fig. 5, direct current for energiza-

tion of electromagnet 11 is supplied by a pair of conductors 31. Initially, reduced magnetizing current is applied through a switch 50 and a resistor 51 to a tap 52 on energizing winding 45 which produces a reduced degree of magnetization in the forward portion of a movable core member 34. With the electromagnet 11 thus energized at a reduced power consumption which will permit continuous energization without overheating, the electromagnet 11 is positioned in contact with the work. The height may be adjusted by means of hydraulic cylinder 16 which is provided to facilitate raising and lowering of the magnet. The magnet 11 may be tilted to the desired angle by loosening screws 26, thus permitting it to be rotated in trunnions 24 and 25. When the magnet has been adjusted to the desired angle, the screws 26 are again tightened and will retain the magnet in this position. The entire magnet assembly including the hydraulic cylinder may also be pivoted laterally about a horizontal axis by loosening a clamping screw 49 associated with trunnion 16 and tightening this screw after the magnet 11 is in the desired position.

Having thus placed electromagnet 11 in the correct working position for the removal of the dent, and with face 39 of matrix 37 in contact with the work, switch 53 is closed permitting the full current, as limited by rheostat 29, to be applied simultaneously to both windings of the electromagnet 11. This is arranged to produce a high degree of energization of the electromagnet thereby bringing movable core member 34 in contact with fixed core member 33. This action abruptly increases the flux and also produces an impact which will further assist in the straightening of the dent. The high degree of magnetization tends to draw the work flat against the face of matrix 39. The flattening action, if not completely effective upon the first energization may be repeated until the dent is removed to the extent desired.

In order to prevent undue arcing at switch 53, a resistor 54 is provided to absorb the energy stored in the electromagnet. Before the energization circuit can be broken, resistor 54 is connected in multiple with the electromagnet thus being connected to dissipate the energy which would otherwise tend to form an arc.

While I have shown what I believe to be the best embodiment of my invention, I do not wish, however, to be limited to the embodiment shown but what I desire to secure by Letters Patent is the invention as defined in the appended claims.

I claim:

1. In a device of the class described, an energizing winding, a magnetic member comprising a fixed portion and a movable portion disposed to be influenced by the energization of the winding, spring means disposed to urge the movable portion away from the fixed portion, a matrix carried by the movable portion and shaped for engagement with a sheet of magnetizable material for the removal of a dent therefrom, and adjustable positioning means supporting the magnetic member.

2. In a device of the class described, an energizing winding, a magnetic member comprising a fixed portion and a movable portion and disposed to be influenced by the energization of the winding, spring means disposed to urge the movable portion away from the fixed portion, a matrix carried by the movable portion and shaped for engagement with a sheet of magnetizable material for the removal of the dent therefrom, adjustable positioning means supporting the magnetic member, and means for producing a reduced degree of energization of the winding for use in adjustment of the positioning means.

3. In a device of the class described, an energizing winding, a magnetic member comprising a fixed portion and a movable portion and disposed to be influenced by the energization of the winding, spring means disposed to urge the movable portion away from the fixed portion, a matrix carried by the movable portion and shaped for engagement with a sheet of magnetizable material for the removal of a dent therefrom, adjustable positioning means supporting the magnetic member, means for producing a reduced degree of energization of the winding for use during adjustment of the positioning means, and means for increasing the degree of energization after the positioning means has been adjusted.

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