

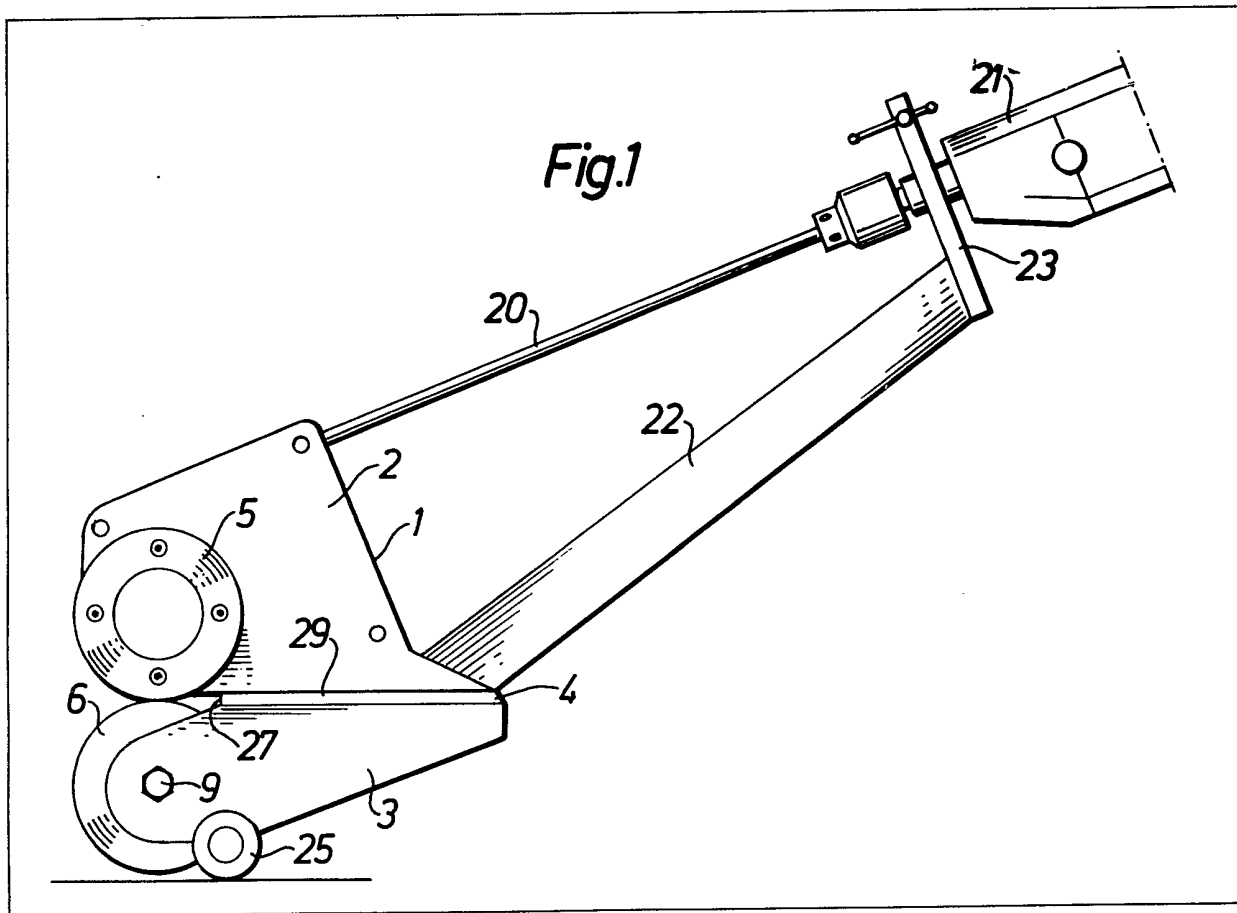
- (21) Application No 8106988
- (22) Date of filing 5 Mar 1981
- (43) Application published 15 Sep 1982
- (51) INT CL³
B23D 19/08
- (52) Domestic classification
B3W 10C4D 10CY 11D
- (56) Documents cited
GB 1516756
GB 0270732
GB 1323970
GB 0251897
GB 1079198
GB 0215821
GB 0825718
- (58) Field of search
B3W B4B
- (71) Applicants
Folke Holm,
Hanogatan 7,
S-150 Trosa,
Sweden.
- (72) Inventors
Folke Holm

(74) Agents
Forrester Ketley and Co.,
Forrester House,
52 Bounds Green Road,
London,
N11 2EY.

(54) Improvements in or relating to a shearing machine

(57) A shearing machine for shearing

sheet material, comprises a body (1) and two co-operating shearing wheels (5, 6) between whose shearing edges (41, 42) the sheet is cut, wheel 5 being driven and having a toothed shearing edge. The stand (1) comprises a first part (2) and a second part (3), which are laterally offset from one another, and an intermediate horizontal connecting part (4). The shearing wheels (5, 6) are axially offset from one another and have their shearing edges (41, 42) in tangential contact with one another. The intermediate horizontal stand part (4) forms a wedge-shaped deflector and has its leading edge (27) disposed in line with and at a distance from the nip (28) between the shearing wheels (5, 6). The shearing machine is free from structural elements on either side of the shearing wheels (5, 6) at the level of the nip 28, thus enabling sheet of any width to be cut and curved cuts to be made.



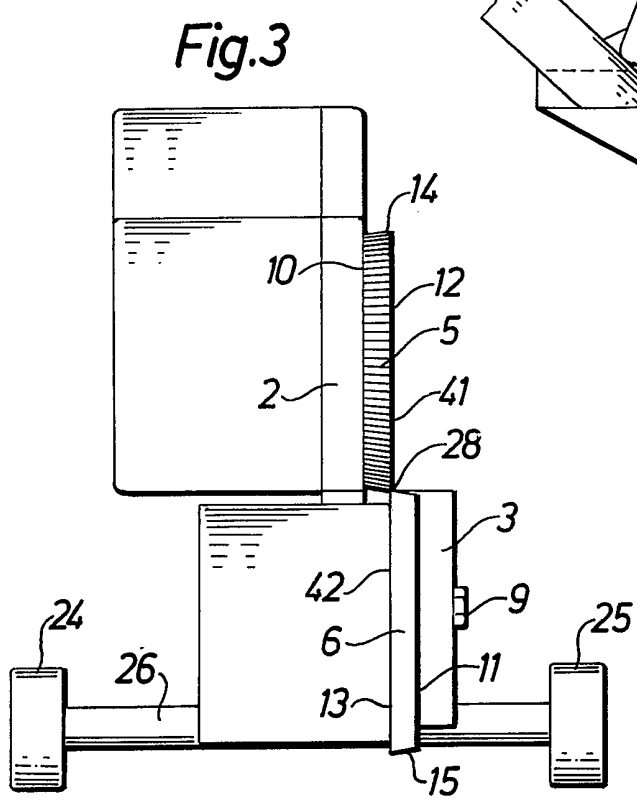
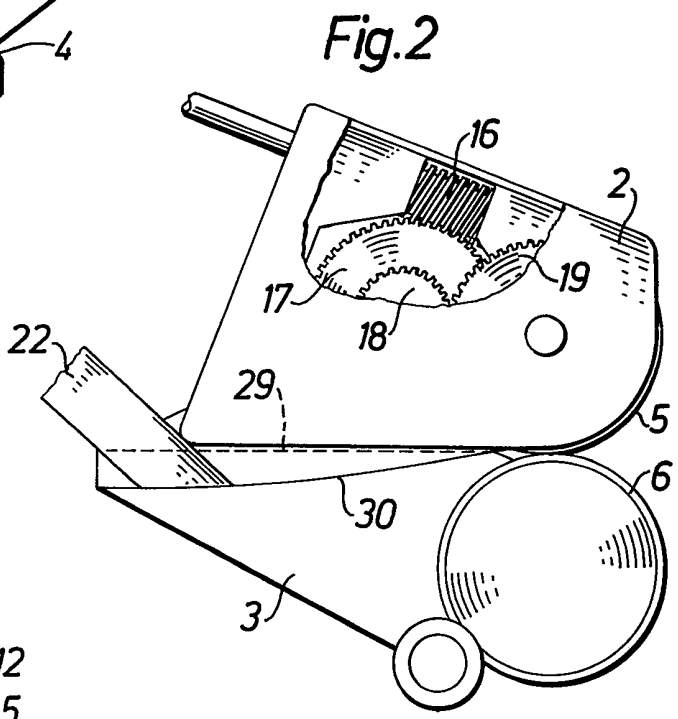
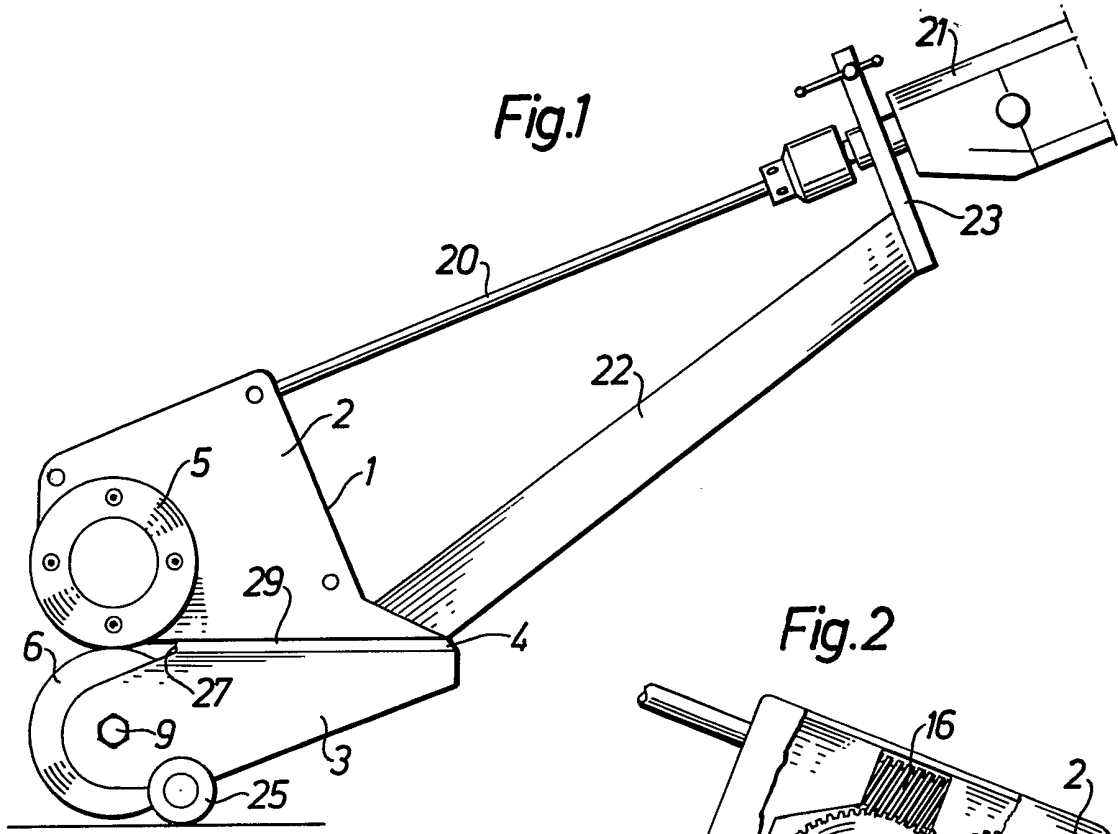


Fig.4

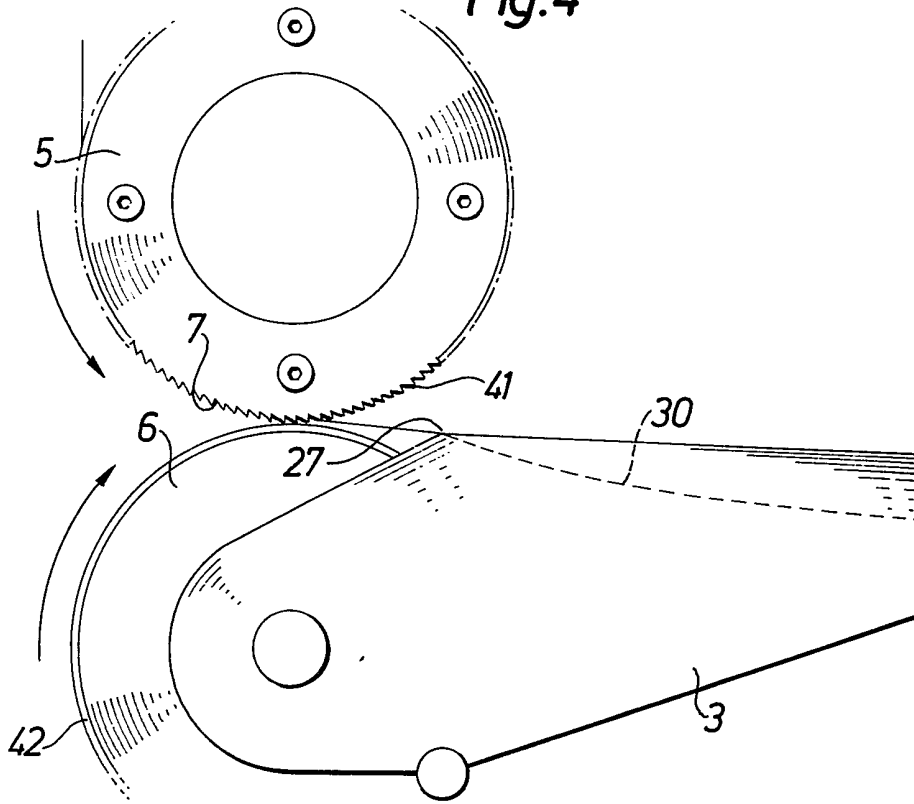


Fig.5

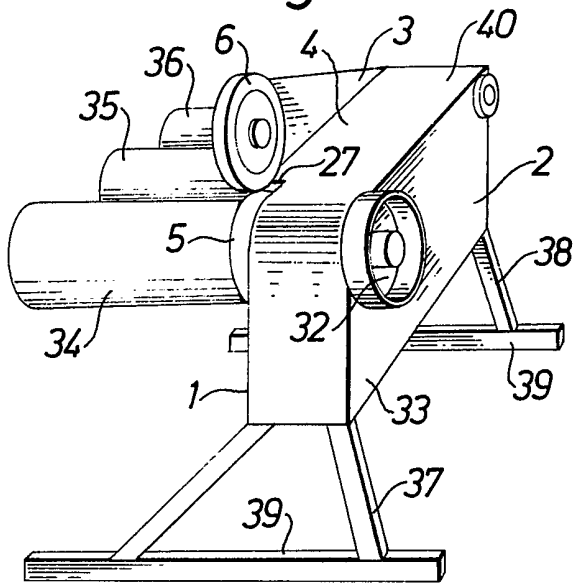
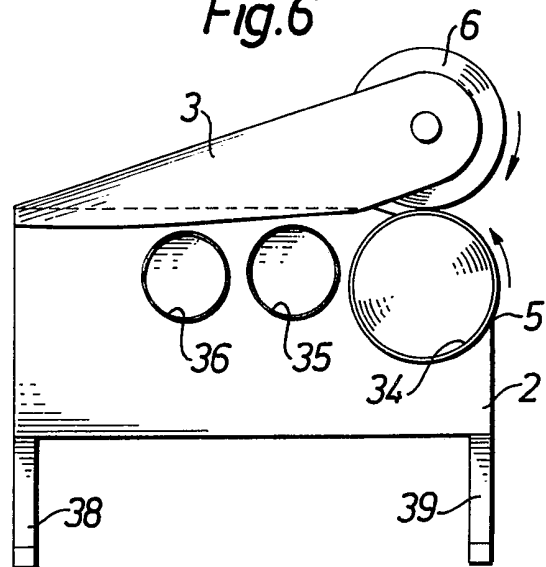


Fig.6



SPECIFICATION

Improvements in or relating to a shearing machine

5 This invention relates to a shearing machine for shearing or cutting both heavy-guage sheet metal and thin sheet metal.

There is a requirement for a shearing machine which can cut heavy-guage sheet metal both in
10 straight lines and in arcuate lines, in a simple and rapid manner and which can thus advantageously replace flame cutting. An advantage of such a shearing machine when compared with a flame cutter is that it enables sheet to be cut without
15 destroying any hot hardening that has been imparted to the sheet without any appreciable deformation or material accumulation occurring at the sheet cuts.

According to this invention there is provided a
20 shearing machine for shearing sheet material, said machine comprising a support body having a first part and a second part, which are laterally offset from one another, and an intermediate horizontal
25 part which connects the first and second parts and two co-operating shearing wheels between whose shearing edges the sheet is cut, one of the shearing wheels being toothed, driven and mounted in the
30 first part of the body, the second shearing wheel being mounted in the other part of the body for free co-rotation, the shearing wheels being axially offset from one another and having their shearing edges in
35 tangential contact with one another, the outer surfaces of the shearing wheels being bevelled and the larger side faces of the shearing wheels formed by the bevels being disposed in the same vertical plane
40 at least with respect to the peripheral surface portions, said intermediate horizontal body part forming a wedge-shaped deflector having its leading edge disposed in line with and at a distance from the
45 nip between the shearing wheels, said deflector having opposed side surfaces adapted each to guide a respective piece of the sheet after the sheet has been cut, and the shearing machine being free from structural elements on either side of the shearing
50 wheels and the body at the level of the shearing wheel nip and the wedge-shaped deflector.

The bevel of the shearing wheels may be about 5°. The machine may be adapted to be driven by a
55 pneumatic or electric hand drill releasably connected to the machine, by means of a mounting on the shearing machine.

The machine may be adapted to be moved and guided manually, being provided with wheels or the like, although alternatively the machine may be
60 adapted to be stationary.

In order that the invention may be more readily understood and so that further features thereof may be appreciated, the invention will now be described by way of example with reference to the accompany-
65 ing drawings, in which:

Figure 1 is a side elevational view of one embodiment of a shearing machine according to the invention;

Figure 2 is a part of the shearing machine of *Figure 1* seen from the opposite side with certain parts cut
70

away;

Figure 3 shows the shearing machine of *Figure 1* in end elevation;

Figure 4 shows part of the shearing wheels in the shearing machine of *Figure 1*;

Figure 5 is a perspective view of a shearing unit according to the invention in the form of a stationary construction; and

Figure 6 is a side elevational view of the shearing machine of *Figure 5*.

Figures 1 to 3 shows a shearing machine according to the invention comprising a body 1 which in turn comprises a first vertical part 2, which is at the top in the example illustrated, and a second vertical part 3 (at the bottom in the example illustrated), with an intermediate horizontal part 4. The top and bottom parts of the body are laterally offset from one another. The body is made in one piece, e.g. by casting or by welding together the said three parts to provide a stable structure.

The shearing machine also comprises shearing members consisting of two wheels which co-operate with one another, i.e. a driven shearing wheel 5 and a freely rotating or co-rotating shearing wheel 6, the wheels each being situated in their own vertical planes and being in offset parallel relationship to one another. The driven shearing wheel 5 is toothed, the edges of the teeth 7 extending in the direction of rotation as shown by an arrow in *Figure 4*. The driven wheel 5 is disposed on an axle 8 mounted rotatably in the top part 2 of the body. The freely rotating wheel 6 is mounted rotatably on an axle 9 rigidly secured in the bottom part 3 of the body. Alternatively, the latter axle can be mounted rotatably in the bottom part, the shearing wheel being secured to the axle. The axles are parallel and situated at a predetermined distance from one another depending on the diameter of the shearing wheels 5, 6, and the axles are stub axles, i.e. they have a fixed mounting both axially and radially. The construction of the body as a single stable member facilitates this fixing of the axles. The position of the bottom axle can be adjusted radially relative to the first axle to compensate for any loss of material occurring, during grinding, at the edges of the shearing members.

Each shearing wheel has an inside face, 10 and 11 respectively, facing the corresponding body part 2 and 3 respectively, and an outside face 12 and 13 respectively, and a radially outer surface 14 and 15 respectively. The outside faces 12 and 13 each have a larger diameter than the corresponding inside faces 10 and 11 respectively, so that the radially outer surfaces each have a bevel which is preferably 5° or thereabouts. The peripheral corner between the radially outer surfaces and the outside of each shearing wheel forms a peripheral shearing edge 41, 42 which, because of the said bevel, has an angle of less than 90°, and which is preferably therefore 85° or thereabouts. To achieve effective cutting, the shearing edges 41, 42 must touch one another, at a nip, and this means that the outside faces 12, 13 of the shearing wheels, or at least the peripheral outer parts thereof, should be the same plane. The shearing nip formed by the shearing wheels thus has no
130

intermediate gap. The shearing wheels are thus single shearing, and this means that a single cutting groove or shearing cut is formed continuously when a sheet passes through the shearing wheel nip and
5 no cuttings are therefore formed.

The intermediate horizontal part 4 of the body also has the function (in addition to being a connector) of acting as a deflector and for this purpose it is constructed in the form of a wedge, the leading edge
10 27 of which is situated in line with the nip of the shearing wheels 5, 6, at right angles to the direction of sheet feed and at a distance from, i.e. somewhat after, the nip 28 between the wheels. The wedge-shaped deflector has a top supporting surface 29 and
15 a bottom supporting surface 30 (or a first supporting surface 29 and a second supporting surface 30), the top surface 29 advantageously being coplanar with the shearing wheel nip or contact point so that the piece of sheet separated on the right (with reference
20 to Figure 3) will be taken up on the top supporting surface 29 of the deflector while the left-hand piece of sheet will be guided beneath the deflector and guided by its bottom supporting surface 30.

The top shearing wheel is driven via a reduction
25 gear comprising a combination of a worm 16 and a gearing comprising three gearwheels 17, 18, 19 mounted in the top part 2 of the body 1. The worm and the gearing are protected by a cover secured to the body 1. The worm is connected to or formed on a
30 drive shaft 20 extending rearwardly from the body to connect with the chuck conventional hand drill 21, e.g. of a power of 450 W, as the power source, and this has proved adequate for cutting 4 mm sheets. A bar 22 is secured to the body 1 and extends
35 rearwardly therefrom. The rear end of the bar is provided with a mounting 23 to support and secure the power source 21, which may be pneumatically or electrically driven.

The shearing machine also comprises two support
40 wheels 24, 25 mounted on a shaft 26 fixed to the bottom part of the body. The wheeled shearing machine is thus readily mobile and can be easily manoeuvred by the operator to a convenient working position before or during the shearing operation.

The power source is advantageously controlled by a control of the steplessly adjustable type so that the sheet can be sheared at a controllable speed according to individual conditions. The sheet feed through the nip thus depends on the speed of the driven
50 shearing wheel 5.

A cylindrical support 31 is provided on the axle 9 of the bottom shearing wheel 6 and is adjacent the outside face of the wheel 16. The support 31 bears the left-hand piece of sheet during cutting as viewed
55 in the direction of sheet feed.

A shearing machine in accordance with the invention can also be constructed for shearing on a bench or the like, i.e. at a normal working height, in which case the driving shaft 20 is shortened and the bar 22
60 is removed from the above-described embodiment and the mounting for the power source is combined directly with the body to enable the releasable connection of the power source to the worm shaft.

Figures 5 and 6 show an alternative embodiment
65 of a shearing machine in accordance with the

invention for stationary use. The essential structural elements of the shearing machine for performing the shearing operation are the same as in the previously described embodiment and therefore have the same
70 references. However, the shearing machine is inverted in relation to the previously described construction, so that the toothed and driven shearing wheel 5 is situated below the freely rotating shearing wheel 6, although they both co-operate as described
75 previously. A belt engaging wheel 32 is provided at the bottom part 33 of the body for connection to an electric motor via a belt, the shearing wheel 5 being driven via a reduction gear as described previously. A cylindrical support 34 is provided on the shaft of
80 the driven shearing wheel to support the right-hand piece of sheet as considered in the direction of sheet feed. Another two such supports 35, 36 are provided on the first part of the body after the said cylindrical support 34 in the direction sheet feed. The shearing
85 machine is supported by two pairs of legs 37, 38 inter-connected by cross-members 39, by means of which the machine can be mounted on a suitable foundation.

The intermediate part 4 of the body has the same
90 location and function as in the first-described embodiment. The top of the first part of the body is constructed as a plane supporting surface 40 which merges into the top supporting surface of the wedge-shaped deflector 4.

In both the embodiments described above, the construction proposed does not result in any components which restrict operation located at the sides of the shearing machine level with the nip 28 of the shearing wheels 5, 6 and the deflector wedge 4.

On either side of the shearing nip and the deflector
100 wedge, in the direction extending from and at a level with the nip and the deflector wedge respectively, the shearing machine is completely free of any structural element which might obstruct the relative
105 movement of the sheet or the shearing machine. This means that the sheet to be sheared may have any desired width and the cut can be made to an arc, even an arc having a very small radius. It is to be appreciated also that there is not any obstructive
110 component at the said level in the direction of relative movement of the sheet after the cut has been made, i.e. behind the nip of the shearing machine.

A preferred embodiment of a shearing machine
115 described above surprisingly enables heavy-gauge sheet of any material to be cut. Sheet of virtually any desired gauge can be cut by appropriate dimensioning of the shearing wheels and power source. The edges of the cut continue to be clean and even
120 require no subsequent machining, unlike the edges obtained in flame cutting, which additionally destroys the hot hardening of the sheets.

The actual shearing operation is virtually silent and smooth with very good control of the shearing
125 line at the speed that is considered appropriate, particularly if a steplessly adjustable speed control is used. Large sheets can be cut and there is no difficulty in cutting long even curves after the sheet has been placed on the supports at the nip height.

130 An important advantage of the preferred embodi-

ment is that a conventional drill machine can be used as the power source and can be rapidly and easily connected to the shearing machine as illustrated and described hereinabove with reference to

5 Figures 1 to 4.

CLAIMS

1. A shearing machine for shearing sheet material, said machine comprising a support body having a first part and a second part, which are laterally offset from one another, and an intermediate horizontal part which connects the first and second parts and two co-operating shearing wheels between
10 whose shearing edges the sheet is cut, one of the shearing wheels being toothed, driven and mounted in the first part of the body, the second shearing wheel being mounted in the other part of the body for free co-rotation, the shearing wheels being
15 axially offset from one another and having their shearing edges in tangential contact with one another, the outer surfaces of the shearing wheels being bevelled and the larger side faces of the shearing wheels formed by the bevels being dis-
25 posed in the same vertical plane at least with respect to the peripheral surface portions, said intermediate horizontal body part forming a wedge-shaped deflector having its leading edge disposed in line with and at a distance from the nip between the shearing
30 wheels, said deflector having opposed side surfaces adapted each to guide a respective piece of the sheet after the sheet has been cut, and the shearing machine being free from structural elements on either side of the shearing wheels and the body at
35 the level of the shearing wheel nip and the wedge-shaped deflector.

2. A shearing machine according to claim 1, wherein the bevel of the shearing wheels is about 5°.

3. A shearing machine according to any of the preceding claims, adapted to be driven by a
40 pneumatic or electric hand drill releasably connectable to the machine by means of a mounting on the shearing machine.

4. A shearing machine according to any of the preceding claims, adapted to be moved and guided manually.

5. A shearing machine according to claim 1 or 2, adapted to be stationary.

6. A shearing machine substantially as herein described with reference to and as shown in Figures
50 1 to 4 of the accompanying drawings.

7. A shearing machine substantially as herein described with reference to and as shown in Figures 5 and 6 of the accompanying drawings.

55 8. Any novel feature or combination of features disclosed herein.

New claims or amendments to claims filed on 4.3.82
Superseded claims 1 and 3 - 8 inclusive

60 New or amended claims:-

1. A shearing machine for shearing sheet material, said machine comprising a support body having a first part and a second part, which are laterally offset from one another, and an intermediate hori-
65 zontal part which connects the first and second parts

and two co-operating shearing wheels between whose shearing edges the sheet is cut, one of the shearing wheels being toothed, driven and mounted in the first part of the body, the second shearing
70 wheel being mounted in the other part of the body for free co-rotation, the shearing wheels being axially offset from one another and having their shearing edges in tangential contact with one another, the outer surfaces of the shearing wheels
75 being bevelled and the larger side faces of the shearing wheels formed by the bevels being disposed in the same vertical plane at least with respect to the peripheral surface portions, said intermediate horizontal body part forming a wedge-shaped de-
80 flector having its leading edge disposed in line with and at a distance from the nip between the shearing wheels, said deflector having opposed side surfaces adapted each to guide a respective piece of the sheet after the sheet has been cut, the shearing machine
85 being free from structural elements on either side of the shearing wheels and the body at the level of the shearing wheel nip and the wedge-shaped deflector, the shearing machine being adapted to be driven by a pneumatic or electric hand drill releasably connect-
90 able to the machine also being adapted to be moved and guided manually, on support wheels mounted on a shaft fixed to the lower part of the support body.

3. A shearing machine substantially as herein described with reference to and as shown in Figures
95 1 to 4 of the accompanying drawings.

Printed for Her Majesty's Stationery Office, by Croydon Printing Company Limited, Croydon, Surrey, 1982.
Published by The Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.