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ROTARY BLOCK PRESS

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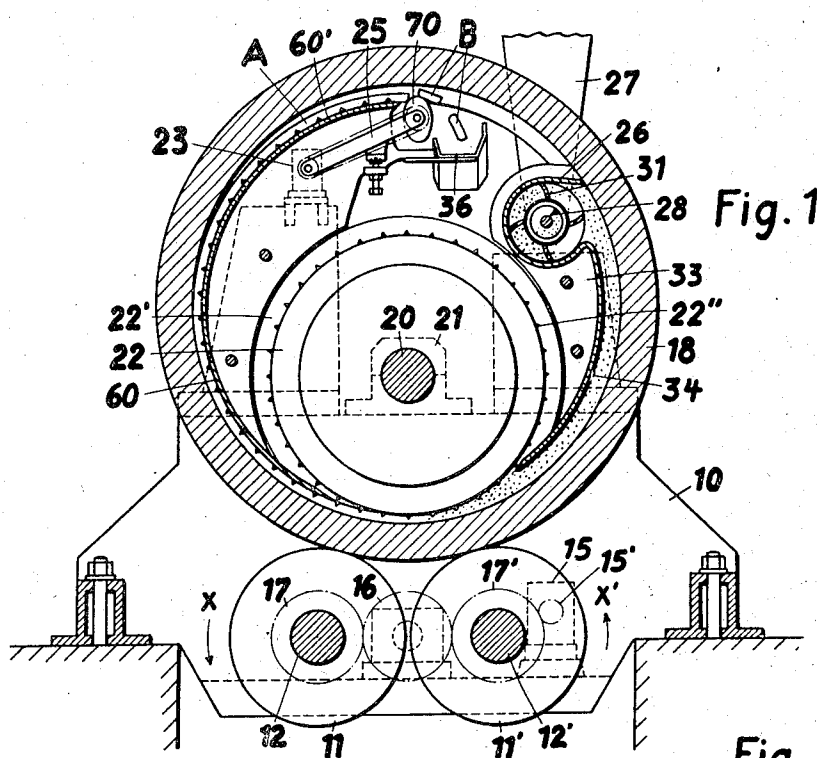


Fig. 1

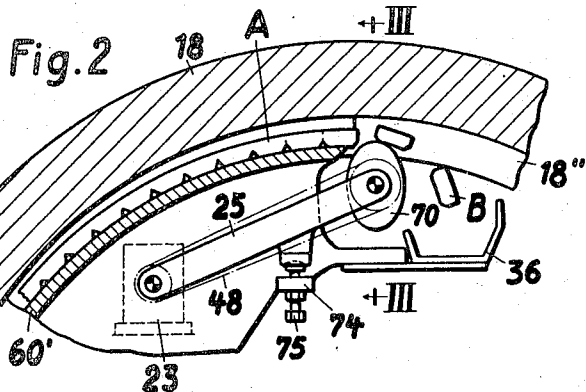


Fig. 2

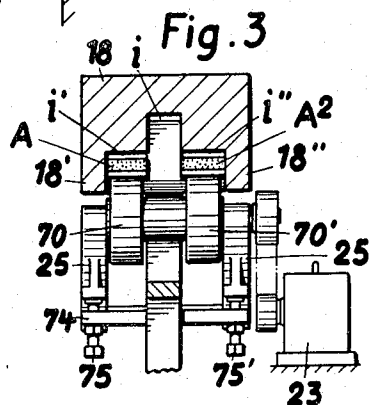


Fig. 3

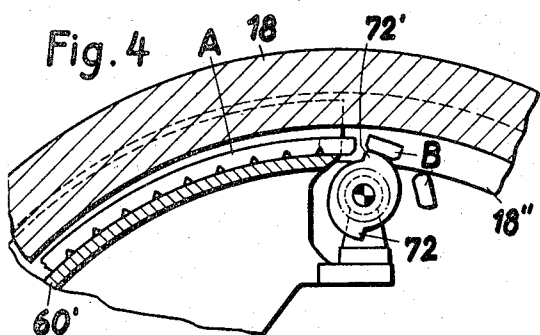


Fig. 4

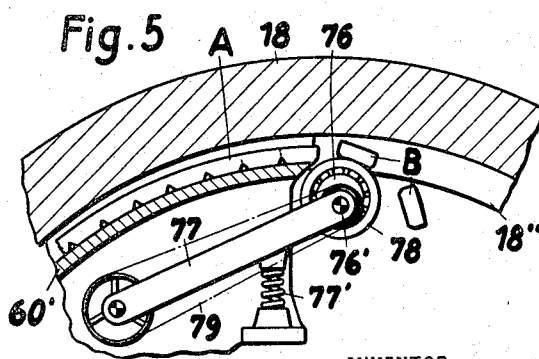


Fig. 5

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ROTARY BLOCK PRESS

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7 Claims. (Cl. 25—21)

My invention relates to the art of making solid blocks or briquettes from granular or powdered material in bulk such as charcoal dust, lignite, ore, slags, shavings etc. with or without binding agents; and more especially to improvements in rotary block presses of the ring-roller type having a rotary mold ring in upright position and grooved at its inner periphery and a compression roller excentrically arranged to and mating with said mold ring as they rotate, wherebetween the raw material under treatment is continuously fed and compressed into a continuous strip, and hereinafter briefly called "blank", which is continuously removed from the mold ring and broken into individual briquettes.

The improvements dealt with hereinafter will be better understood by first critically reviewing the state of the art concerning briquetting presses of the ring roller type described.

It has been proposed to remove the blank from the mold ring and to concurrently break it into individual pieces by means of a stationary wedge shaped deflecting member extending into the mold of the rotating ring and having a curved inner working face, against which the upper free end of the blank is forced.

As a matter of fact by this rather rough treatment the blank is abruptly broken into pieces of unequal length, and a great proportion of small pieces and fines are produced which are undesirable because of tending to choke the grates of furnaces, wherein they are to be burned.

A structurally improved rotary press has become known in this art, wherein the blank is formed with indentations promoting the production of briquettes of equal length and wherein the blank is also positively removed, namely scraped or raked out of the mold ring by a stationary deflecting wedge extending into the mold of said mold ring, and then ascends through a curved channel or duct formed by the concave inner face of said deflecting wedge and the convex face of another guiding and supporting member engaging the blank from within.

The blank on issuing from said curved duct, is subdivided into single briquettes by a separate breaking means of specific design comprising an excentric disc rapidly rotated at high speed, and a spring resiliently supporting said disc.

It has been found in the course of the inventor's practical experiments that the said blank deflecting wedge cooperating with the mold ring and the blank breaking means,—which was heretofore considered to be an indispensable element

for positively removing the blank and for supporting it from the rear near the breaking points,—is rapidly and prematurely worn out by its highly abrasive frictional contact with the blank, and that keeping the said deflecting wedge in repair and replacing it calls for highly skilled labour, and causes frequent and long interruptions in the work of the press more so, since said wedge is difficult of access and supervision lying in a remote place and out of sight.

Another more serious drawback inherent to said rotary briquetting presses consists in that the blank—because of containing often chips of wood, roots and pieces of hard or sticky foreign minerals of various description—is liable to accidentally choke the passage between the said deflecting wedge and the opposed inner guiding and supporting member, with the result, that the press is stopped and subject to breakage of vital parts.

Still another drawback of rotary briquetting presses of the type set forth consists in that the energy consumed by the frictional interengagement of the blank and the said deflecting wedge and the energy consumed in rotating at high speed—namely in practice at about 3000 R. P. M.—the said excentric disc for breaking the blank into pieces considerably adds to the total consumption of power by the press.

The principal object of this invention is to overcome the said drawbacks by providing a structurally simplified block press of the ring roller type described so re-designed, that its consumption of power is greatly reduced and that the press can be more easily supervised and kept in proper working condition.

Other objects aimed at by the invention and advantages obtained will become apparent incidentally to practitioners in this field as the description proceeds.

A salient feature of the re-designed block press is the absence of a deflecting wedge: It has been found, that blanks of conventional cross sectional shape and made for instance from brown coal or lignite finely comminuted, heated and dried down to about 15% water content are apt to freely and cleanly pass out of the annular mold of the mold ring by the action of their own gravitational forces, namely on approaching the inner crown portion of the mold ring.

Another equally important feature of the invention is the provision of a re-designed breaking device preferably a rotary one, acting upon the free and unsupported end of the blank, namely the very briquette to be severed, so ab-

ruptly and violently, that the mass of the last but one briquette and its other mates will effectively assist in the breaking action by their own inertia and with the result, that the individual

5 briquettes are cleanly severed and broken off the blank at its indentations.

The nature and scope of the invention are briefly outlined in the appended claims and will be more fully understood from the following

10 specification taken together with the accompanying drawing, in which

Fig. 1 is a side elevation, partly in section and showing a rotary block press re-designed according to this invention,

15 Fig. 2 is a fragmentary section vertically taken through the press and showing in a larger scale the upper portion of the mold ring and the breaking device,

Fig. 3 is a fragmentary cross section taken on

20 line III—III in Fig. 2,
Figs. 4 and 5 diagrammatically show structurally modified breaking devices for rotary block presses re-designed according to this invention.

25 The rotary block press structurally improved with the objects in view outlined above comprises:

(1) A frame 10, wherein two rollers 11, 11' keyed to rotary shafts 12, 12 are journaled for

30 supporting and revolving,
(2) A mold ring 18 formed at its inner periphery with a T-shaped annular recess, consisting of a relatively deep guide groove *i* in the center and two stepped mold grooves *i'*, *i''* formed at

35 both sides by flanges 18', 18'',
(3) Means for rotating said rollers 11, 11' in the direction of the arrows *x*—*x'*, and comprising an electric motor 15 and a train of gear wheels 15', 16, 17, 17' cooperatively intercon-

40 necting said electric motor and rollers 11, 11',
(4) A pressing roller 22 keyed to a rotary shaft 20 and journaled in bearings 21 of the frame 10 in an excentric position to the mold ring 18 for cooperation with the latter as they rotate;

45 said pressing roller 22 is formed on its peripheral faces with a central annular rib 22' for engagement with the said central groove *i* of the mold ring 18 and with teeth 22'' for producing spaced indentations or notches in the blanks

50 A, A2 (Fig. 3),

(5) A feeding device attached to the frame 10 for charging the material under treatment into the mold ring 18; said feeding device, diagrammatically shown in Fig. 1, comprises a hopper 27, through which the material proceeds into a worm conveyor 28, and a bladed rotary propeller surrounding said worm conveyor and being enclosed in a casing 26; by the blades 31 of the propeller the material is thrown in to the

60 aforesaid grooves *i'*, *i''* of the rotating mold ring; curved cover plates 34 attached to casing 25 and provided with a central reinforcing rib 33 are provided for guiding and retaining the material in said grooves *i'*, *i''* on its way to the

65 pressure roller 22,
(6) Crescent shaped guide plates 60, 60' for covering the blanks, A, A2 from without in the lower section of the mold ring as they ascend from their birth place underneath the pressure roller 22, and supporting the blanks on their way

70 out of the press: the crescent shaped guide plates 60, 60' for covering the blanks A, A2 follow the inner contour of the mold ring. The lower ends of the crescent-shaped plates are adjacent to the pressing roller and the upper ends of said plates

extend to a point within the crown portion of the mold ring. According to this invention said blanks A, A2 are allowed to gradually liberate themselves spontaneously in the upper section of the mold ring 18 and to be deflected therefrom

5 by their own gravitational forces.
For this purpose the upper portions 60' of the said crescent shaped plates are spaced wider apart from the mold ring 18 than their lower ends and preferably terminate underneath its

10 crown portion so as to support the blanks A, A2 for a considerable length of their way out of the press and before being broken into pieces by

(7) A blank breaking device; the latter is of the impact giving type and preferably arranged 15 closely underneath the upper terminal edges of the crescent shaped guide plates 60, 60'; in the embodiment of the invention shown by way of an example in Figs. 1 to 3 said blank breaking device comprises two rotary discs 70, 70' each of which having substantially elliptically shaped

20 cams in diametric disposition to each other, an oscillatable arm 25 fulcrumed at the frame 10, wherein said rotary discs are journaled, an electric motor 23 and a belt drive 48 for rotating said

25 discs, and a screw and nut gear 74, 75 for supporting said arm 25 and adjusting the working position of the breaking device relatively to the blanks A, A2.

The frequency and violence of the impacts im-

30 parted to the blanks A, A2 by the rotary discs 70, 70' are so chosen that the blanks will react by virtue of their own inertia—mass and weight—so as to powerfully assist in the break-

ing action and ensure the individual blocks or

35 briquettes B to be severed at the predetermined points, notches, indentations or other marks produced in the blanks by the teeth 22' of the pressure roller 22,

(8) A discharge chute 36 into which the bri-

40 quettes B drop on leaving the press.

A fan and suction pipes (not shown) may be provided to advantage from continuously removing dust and deposits from the press.

Various other changes and modifications may

45 be conveniently made in the structural details, assemblage and cooperation of the component parts of rotary block presses of the improved design described, without substantially departing from the spirit and the salient ideas of this in-

50 vention:

For instance the rotary discs of the blank

breaking device may be formed to advantage with

cams 72, 72' of the so-called jumping type shown

in Fig. 4 and so designed, that a relatively large

55 component of the impact forces imparted to and breaking the blanks into individual briquettes will frictionally act in peripheral direction thus

aiding in the quick discharge of the briquettes

60 B from the press.

Another structurally modified blank breaking

device is shown in Fig. 5, wherein the discs designated 76 are excentrically mounted on a rotary

shaft 76' journaled in an oscillatable arm 77

which is yieldingly supported by a spring 77',

65 said discs supporting by means of ball bearings rotary sleeves 78 and being rotated by a belt drive 79 and an electric motor not shown.

Good results have been obtained with blank

70 breaking devices of the double cam type shown in Figs. 1 to 4 and working at a speed of from

1500 to 2000 revolutions per minute, and with a

breaking device of the excentric or single cam

type shown in Fig. 5 working at a speed of about

3000 R. P. M.

What I claim is:

1. In a rotary block press, a frame, a mold ring rotatably supported in upright position by said frame, means for rotating said mold ring, a pressing roller excentrically arranged in said mold ring for cooperation therewith, means for feeding the material under treatment into the mold ring, a crescent shaped guide plate arranged inside the mold ring for cooperation therewith in spaced relation, and extending from adjacent the pressing roller to a point within the upper portion of the mold ring, and being spaced along its upper terminal end portion away from the inner periphery of the mold ring so as to support the blank on liberating itself and gravitationally descending out of the mold, and impact giving means for breaking the blank into pieces.

2. In a rotary block press, a frame, a mold ring rotatably supported in upright position by said frame, means for rotating said mold ring, a pressing roller excentrically arranged in said mold ring for cooperation therewith, means for feeding the material under treatment into the mold ring, a crescent shaped guide plate arranged inside the mold ring for cooperation therewith in spaced relation, and extending from adjacent the pressing roller to a point within the upper portion of the mold ring, and being spaced along its upper terminal end portion away from the inner periphery of the mold ring so as to support the blank on liberating itself and gravitationally descending out of the mold,—said crescent shaped plate terminating underneath the crown portion of the mold ring—and impact giving means arranged at the terminal edge of said crescent shaped plate for breaking the blank into pieces.

3. In a rotary block press, a frame, a mold ring rotatably supported in upright position by said frame, means for rotating said mold ring, a pressing roller excentrically arranged in said mold ring for cooperation therewith, means for feeding the material under treatment into the mold ring, a crescent shaped guide plate arranged inside the mold ring for cooperation therewith and at its upper end portion being spaced from the upper section of the mold ring so as to support the blank on liberating itself and gravitationally descending out of the mold, said crescent shaped guide plate having its lower end adjacent the pressing roller and its upper terminal end within the crown portion of the mold ring, and impact giving means arranged at the terminal edge of said crescent shaped plate for breaking the blank into pieces,—said impact giving means comprising a rotary disc having two cam shaped working faces diametrically arranged to each other.

4. In a rotary block press, a frame, a mold ring rotatably supported in upright position by said frame, means for rotating said mold ring, a pressing roller excentrically arranged in said mold ring for cooperation therewith, means for feeding the material under treatment into the mold ring, a crescent shaped guide plate arranged inside the mold ring for cooperation therewith and at its upper end portion being spaced from the upper section of the mold ring so as to support the blank on liberating itself and gravitationally descending out of the mold, said crescent shaped guide plate having its lower end adjacent the pressing roller and its upper terminal end within the crown portion of the mold ring,

impact giving means in the form of a rotary disc arranged at the terminal edge of said crescent shaped plate for breaking the blank into pieces,—and means for adjusting the working position of said rotary disc relatively to the blank.

5. In a rotary block press, a frame, a mold ring rotatably supported in upright position by said frame, means for rotating said mold ring, a pressing roller excentrically arranged in said mold ring for cooperation therewith, means for feeding the material under treatment into the mold ring, a crescent shaped guide plate arranged inside the mold ring for cooperation therewith and at its upper end portion being spaced from the upper section of the mold ring so as to support the blank on liberating itself and gravitationally descending out of the mold, said crescent shaped guide plate having its lower end adjacent the pressing roller and its upper terminal end within the crown portion of the mold ring, impact giving means in the form of a rotary disc arranged at the terminal edge of said crescent shaped plate for breaking the blank into pieces, and means for adjusting the working position of said rotary disc relatively to the blank,—the working faces of said rotary disc being substantially elliptic.

6. In a rotary block press, a frame, a mold ring rotatably supported in upright position by said frame, means for rotating said mold ring, a pressing roller excentrically arranged in said mold ring for cooperation therewith, means for feeding the material under treatment into the mold ring, a crescent shaped guide plate arranged inside the mold ring for cooperation therewith and at its upper end portion being spaced from the upper section of the mold ring so as to support the blank on liberating itself and gravitationally descending out of the mold, said crescent shaped guide plate having its lower end adjacent the pressing roller and its upper terminal end within the crown portion of the mold ring, and impact giving means arranged at the terminal edge of said crescent shaped plate for breaking the blank into pieces, said impact giving means comprising a rotary disc formed with two jumping cams arranged diametrically to each other.

7. In a rotary block press, a frame, a mold ring rotatably supported in upright position by said frame, means for rotating said mold ring, a pressing roller excentrically arranged in said mold ring for cooperation therewith, means for feeding the material under treatment into the mold ring, a crescent shaped guide plate arranged inside the mold ring for cooperation therewith and at its upper end portion being spaced from the upper section of the mold ring so as to support the blank on liberating itself and gravitationally descending out of the mold, said crescent shaped guide plate having its lower end adjacent the pressing roller and its upper terminal end within the crown portion of the mold ring, impact giving means in the form of a rotary disc arranged at the terminal edge of said crescent shaped plate for breaking the blank into pieces, and means for adjusting the working position of said rotary disc relatively to the blank,—said adjusting means comprising an oscillatable arm carrying said rotary disc and a screw and nut gear supporting said arm.

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