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T. RIGBY

MANUFACTURE OF BRIQUETTES

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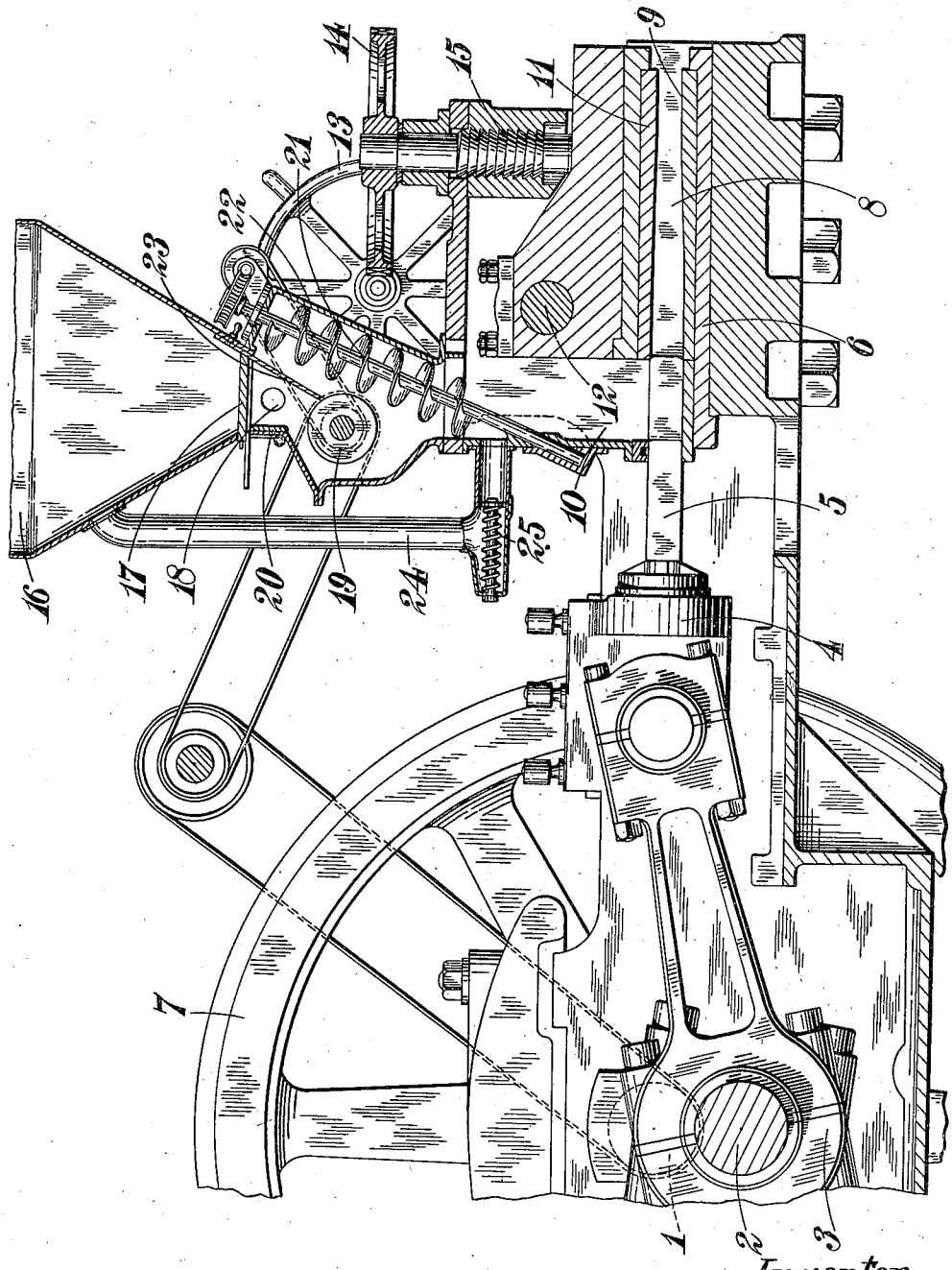

Inventor
Thomas Rigby
by Wilkinson & Giusta
Attorneys.

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UNITED STATES PATENT OFFICE.

THOMAS RIGBY, OF WESTMINSTER, LONDON, ENGLAND.

MANUFACTURE OF BRIQUETTES.

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To all whom it may concern:

Be it known that I, THOMAS RIGBY, a subject of the King of England, residing at Westminster, London, England, have invented certain new and useful Improvements in the Manufacture of Briquettes, of which the following is a specification.

The present invention is for improvements in and relating to the manufacture of briquettes.

The invention relates to the manufacture of briquettes in die presses of the type in which a plunger or ram accurately fits and is moved backward and forward in a working cavity or chamber, supplied at each stroke of the ram with fresh material entering through a slot or port which is alternately opened and closed by the movement of the plunger or ram, the said plunger on its forward movement driving the material to be briquetted through tapering dies forming a reduced outlet from the end of the chamber, so that successive charges leave the chamber as a series of briquettes, which are discharged from the machine against the resistance of an appropriate length of passage-way of reduced size.

Such a briquette press is known as an open die briquetting press and the thickness of the briquettes made is dependent usually on the weight of material entering and filling the working chamber before the return or compression stroke of the plunger or ram. Consequently the thickness is also affected by the specific gravity of the material admitted to the working chamber.

The object of the present invention is to provide a means for increasing the output of briquetted material from a briquetting press of the type indicated.

According to this invention, a process of briquetting is characterized by feeding the material to be briquetted, for example, peat, into the working chamber of the press under compression greater than that produced by the ordinary hopper-feed so that the material is submitted to the action of the ram in a precompressed condition.

It is usual with such a press to obtain the initial resistance necessary for the manufacture of a hard briquette to build up such resistance gradually by means of admixture of oil with the peat dust. This has the effect of causing a partial resistance and a briquette is made having a definite shape. The proportion of oil in the mixture is gradually reduced and the briquettes produced become harder until when the oil is cut out altogether the briquette produced is of the desired hardness.

To vary the oil percentage when building up the resistance necessitates usually a certain amount of manipulation by the attendant and the oil peat mixture is usually fed into the press by hand.

Consequently provision is made in this invention to enable this to be done either separately or in conjunction with a device for precompressing the material.

An apparatus for carrying out the process of this invention comprises the combination with a briquetting press, of the type indicated, of means, for example, a screw conveyor, for feeding the material to the working chamber of the press in a precompressed condition.

The apparatus in a specific form may comprise in combination with a briquetting press of the type described means for feeding material to the press from a source of supply independently of the compression device, or alternatively, through the compression device such as a screw conveyor.

The screw conveyor or the like may be driven by variable speed transmission gear from the press driving mechanism.

The accompanying drawing is an elevation partly in section of one form of briquetting press embodying this invention.

A steam or other engine operates a main crank-shaft 1 having a crank 2 connected by a connecting rod 3 with a cross-head 4, actuating a plunger or ram 5 operating in the working chamber 6 of the press, the crank-shaft being preferably fitted with fly-wheels 7.

The working chamber 6 communicates, by means of taper dies 8 at its further end, with a discharge passage 9 of the same dimensions as the smaller parts of the dies 8, and through which the briquettes are forced from the working chamber 6 which is fed from a vertical feed-chamber 10. This vertical feed-chamber 10 is uncovered by the plunger 5 when in the rearward or outward position, and is completely covered when the plunger is at the forward or inward end of its stroke. As is customary in such presses the two vertical sides of the working chamber are fixed and the upper wall 11 is vertically movable about a pivot 12, the adjustment of the upper wall being effected

through a hand-wheel 13, worm gearing 14 and a screw plunger 15. The raw material for the briquettes is supplied to the feed-chamber 10 from a hopper 16, and in the particular example described special arrangements are made for the type of feed which is used in the manufacture of briquettes from dried peat pulp; in that process it is necessary to feed to the briquetting press in the first place a quantity of oiled peat to set up the necessary frictional resistance between the die and the plunger. To allow of this the feed-hopper 16 is provided with a sliding door 17 by means of which the supply of material can be cut off, and below the door 17 is a hand-hole 18 through which the oiled peat or similar starting material can be supplied. At the bottom of the hopper is a smooth roller 19, which is driven in a counter clockwise direction; the material fed by the roller drops into the feed-chamber 10. When the supply of starting material through the hand-hole 18 is sufficient, the door 17 may be opened so as to allow the main supply to enter from the hopper 16. The amount of material fed by the smooth roller 19 can be regulated by a vertically adjusted shutter 20. Between the bottom of the hopper 16 and the feed-chamber 10 (and to one side of the smooth roller 19) is arranged a screw conveyor 21 in a chamber 22. The screw conveyor chamber can be shut off from the hopper when desired (for example, when starting up) by a sliding door 23.

When it is desired to feed the material from the hopper into the feed-chamber 10 under pressure, the sliding door 23 is moved away to allow of free passage from the hopper into the screw conveyor chamber. At the same time the shutter 20 may be lowered, or if desired, part of the feed may be allowed to pass directly over the smooth roller 19 into the feed-chamber 10, and part of the material may pass through the screw conveyor.

A by-pass pipe 24 provided with a spring controlled valve 25 connects the feed-chamber 10 with the hopper 16 so that if the pressure in the feed-chamber exceeds a certain predetermined degree, the material in the feed-chamber will be squeezed past the valve 25 through the by-pass 24 and so act as a safety valve.

The action of the screw conveyor normally is to introduce the material to be briquetted into the feed-chamber 10 under extra compression and in a state of increased density.

In some cases the mere action of the screw conveyor may cause the material to be pressed or agglomerated into lumps of comparative density and these lumps may pass through the chamber 10 without having their density further increased. It will therefore be understood that the compression sought for according to this invention may arise in the chamber 10 or in the screw conveyor.

It will be appreciated that a plurality of such units as those described may be employed and that such may be driven in parallel from the same source of power, and, if desired, a single distributing appliance may be provided to serve all the units in the combination.

In starting up with material incorporated with a binder, such as oiled peat, the positive feed screw or other mechanism employed may be driven at such speed that the material is fed to the working chamber at the ordinary normal pressure. As soon as briquetting proceeds satisfactorily the speed of the feed screws may be increased until the desired degree of compression is obtained. In such a case the feed mechanism is advantageously driven from the power supply of the press through variable speed power transmission gear, such as cone pulleys or other similarly operable devices, by means of which the speed may be gradually increased until the desired conditions are obtained to meet the special case.

For forming briquettes of wet-carbonized peat the material fed to the hopper is in a powdered or disintegrated condition, and contains gases or air, which are more or less entangled in the material, and tend greatly to reduce its specific gravity, which in this condition may approximate to not more than .2, whereas the specific gravity of a finished briquette will be in the neighborhood of about 1.3. Under these circumstances, it will be seen that the uncompressed material occupies about 6½ times the volume of the finished briquette, so that the thickness of briquette obtainable for a given stroke of the machine is small, and the output of briquettes from the machine consequently limited.

By operating according to the present invention, the feeding of the peat to the press can readily be effected at a pressure which is sufficient partly to compress the peat and dispel therefrom a considerable quantity of the entrained gas.

The advantages of the invention (among which it is the aim of the invention to include not only an increase in press output but also an overall economy of power and the production of larger briquettes and of better briquettes, owing to the lesser amount of gas left to be expelled from the powder at the briquetting stroke), will be better appreciated when it is pointed out that it has been found practical to compress into briquettes, of a specific gravity of about 1.3, in a press of the type referred to, wet carbonized peat powder which, of a gravity in the normal condition of 0.2, had been forced into the chamber of the press at a pressure giving the contents of the chamber before

the advance of the plunger a gravity of about 0.3, or again that similar results (that is to say a briquette gravity of about 1.3 and a powder gravity in the press chamber of about 0.3) can be obtained, with the comparatively flocculent product of the drying of raw peat pulp on a drum drier as a film which is a powder of say a gravity of only 0.12 in the normal condition.

I claim:

1. In a briquetting apparatus, in combination, a working chamber, a ram working therein, a hopper for material to be briquetted, means for feeding material in an uncompressed state from said hopper to the working chamber, alternative means for forcing material from said hopper into said working chamber, and means for rendering operative at will either the feeding means or the forcing means.

2. In a briquetting apparatus, in combination, a working chamber, a ram working therein, a hopper for material to be briquetted, a drum beneath the hopper, means for rotating the drum at will to deliver material from the hopper to the working chamber, a worm-feed device adapted to deliver material from the hopper to the working chamber independently of the drum, and in a pre-compressed state and means for controlling the supply of material from the hopper to the drum and to the worm-feed device independently.

3. In a briquetting apparatus, in combination, a working chamber, a ram working therein, a hopper for material to be briquetted, a drum beneath the hopper, means for rotating the drum at will to deliver material from the hopper to the working chamber, a worm-feed device adapted to deliver material from the hopper to the working chamber independently of the drum, and in a pre-compressed state, a shutter adjustable at will to control delivery of material from the hopper to the drum, and a shutter adjustable at will to control delivery of material from the hopper to the worm-feed device.

In testimony whereof I affix my signature.

THOMAS RIGBY.