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(54) **A method and apparatus for protecting a fodder press against jamming.**

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DE--A-- 2 013 272
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GB--A-- 950 093
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US--A-- 3 167 813
"Die Mühle + Mischfuttertechnik", Vol. 6, 118. Jahrg., 05.02.81, Detmolt (West-Germany), W.Wetzel: Automatisierung beim Pelletieren; pp. 74-78
Diagramme (French version) No. 67, April 79, Braunschweig, W.Wetzel, "La nouvelle série de presses à granuler Kubex"; pp. 11-

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Description

The invention relates to a method and apparatus for protecting a fodder press against jamming.

In fodder presses before the raw material, such as ground fodder, is supplied to the press, said raw material is mixed within steam. The steam provides on the one hand a lubricating effect during the pressing through the die and on the other hand provides a sufficient binding force to the lump eventually formed from the ground fodder. The supply of steam should be carefully adjusted to the nature and the quantity of the raw material in order to ensure that the pressing through the die takes place with optimally low energy consumption and an optimally high production. If excessive steam in relation to a given quantity of raw material is supplied, the fodder in the press will obtain a gelatin form and this gelatin formation will block the press, which will increasingly load the drive motor and likewise lead to a substantially lower efficiency. If no reduction of steam supply or increase in the quantity of supplied raw material takes place, the formation of gelatin will continue to increase until the press automatically stops since the maximum motor power is exceeded. In practice it is found that the protection of the motor often reacts even so slowly that the driving belts for the press burn out before the motor stops. After the jamming of the press, the space containing the pressure rolls and the die has to be cleaned before the press can be put in operation again.

In the publication « La nouvelle série de presses à granuler Kubex » by W. Wetzel in « Diagramme » Nr. 67, April 1979, pages 11-14 a method and an apparatus for protecting a fodder press against jamming are described, the fodder press comprising a press chamber having a rotary die and a plurality of pressure rolls positioned within the die, each being rotatable around a shaft, a motor for driving the die as well as a door positioned before the press chamber, said door being coupled to a supply opening for raw material, in which the magnitude of the electric current flowing towards the motor is measured and when a predetermined current value is exceeded a control signal is generated by which control signal means are set in operation for opening said door.

In the fodder press according to this publication, the door is in the form of a valve door that has been arranged in the front face of the part of the supply duct for raw material that extends over the front end of the press chamber. This valve door has a limited size and extends over only a part of the open front end of the rotary die.

It has also already been proposed to prevent the jamming of a fodder press by detecting the formation of gelatin in a very early stage and subsequently to stop the supply of raw material, for instance by automatically closing a valve in the supply opening of the raw material. However, it has been found that the jamming process takes place so rapidly that the quantity of raw material still present upon the closure of such a valve between said valve and the press chamber is sufficient to produce a complete jamming of the press, so that the press will still have to be stopped and cleaned.

It is the object of the invention to provide a method and an apparatus for protecting a fodder press against jamming, said method being highly reliable and said apparatus being adapted to be simply applied without high cost on existing presses, for example, on a fodder press as disclosed in Dutch patent application 281,048.

The invention to this effect provides a method for protecting a fodder press against jamming, the fodder press comprising a press chamber having a rotary die and a plurality of pressure rolls positioned within the die, each being rotatable about a shaft, a motor for driving the die, as well as a door positioned before the press chamber, and extending over the complete area of the front end of the press chamber so as to close the latter, said door being coupled to a supply opening for raw material, in which the magnitude of the electric current flowing towards the motor is measured and when a predetermined current value is exceeded a control signal is generated by which control signal means are set in operation for opening said door.

The invention likewise provides an apparatus for protecting a fodder press against jamming, the fodder press comprising a press chamber having a rotary die and a plurality of pressure rolls positioned within the die, each being rotatable about a shaft, a motor for driving the die, as well as a door positioned before the press chamber, and extending over the complete area of the front end of the press chamber so as to close the latter, said door being coupled to a supply opening for raw material, means being provided for measuring the electric current flowing towards the motor, means for generating a control signal when a predetermined current value is exceeded and means for opening upon command of said control signal the door positioned before the press chamber.

It further is observed that German Offenlegungsschrift 2,013,272 describes a method and an apparatus for comparing the momentary current flowing to the motor of a press with the current that under normal circumstances has to flow to said motor. This comparison is carried out when the motor is in an unloaded condition or when the motor carries out one specific function. When the momentary current is not equal to the current which flows under normal conditions, this is an indication that something is wrong with the motor and the motor is disconnected. In the power lines to the motor also overload fuses can be inserted, to cut off the power when the motor is in an overload condition.

It has been found that the jamming of a fodder

press by means of the features according to the invention can be completely prevented. When the fodder press threatens to become jammed, the motor power input, and hence the current flowing to the motor, rapidly increases. This current increase can be detected and upon excess of a predetermined value, a control signal for opening the door can be generated. Since the door positioned before the press chamber is opened, in which door there is provided the supply opening for raw material, the supply of even the smallest quantity of raw material is prevented, while likewise the loose raw material still present in the press chamber can fall out of the machine. The pressure rolls press the other raw material still present, which did not fall out of the press chamber, through the die. It is supposed that not only the complete stopping of the supply of raw material is favourable to prevent gelatin formation, but that likewise the sudden entry of relatively cool ambient air into the press chamber favourably affects the processing by the pressure rolls of the raw material still present.

One embodiment of the invention will now be described, by way of example, with reference to the accompanying drawing, in which :

fig. 1 is a partially exploded front view of a fodder press provided with the apparatus according to the invention ;

fig. 2 is a top view of the press according to fig. 1, in which the door is shown in a closed and an opened position and

fig. 3 is a diagramatic view of the control circuit for the apparatus according to the invention.

Figures 1 and 2 show a fodder press comprising a housing 1 having at its front a press chamber 2 with mounted therein three pressure rolls 3, 4 and 5, each being rotatable about a stationary shaft. The pressure rolls coact with the inside of a perforated annular die 6 enclosing said rolls, which die is mounted on the one end of a hollow rotatably mounted shaft 7, which at the other end carries a drive disk 8. The drive disk 8 is coupled to the drive motor 9 via a belt. Before the die 6 there is attached to the housing a door 10 which is adapted for rotation about a pivot 10a. The supply of raw material to the press chamber takes places via a suitable opening in the door through a supply 11. The door is provided with an extended attachment member 12 and the housing is provided with an attachment point 13 situated beside the press chamber at the exterior of the housing. Between the free end of the attachment member 12 and the attachment point 13 there is provided an air cylinder 14 which is actuated upon command of a control signal and being adapted to displace the door 10 from the closed position 2 shown in fig. 2 in full lines towards the open position shown in dotted lines. Instead of an air cylinder other members may be used which under influence of a control signal ensure the required opening of the door.

Fig. 3 diagrammatically shows an electric circuit for generating the control signal for the air cylinder 14. To one of the feed line T of the motor 9, which in the case shown in connected to a threephase (R, S, T) supply voltage, there is coupled a transducer 20 which is connected to a device 21. The device 21 is adapted to produce a control signal when the current that flows through the line T exceeds an adjustable predetermined value. Such a device 21 may for instance be a contact ammeter having an adjustable response value, as marketed under the tradename Fotact. The control signal of the device 21 is supplied to a relay 22 a contact 22a of which is incorporated in the feed line for the air cylinder 14, which is diagrammatically shown. When the relay 22 under influence of the control signal of the device 21 is responsive, the contact 22a is closed and the cylinder is energized in such a way that the door 10 of the press is opened.

The method according to the invention is performed as follows. The device 21 is set in such a way that it produces a control signal when a predetermined current value is exceeded, e. g. at a value which is 20 % higher than the value upon normal operation. This current value is chosen in such a way that at the predetermined current value an initial gelatin formation in the press chamber 2 occurs. When the predetermined current value is exceeded, the device 21 produces the control signal and the air cylinder 14 is energized through relay contact 22a and opens the door 10 of the press. All the raw material still present in the supply 11 and at the inside of the door falls downwardly and can no longer reach the press chamber 2. The loose, raw material still present in the press chamber 2 can also fall out of the press chamber, while the raw material still present between the pressure rolls and the die is pressed through the die, so that the press therefore is completely self-cleaned without human intervention.

When the door is opened an alarm signal is produced on behalf of an operator, while naturally also the supply of raw material is stopped. After the press has cleaned itself in the above described manner, the door is closed by the operator, the steam supply is slightly reduced, the press is put in operation and the supply of raw material is resumed. The protection against jamming according to the invention is therefore effected completely automatically, while the replacing in operation of the press can take place very quickly, since the time-consuming manual cleaning of the press chamber is superfluous.

It will be clear that many modifications are possible within the scope of the claims. For instance, instead of one cylinder two cylinders may be applied, while the door of the press no longer rotates about a fixed point but is advanced by cylinders on either side of the door parallel to the front face of the press. Since in such a case a uniform displacement of the door is highly important, preferably so-called electrocylinders are employed which are provided with a threaded drive shaft and a motor for moving such shaft.

Claims

1. A method for protecting a fodder press against jamming, the fodder press comprising a press chamber (2) having a rotary die (6) and a plurality of pressure rolls (3, 4, 5) positioned within the die (6), each being rotatable about a shaft, a motor (9) for driving the die (6), as well as a door (10) positioned before the press chamber (2), and extending over the complete area of the front end of the press chamber so as to close the latter, said door being coupled to a supply opening (11) for raw material, in which the magnitude of the electric current flowing towards the motor (9) is measured and when a predetermined current value is exceeded a control signal is generated by which control signal means (14) are set in operation for opening said door (10).

2. A method according to claim 1, characterized in that the centre of the door (10) is opened at a speed larger than about 0,15 m/sec.

3. A method according to claim 1 or 2, characterized in that the door (10) is opened by means of an air cylinder (14).

4. An apparatus for protecting a fodder press against jamming, the fodder press comprising a press chamber (2) having a rotary die (6) and a plurality of pressure rolls (3, 4, 5) positioned within the die (6), each being rotatable about a shaft, a motor (9) for driving the die (6), as well as a door (10) positioned before the press chamber (2), and extending over the complete area of the front end of the press chamber so as to close the latter, said door being coupled to a supply opening (11) for raw material, means (20) being provided for measuring the electric current flowing towards the motor (9), means (21) for generating a control signal when a predetermined current value is exceeded and means (14) for opening upon command of said control signal the door (10) positioned before the press chamber (2).

5. An apparatus according to claim 4, characterized in that the means for opening the door comprise an air cylinder (14).

6. An apparatus according to claim 4, characterized in that the means for opening the door comprise two cylinders at each side of the door, each cylinder comprising a threaded drive shaft and a motor for driving such shaft, the arrangement being such that the door can be advanced by the drive shafts to a position parallel to but at a distance from the front face of the press chamber.

7. An apparatus according to claim 4 or 5, characterized in that the means for measuring the current flowing towards the motor comprise a contact ammeter.

Patentansprüche

1. Verfahren zum Schützen einer Futterpresse gegen Verklemmen, die Futterpresse umfassend eine Presskammer (2) mit einer rotierenden Matrize (6) und mehreren Pressrollen (3, 4, 5), in der Matrize (6) sitzend und jede um eine Achse drehbar, einen Motor (9) zum Antreiben der Matrize (6) sowie eine vor die Presskammer (2) gesetzte Tür (10), die sich über die ganze Oberfläche der Vorderseite der Presskammer erstreckt, um letztere zu schliessen, welche Tür an eine Beschickungsöffnung (11) für Rohmaterial gekoppelt ist, wobei die Grössenordnung des dem Motor (9) zufliessenden elektrischen Stroms gemessen wird und, wenn ein vorbestimmter Stromwert überschritten ist, ein Steuersignal erzeugt wird, durch welches Steuersignalelemente (14) in Betrieb gesetzt werden, um die genannte Tür (10) zu öffnen.

2. Verfahren gemäss Anspruch 1, dadurch gekennzeichnet, dass die Mitte der Tür (10) mit einer Geschwindigkeit grösser als etwa 0,15 Meter pro Sekunde geöffnet wird.

3. Verfahren gemäss Anspruch 1 oder 2, dadurch gekennzeichnet, dass die Tür (10) durch Elemente eines Luftzylinders (14) geöffnet wird.

4. Vorrichtung zum Schützen einer Futterpresse gegen Verklemmen, die Futterpresse umfassend eine Presskammer (2) mit einer rotierenden Matrize (6) und mehreren Pressrollen (3, 4, 5), in der Matrize (6) sitzend und jede um eine Achse drehbar, einen Motor (9) zum Antreiben der Matrize (6) sowie eine vor die Presskammer (2) gesetzte Tür (10), die sich über die ganze Oberfläche der Vorderseite der Presskammer erstreckt, um letztere zu schliessen, welche Tür an eine Beschickungsöffnung (11) für Rohmaterial gekoppelt ist, wobei Elemente (20) zum Messen des dem Motor (9) zufliessenden elektrischen Stroms, Elemente (21) zur Erzeugung eines Steuersignals, wenn ein vorbestimmter Stromwert überschritten wird, und Elemente (14) zum Oeffnen der vor die Presskammer (2) sitzenden Tür (10), auf das Kommando der Steuersignale, vorgesehen sind.

5. Vorrichtung gemäss Anspruch 4, dadurch gekennzeichnet, dass die Elemente zum Oeffnen der Tür einen Luftzylinder (14) umfassen.

6. Vorrichtung gemäss Anspruch 4, dadurch gekennzeichnet, dass die Elemente zum Oeffnen der Tür zwei Zylinder an jeder Seite der Tür umfassen, jeder Zylinder umfassend eine mit Gewinde versehene Treibwelle und einen Motor für den Antrieb der Welle, wobei die Anordnung so getroffen ist, dass die Tür durch die Treibwellen vorschiebbar ist in eine Position parallel zu, jedoch in einem Abstand von der Vorderseite der Presskammer.

7. Vorrichtung gemäss Anspruch 4 oder 5, dadurch gekennzeichnet, dass Elemente zum Messen des dem Motor zufliessenden Stroms ein Kontaktammeter umfassen.

Revendications

1. Un procédé pour protéger contre le coincement une presse à fourrage, cette presse à fourrage comprenant une chambre de pressage (2) pourvue d'une matrice rotative (6) et d'une pluralité de rouleaux presseurs (3, 4, 5) disposés à l'intérieur de la matrice (6), chaque rouleau pou-

vant tourner autour d'un axe, un moteur (9) destiné à entraîner la matrice (6), ainsi qu'une porte (10) montée devant la chambre de pressage (2) et s'étendant sur la surface entière du bout avant de la chambre de pressage pour ainsi fermer la dernière, ladite porte étant couplée à une ouverture d'alimentation (11) pour la matière première, dans laquelle la valeur du courant électrique traversant le moteur (9) est mesurée, et que, lorsqu'une valeur prédéterminée du courant est dépassée, un signal de commande est produit et met en service un moyen de commande (14) pour ouvrir ladite porte (10).

2. Un procédé conforme à la revendication 1, caractérisé en ce que le centre de la porte (10) est ouvert à une vitesse supérieure à environ 0,15 m/s.

3. Un procédé conforme à la revendication 1 ou 2, caractérisé en ce que le centre de la porte (10) est ouvert au moyen d'un cylindre pneumatique (14).

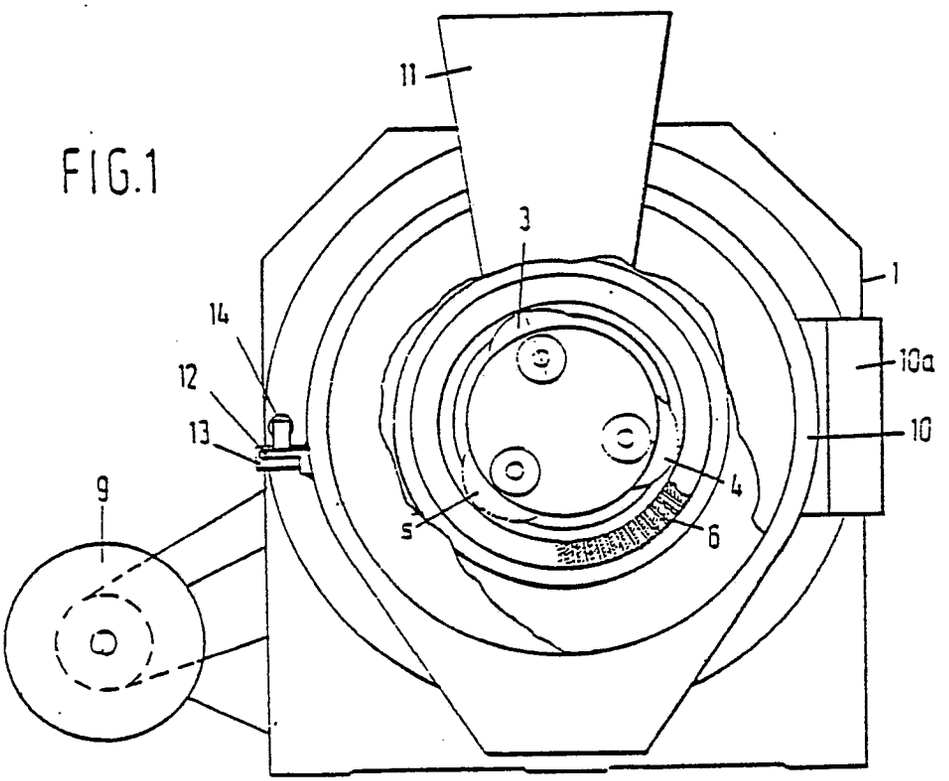
4. Un dispositif pour protéger une presse à fourrage contre le coincement, la presse à fourrage comprenant une chambre de pressage (2) pourvue d'une matrice rotative (6) et d'une pluralité de rouleaux presseurs (3, 4, 5) disposés à l'intérieur de la matrice (6) chaque rouleau pouvant pivoter autour d'un arbre, un moteur (9) pour l'entraînement de la matrice (6), ainsi qu'une porte (10) montée devant la chambre de pressage (2), et s'étendant sur la surface entière du bout avant de la chambre de pressage pour ainsi fermer la dernière, ladite porte étant accouplée à une ouverture d'alimentation (11) pour la matière première, un moyen (20) étant prévu un moyen (20) pour mesurer le courant électrique qui traverse le moteur (9) un moyen (21) pour produire un signal de commande lorsqu'une valeur prédéterminée du courant est dépassée et un moyen (14) pour ouvrir sur commande dudit signal de commande, la porte (10) montée devant la chambre de pressage (2).

5. Un dispositif conforme à la revendication 4, caractérisé en ce que le moyen destiné à ouvrir la porte comprend un cylindre pneumatique (14).

6. Un dispositif conforme à la revendication 4, caractérisé en ce que le moyen destiné à ouvrir la porte comprend deux cylindres disposés de chaque côté de la porte, chaque cylindre comprenant un arbre d'entraînement fileté et un moteur pour entraîner ledit arbre, le dispositif étant tel que la porte peut être avancée par les arbres d'entraînement à une position parallèle à la face avant de la chambre de presse mais à une certaine distance de cette dernière.

7. Un dispositif conforme à la revendication 4 ou 5, caractérisé en ce que le moyen destiné à mesurer le passage du courant à travers le moteur consiste en un ampèremètre à contacts.

FIG.1



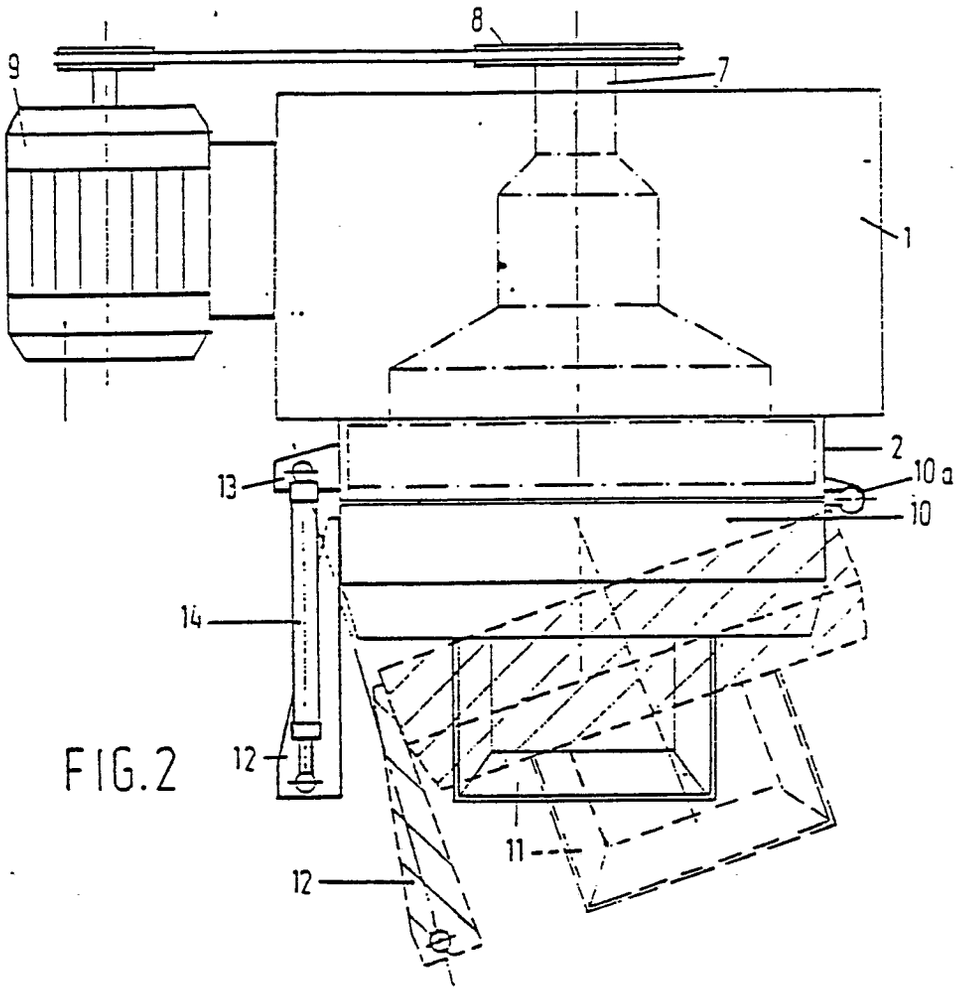


FIG.2

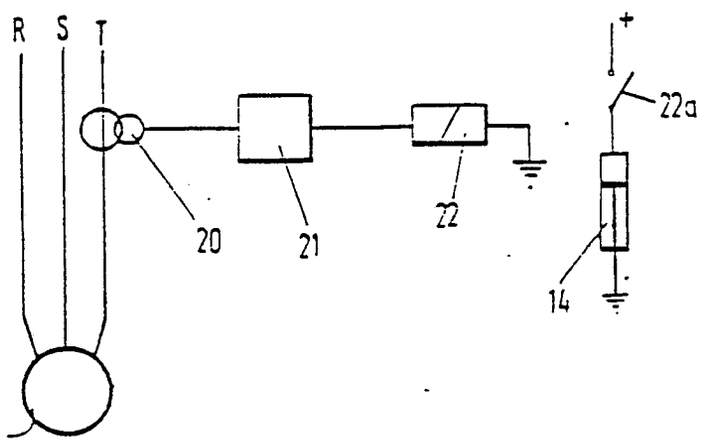


FIG.3