Sept. 27, 1932. W. LINDEMANN 1,879,356

BRIQUETTING PRESS

Filed Sept. 1, 1931

Fig. 3

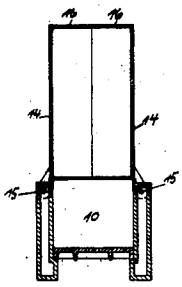


Fig. 1

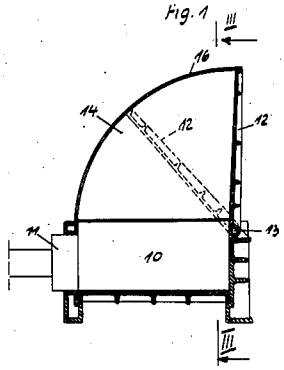


Fig. 5

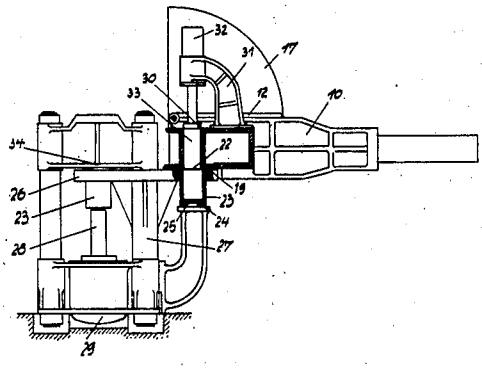
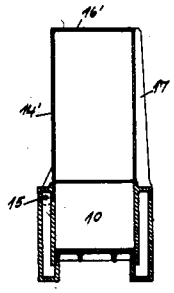


Fig. 2

Fig. 4



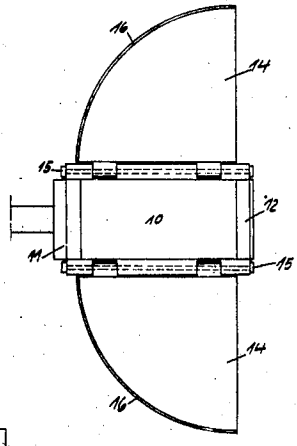


Fig. 6

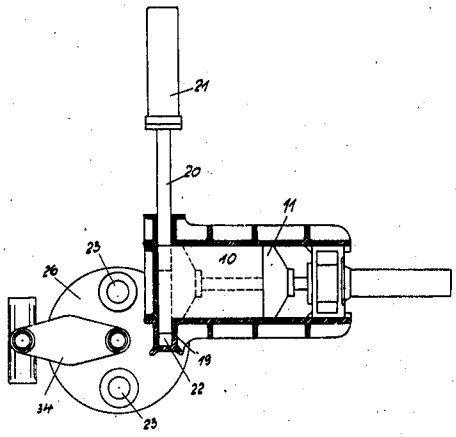
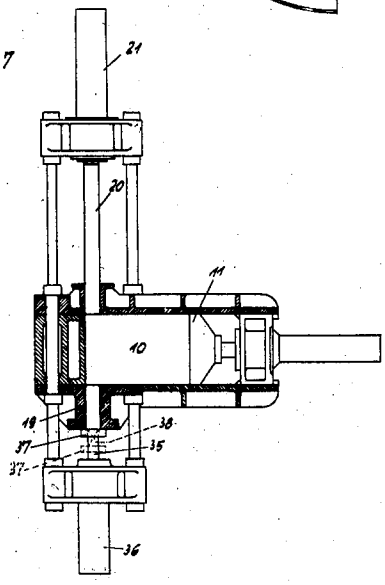


Fig. 7



Waldemar Lindemann
Inventor

Victor J. Evans & Co.
Attorneys.

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UNITED STATES PATENT OFFICE

WALDEMAR LINDEMANN, OF DUSSELDORF, GERMANY

BRIQUETTING PRESS

Application filed September 1, 1931, Serial No. 560,676, and in Germany January 31, 1931.

My invention relates to devices on presses, used for briquetting metal turnings and borings of different description.

One object of my invention is a press suitable for bundling very curly and bulky turnings, especially steel turnings, and to bundle this material, if necessary, under highest pressure.

One object of my invention is a device for filling in of bulky turnings into the pressbox of a briquetting press, whereby the turnings, by means of this device, are already subject to a preliminary pressure and whereby the closing lid pushes the turnings out of this device into the pressbox, where they are subject to a further compression.

Another object of my invention is the combination of a bundling press with a briquetting press.

A further object of my invention is a bundling press for turnings, combined with briquetting chamber.

It has been necessary hitherto, to crush very curly and bulky turnings, especially steel turnings, before bundling same, owing to the bulk of this material having such a low density that only a relatively small volume could be filled into the pressbox. The crushers, used for this purpose, are however very often damaged by solid pieces of iron, the turnings are mixed with, thus making the crushing process very expensive. I therefore provide my press with a device, by which the capacity of the pressbox is considerably enlarged at the beginning of the pressing process, thus enabling the turnings to be filled in without any previous crushing process. In order to transform the turnings into briquettes by exerting the maximum of pressure, I combine such a press with a briquetting press.

In the drawing:

Fig. 1 is a vertical section through a pressbox with filling device.

Fig. 2 shows the device as per Fig. 1, seen from above.

Fig. 3 is a vertical section as per line III—III of Fig. 1.

Fig. 4 shows the same device as that in Fig. 3 in a somewhat modified construction.

Fig. 5 shows partly in section a combination of a bundling press with a briquetting press, whereby the moulds of the latter are arranged in a rotary table.

Fig. 6 is a view from above, partly in section, from the press as per Fig. 5. The dotted lines show the pressure ram 11 in its final position, furthermore the pressure ram 20, which has penetrated somewhat into the pressbox.

Fig. 7 is another combination of a bundling press with a briquetting press, whereby the mould of the briquetting press forms a part of the pressbox of the bundling press.

Referring to Figs. 1 to 4, 10 is the pressbox of a horizontal bundling press, 11 is the pressure ram moving therein and 12 the lid, swinging around the axle 13. It is advisable to arrange the axle 13 beneath the upper board of the pressbox, so that the lid, when being shut, is lying within the walls of the box. The mechanism for moving the pressure ram 11 and the lid 12 may be of any kind and same being well known and not forming part of my invention, they have not been represented.

Either sides of the pressbox 10 are fitted with flappable hoppers 14, swinging around the axle 15, either of these hoppers having a vertical border or flange 16, being of sufficient length to enable the hoppers 14 to form a completely shut casing, when same have been lifted into their vertical position, whereby the borders 16 are joined.

The hoppers 14 have a circular shape and they comprise about the quarter part of a circle, the radius of which, measured within the borders 16 correponds with the length of the lid 12. These hoppers can be moved by any hydraulic or mechanical means, which are not shown on the drawing, into their horizontal or vertical position.

When these hoppers are in their horizontal position, as shown in Fig. 2, they act as filling moulds. Not only the pressbox 10 but also the hoppers 14 can be filled with turnings. The hoppers 14, after having been lifted into their vertical position, as shown in Figs. 1 and 3, so that the borders or flanges 16 are joining, form an enlargement of the

pressbox. The lid 12, standing in vertical position as shown in Fig. 1, shuts this enlarged box at one side.

As soon as the lid 12 penetrates into the pressbox, as shown in dotted lines in Fig. 1, pushes the turnings, which are enclosed by the 2 hoppers 14, into the pressbox, thus subjecting the material to be pressed to a preliminary pressure before the real pressure process has begun. When the lid has been shut, the hoppers 14 can return into their horizontal position. Now the real pressure process begins in the usual way by advancing of the pressure ram 11.

Although the pressbox is generally fitted with 2 hoppers 14, it is also possible to arrange for a single hopper only, as shown in Fig. 4. This construction provides a hopper 14′ on one side of the pressbox and a fixed vertical wall on the opposite side. In this case, the border or flange 16′ of the hopper 14′ is of sufficient length, that it joins the fixed wall 17, when the hopper is in its vertical position.

Owing to the fact, that bulky turnings, when pressed into a bundle, do not hold sufficiently together, the press, as above described, is generally combined with a device, allowing to exert a further and especially high pressure onto the bundle, thus transforming same into a briquette.

The pressbox 10 of the press, represented in Figs. 5 and 6, has a lengthening 19 on one side. A pressure ram 20 moves through an opening in the opposite wall of the pressbox, this ram being generally actuated by a hydraulic mechanism 21 and being of sufficient length so as to enter the lengthening 19. The bottom of this lengthening 19 has an opening 22, beneath which the mould 23 of a briquetting press can be placed. At the bottom of the mould 23 a plate 25 is loosely lying on a support 24. The rotary table 26, turning around the standard 27 of a briquetting press, is fitted with several of these moulds. This briquetting press is fitted with a pressure ram 28 which can be lifted by means of a hydraulic cylinder 29.

A pressure ram 30 is arranged in the upper wall of the lengthening 19, this ram 30 being actuated by a hydraulic piston 32, fixed to the standard 31. As this standard 31 does not allow the arrangement of the flappable hopper 14 on this side of the pressbox generally the construction as per Fig. 4 is adopted in this case, whereby a hopper 14 is only provided on one side, whereas a fixed wall 17 is arranged on the side of the pressbox, opposite to the standard 31, as it is represented in Fig. 5.

When the turnings have been subject to a preliminary pressure by closing the lid 12, they are pressed to a bundle by the advancing ram 11. As always bulky turnings are to be pressed, these do not enter the lengthening 19, when same are compressed. As soon as the pressure ram 11 has advanced up to the chamber 19, it will be stopped, whereupon the pressure ram 20 advances. This ram exerts an additional pressure onto the pressed bundle and pushes it into the chamber 19. The bundle is hereby pressed in such a degree, that it can pass the opening 22. The pressure ram 20 will be stopped as soon as it has advanced up to the border of the opening 22. Now the pressure ram 30 is set in motion, which pushes the bundle 33 through the opening 22 into the mould 23.

The rotary table 26 can now be turned until the mould 23 with the bundle therein has reached the position above the pressure ram 28, whereupon same is lifted, together with the plate 25, thus compressing the bundle into a briquette, whereby the top sill 34 of the press forms the counterplate for the mould 23, which is open at the upper end.

By further turning of the rotary table, the briquettes will then be ejected out of the mould 23 by means of a second ram, which is not represented.

The construction of the briquetting press is well known and does not form a part of this invention. My invention does however not only refer to the construction, as represented above, whereby the bundling press is arranged above the rotary table 26, turning around a vertical axle and whereby the bundle is pushed into the mould 23 from above.

The arrangement could also be made in that way, that the bundle is pushed from below into the mould of a briquetting press. Furthermore a briquetting press could be used, whereby the rotary table turns around a horizontal axle and whereby the bundling press is arranged in that way, that the bundle is pushed from the side into the mould of a briquetting press.

The rotary table of the briquetting press is fitted with several moulds 23. The rotary table is fitted with a bolting up device, by means of which the rotary movement of the table can be stopped as soon as a mould 23 is standing beneath the opening 22.

This locking up device is combined with the control valve of the press in that way, that the press cannot be set going, when this device is bolted up. This device does however not form a part of my invention and it is therefore not represented on the drawing.

Fig. 7 represents a somewhat modified construction. Here, the pressbox 10, the pressure ram 11, the lateral lengthenings 19 and the pressure ram 20 have been arranged in the same way as shown in Fig. 6. The bottom of the lengthening 19 is however not fitted with an opening. Contrary to Fig. 6, where the end of the lengthening is shut, this lengthening is open in this case and will be shut by means of the ram 35, which is actuated by the hydraulic cylinder 36. The end

37 of the pressure ram 35 is generally somewhat larger than the opening of the chamber 19, so that the pressure ram cannot enter this chamber. When the pressure ram 11 has advanced up to the lengthening 19 and when it has thus pressed the turnings into a bundle, this bundle will be pushed into the chamber 19 by means of the advancing ram 20. The pressure of this ram is so high, that the bundle is transformed to a briquette in the chamber 19. After this pressure process the ram 35 returns into the position as shown in dotted lines on the drawing and the ram 20 advances, so that the briquette 38 is kept outside the pressbox between the rams 20 and 35, as shown in dotted lines. The briquette falls down as soon as the ram 20 is drawn back, whereupon the ram 35 is lifted anew until its head 37 reaches the opening, thus enabling the beginning of a new pressing process.

My claims are the following:

1. A bundling press, having a pressbox, a lid suitable for closing this box, means in this pressbox, suitable for compressing the material, filled in, flappable hoppers on opposite sides of the pressbox arranged for being placed into a horizontal or vertical position, borders or flanges on these hoppers, suitable for joining, when the hoppers are in their vertical position and furthermore suitable for guiding the lid in a closed casing.

2. A bundling press, having a pressbox, means in this pressbox for compressing the material filled in, a lid, suitable for being turned and to shut the said pressbox, flappable hoppers at either sides of the pressbox, arranged by the side of the lid, these hoppers being suitable for being moved into a horizontal or vertical position and having the shape of a quarter of a circle, the radius of this circle corresponding with the length of the aforementioned lid, the hoppers being furthermore fitted with borders or flanges, suitable to form a closed casing above the pressbox in connection with the hoppers themselves and the lid, when the hoppers are in their vertical position.

3. A bundling press, having a pressbox, means in this pressbox for pressing the material filled in a lid, suitable for being turned and to shut the said pressbox, a fixed wall, having the shape of a quarter of a circle and forming the lengthening of one wall of the pressbox, a flappable hopper on the opposite side of the pressbox, suitable for being turned into a horizontal or vertical position, the said hopper having the shape of a quarter of a circle, with a radius, corresponding more or less with the length of the said lid, this hopper being fitted with a border or a flange, suitable to join the said wall, when the hopper is in its vertical position.

4. The combination of a bundling press, having a pressbox, means in this press box for compressing the material filled in, a lid, suitable for being turned and to shut this pressbox, a fixed vertical wall, forming the lengthening of a wall of the pressbox, a flappable hopper on the opposite side of this pressbox, suitable for being moved into a horizontal or vertical position and to form a closed casing in connection with the said fixed wall and the lid, which joins this casing in any of its positions, with a second press, suitable to receive the bundles of the first press and to transform same into briquettes.

5. A press, having a pressbox, a lid, suitable for closing this pressbox, means in this pressbox for pressing the material, a lengthening on one side of the said pressbox, a pressure ram in the opposite wall of the pressbox, means to actuate this ram, same being suitable for pushing the compressed material into the aforementioned lengthening, an opening in said lengthening, a third pressure ram arranged opposite to said opening, a rotary table, fitted with moulds, suitable for being moved underneath the said opening and means for compressing the material, which has been pushed into the said moulds.

6. A press, having moulds, a pressure ram, suitable for being moved into said moulds, a support for said moulds, a rotary table, containing said moulds, a pressbox, fitted with a lid, means in this pressbox for compressing the material, filled in, a lengthening on one side of the said pressbox, means for pushing the material into said lengthening, an opening in said lengthening, the rotary table being suitable for bringing said moulds in communication with said opening and means for pushing the material into said moulds.

7. A press having a pressbox fitted with a lid, means in this pressbox for compressing the material, a lateral lengthening on said pressbox, an opening in the wall of the pressbox which is arranged opposite to said lengthening, a pressure ram in said opening, suitable for being moved into said lengthening, means for actuating this pressure ram, a ram, suitable for closing the said opening and means to actuate this ram.

In testimony whereof I affix my signature.

WALDEMAR LINDEMANN.