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FEEDING MECHANISM FOR BRIQUETTING MACHINES

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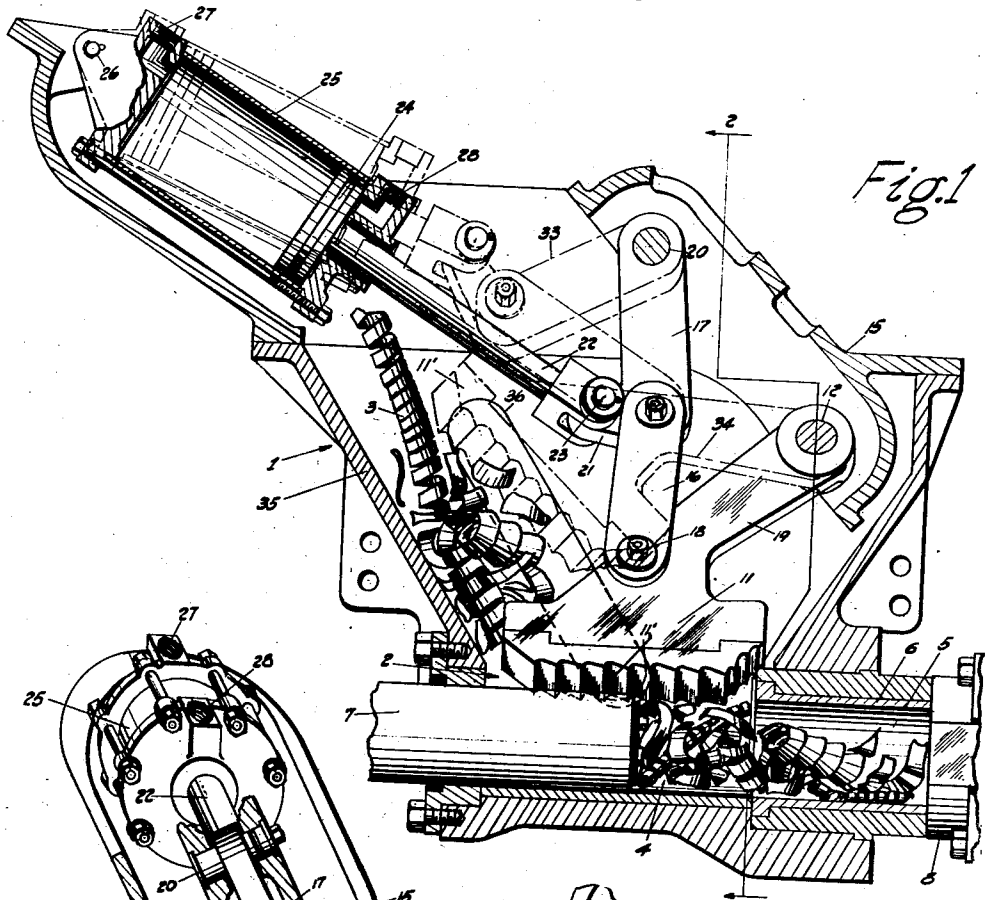


Fig. 1

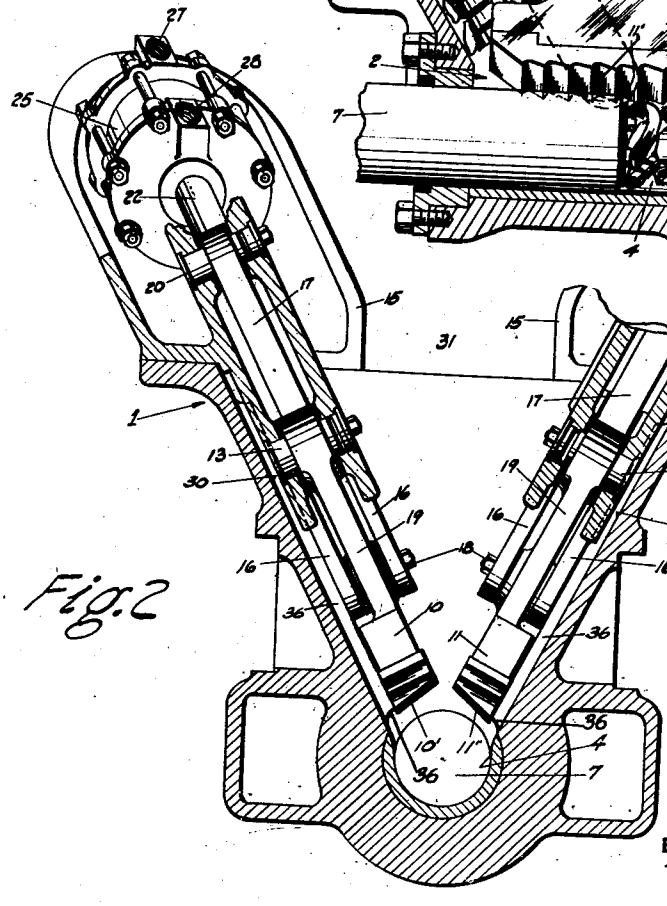


Fig. 2

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FEEDING MECHANISM FOR BRIQUETTING MACHINES

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This invention relates generally to feeding mechanisms for briquetting machines in which metallic clips or turnings from lathes are fed from a hopper into a chamber to be compressed into a relatively solid briquet.

Briquetting machines of both hydraulic and mechanical types have long been employed for compressing chips of cast iron or other similar readily compactible material but difficultly has been encountered in briquetting steel turnings or chips. One of the difficulties is in connection with adequately feeding the steel chips to the compressing chamber. While certain feeding devices have been heretofore proposed and used, yet they have been deficient in certain functional and structural aspects.

It is an object of my invention to provide an improved mechanism for feeding chips from a hopper into a briquetting mechanism and particularly for feeding chips or lathe turnings of steel or other spring-like metal.

Another object is to provide an improved mechanism for feeding chips or lathe turnings into a compressing chamber of a briquetting machine in a simple, direct and economical manner and to do so with a mechanism that is relatively compact, requires minimum power and provides a high degree of accessibility of the hopper to facilitate filling the same.

A further object is to provide an improved mechanism for feeding chips, lathe turnings or the like into the compressing chamber of a briquetting machine with a feeding movement that is particularly effective in not only causing the chips and material to flow downwardly through a hopper but also to be fed in a relatively uniform and positive manner into a compressing chamber.

Other objects and advantages will be more apparent to those skilled in the art from the following description of the accompanying drawing in which:

Fig. 1 is a longitudinal vertical section through my improved feeding mechanism together with a portion of a briquetting machine; and

Fig. 2 is a transverse section taken substantially on the line 2—2 of Fig. 1.

It will be understood that the portion of the briquetting machine shown herein may be of any suitable mechanically or hydraulically operated type, both of which are well-known in the art, and hence need not be shown or described in detail. It will suffice to state that a hopper 1 has suitable sloping sides terminating in a discharge opening generally indicated at 2 through which chips, lathe turnings or the like generally indicated at 3 are fed into a receiving chamber 4 which communicates at one end with a compressing or mold chamber 5 of a briquetting mold body 6, while the other end of the receiving chamber 4 has a compressing plunger 7 reciprocated either mechanically or hydraulically in a well-known manner. The mold chamber 5 is normally closed at one end by a suitable and well-known end member 8. After compression of a briquet in chamber 5, the end member 8 may be either axially removed to open the chamber 5 and allow the briquet to be pushed out of the open end by continued movement of the plunger or as is quite customary, the end member 8 is stationary and briquets are stripped from the mold by bodily shifting the hopper and mold to the left while maintaining plunger 7 in a temporarily stationary position at the end of its compressing stroke. Movement of the hopper to the left away from the end member 8 automatically opens the end of the mold to allow the briquet to drop, the plunger force being released, of course, to avoid holding the briquet against the end member 8. This mode of operation is well-known and hence need not be further described.

To feed chips 3 into chamber 4, I provide specifically a pair of pressing feet 10 and 11 which are preferably mounted for swinging movement about pivot pins 12 and 13. The structure and operating mechanisms for each of the two feet or material engaging feeding elements are identical except that they are respectively made for left and right hand locations and each foot is provided with oppositely inclined surfaces 10' and 11', Fig. 2. Hence the description of one of these devices will serve for both, except for the cooperative action between them during operation which will be described later. For example, the pivot 12 of foot 11 is secured in a removable cover support 15 of the hopper and this foot is operated by a pair of toggle links 16 and 17 respectively pivotally connected at 18 to a foot arm 19 and to the removable support 15 by a pivot 20. The link 17 is provided with an offset portion 21 to which a piston rod 22 is pivotally connected at 23, the piston rod being connected to a piston 24 disposed in a cylinder 25 which, in turn, is pivotally supported at 26 in another portion of the removable support 15. This piston and cylinder motor may be actuated by either hydraulic or pneumatic fluid admitted alternately to the opposite ends of the cylinder through passages 27 and 28 and controlled by any

usual manual or automatic valve mechanism for either intermittently or continuously reciprocating the piston and rod as may be desired. The details of such a valve mechanism are well-known in the art for admitting and exhausting fluid alternately to opposite ends of the cylinder and need not be described herein. A single valve mechanism may be employed for both motors thereby to cause the motors to move up and down substantially in synchronism, although independent movement of the motors may be employed if desired. As shown in Fig. 2, the fact that the feeding feet and toggle mechanism lie along the upward diverging side walls of the hopper permits supports 15 to be located near the upper edges of the side walls 29 and 30 of hopper 1 thereby providing a free open space 31 through which chips, turnings, etc. may be dropped into the hopper to fill the same.

In the preferred form of operation, feeder feet 10 and 11 start downward and to the right after plunger 7 has initially withdrawn to the left from mold chamber 5 to open the same, the feeder feet reaching their lower position as or before the plunger 7 starts to the right on its working stroke. Hence the feeder feet will not compact the material but hold it while plunger 7 presses it into the mold chamber 5. The feeding motors 25 may be operated so as to hold the feeding feet in their down position during the forward movement of plunger 7. During the foregoing downward movement of the feet 10 and 11 they will sweep in arcuate paths toward the hopper opening 2 and also in a direction toward mold chamber 5. This has the advantage of not only filling the receiving chamber 4 and of holding the material therein as above mentioned but also of tending to urge the material in the direction of mold chamber 5 so as to cooperate with the similar direction of plunger movement. Hence the feeding of chips to the receiving chamber 4 is in a direction for insuring maximum ease of flow of the chips during feeding. Furthermore, the swinging movement of the feeding feet is accomplished with considerable force by reason of the toggle action of links 16 and 17 whereby movement of piston rod 22 to the left causes these links to have their dotted line positions 33 and 34 in which position the foot 13 is raised to face substantially the rear wall 35 of the hopper. The extraordinary feeding power developed by my improved mechanism also permits feeding of material such as metallic chips from planers, boring machines, lathes, etc., which have a relatively high resilience and resistance to being easily fed into a receiving chamber. This power is obtained with relatively small and inexpensive piston and cylinder motors 24 and 25. Also the toggle links by operating within the hopper are capable of exerting a feeding influence on the chips within the hopper, this being obtained not only when the links 16 and 17 move from their disaligned dotted line position 33 forwardly into their aligned position as shown in full lines in Fig. 1, but also when the arm portion 19 of the feet swing downward toward the opening 2. My improved arrangement as shown in Fig. 2 also permits two feeding feet to initially engage material at relatively widely transversely spaced points in the upper part of the hopper and to force such material into common interengagement when it is brought into close juxtaposition adjacent the opening outlet 2 thereby insuring that material will be effectively squeezed or forced through the discharge opening into the receiving chamber 4. If pneumatic operation is employed the two feet will automatically operate either in synchronism or alternately depending upon the resistance encountered by the respective feet but this action will automatically bring about a complete filling of the receiving chamber 4 because of the reciprocation of the feet in cooperation with movement of the plunger 7. The bottoms of the feeding feet are corrugated with a wedge shaped formation to assist in gripping the material on the down stroke but to slide more easily over the material on the up stroke. Also if desired suitable wearing strips 36 may be removably secured on the inside surfaces of the hopper wall against which feet 10 and 11 will bear to resist the lateral forces of the feet.

The embodiment of my invention shown herein is particularly compact and relatively inexpensive in its construction, operation and maintenance and is easily accessible for inspection and repair as well as being particularly effective in feeding material of spring-like quality and of providing a wide opening through which the hopper can be filled at its top.

It will of course be understood that various changes in details of construction and arrangement of parts may be made by those skilled in the art without departing from the spirit of the invention as set forth in the appended claims.

I claim:

1. A feeding mechanism for a briquetting machine comprising a hopper having a discharge opening and inclined walls converging toward said opening, a plurality of material feeding elements, means for supporting the same for movement toward and away from said opening to feed material therethrough, said material feeding elements and supporting means therefor being located along said inclined walls so as to diverge from each other at their upper ends thereby to provide an opening for supplying material to the hopper, and power mechanism located at said upper ends for actuating said means.

2. A feeding mechanism for a briquetting machine comprising a hopper having a discharge opening therein, an element for feeding material from the hopper through said opening, means for supporting said feeding element for swinging movement, power mechanism for actuating said feeding element, a material receiving chamber, a mold chamber located at one end of the receiving chamber and communicating therewith, a compressing plunger entering said receiving chamber from the other end thereof, and said swinging supporting means for said feeding element being so arranged as to cause the swinging action on its feeding element to swing on its feeding stroke toward that end of the receiving chamber adjacent the mold chamber.

3. A feeding mechanism for a briquetting mechanism comprising a hopper having a discharge opening terminating in a material receiving chamber, a feeding foot pivotally supported so as to swing in an arcuate path within said hopper toward and away from said opening to feed material thereto from the hopper, toggle mechanism operatively connected to said foot, and a piston and cylinder motor connected to said toggle mechanism to actuate the foot and to exert the greatest feeding force when the feeding foot is near the discharge opening thereby to effectively compress material adjacent said opening to force the material therethrough into said receiving chamber.

4. The combination set forth in claim 3 further characterized in that said feeding foot is corrugated in a direction so as to have its maximum gripping force on the material during movement toward said opening.

5. The combination set forth in claim 3 further characterized in that a plurality of said pivotally mounted feeding feet are supported for pivotal movement in planes which converge during their feeding movement toward said discharge opening whereby material may be initially engaged at transversely spaced portions in the upper part of the hopper and then fed into common interengagement adjacent said discharge opening to be forced therethrough.

HERBERT S. FULLERTON.