RESEARCH OF GRINDING METHODS IN THE FORMATION OF SPREADABLE DISPERSED SYSTEMS

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ABSTRACT

Nowadays, the need for solid fuel products in our Republic is increasing day by day. However, in the production of solid fuel products, for example, for the preparation of briquettes based on the soft fraction of coal and biobinders, it is first necessary to solve the issues of increasing its heat transfer efficiency. For this purpose, in-depth analysis of the research work carried out on the physico-mechanical properties of the selected raw materials, the level of grinding, the laws of structural dependence, creates a basis for the introduction of targeted technologies.

Key words: *coal briquette, crushing methods, solids, roller crusher, cone crusher, disintegrator.*

АННОТАЦИЯ

В настоящее время потребность в твердотопливных изделиях в нашей республике возрастает с каждым днем. Однако при производстве твердотопливной продукции, например, для приготовления брикетов на основе мягкой фракции угля и биовяжущих, в первую очередь необходимо решить вопросы повышения эффективности ее теплообмена. С этой целью углубленный анализ проведенных исследований физико-механических свойств выбранного сырья, степени помола, закономерностей структурной зависимости создает основу для внедрения целевых технологий.

Ключевые слова: *угольный брикет, способы дробления, твердые частицы, валковая дробилка, конусная дробилка, дезинтегратор.*

INTRODUCTION

Coal fraction is one of the main raw materials in the production of briquettes. One of the influencing factors for the effective binding of the coal fraction with biobinders and the formation of a suitable structure is the degree of grinding of the coal fraction. From this point of view, the construction, methods and laws of grinding devices for obtaining the fine fraction of coal are studied in the section called literature review.

The burning intensity of the coal fraction is characterized by the level of its grinding and the formation of a structure with additional inorganic substances. Crushing of solid bodies obeys the laws of mechanics, external forces overcome the forces of mutual attraction of small particles of the body, including atoms and molecules [1; p. 87-89, 2; p. 97-103].

Table 1.

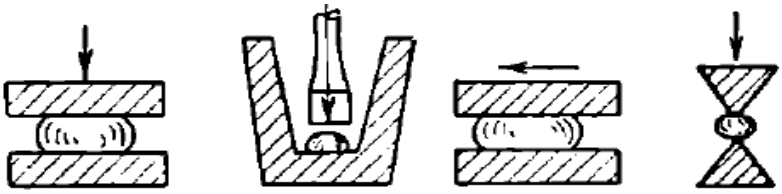
Grinding methods

Grinding type	The size of solid particles before grinding , mm	Size of solid particles after grinding , mm	Level of fineness
Coarse (grind)	1500-30 0	300 - 10 0	2-6
Medium (grinding)	300 - 10 0	5 0-10	5-10
Small (grind)	5 0-10	10 - 2	10-50
Soft (crush)	10-2	$2\text{-}75 \cdot 10^{-3}$	~ 100
Too much soft _	$10\text{-}75 \cdot 10^{-3}$	$75 \cdot 10^{-3}\text{-}1 \cdot 10^{-4}$	-

MATERIALS AND METHODS.

Crushing of solids is carried out in one or more stages. Each device designed for grinding is based on ensuring the degree of grinding within the recommended limits. For example, grinding level for jaw crushers $i = 3 \div 6$; $i = 100$ for mills .

In industry, devices for increasing the surface of solid materials and grinding them are used based on crushing, impact, friction and fragmentation methods (Fig. 1).



a b c d

Figure 1. Grinding methods :

a - crushing ; *b* - impact ; *c* - friction ; *d* - to be .

This type using grinding methods, of the material robustness depending on the level (*s*). conditional respectively the following to groups is divided (Table 2) [6; b, 123-229, 7; b,345-361] .

Table 2

Materials in decomposition level of robustness _ classification

Materials	s , kDj
Hard	2095 from more than
Average hardness	419-2095
Soft	From 419 less

Physical and mechanical properties of materials depending on the following grind methods used (Table 3) [8; b, 123-229, 9 ; b,345-361] .

3- Table

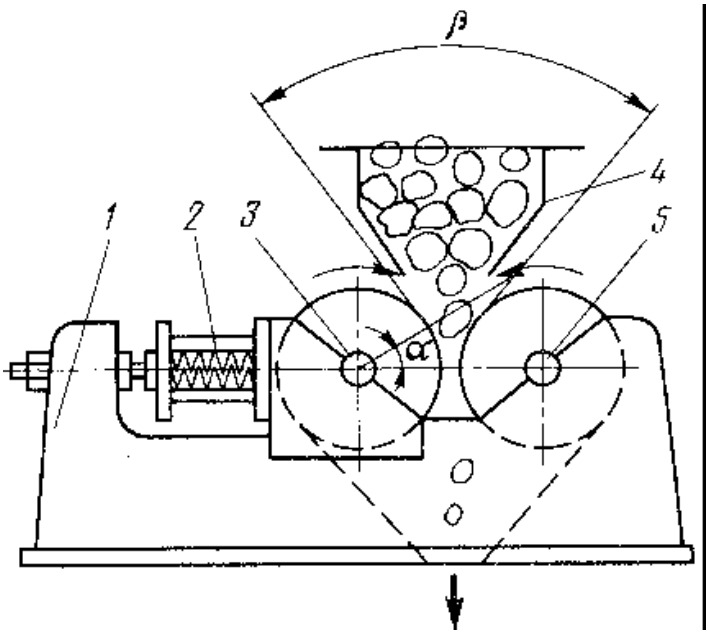
Grinding methods on the mechanical properties of materials

Material structure	**Grinding method**
Hard and fragile	Compression , shock
Hard and elastic	Write _
Fragile ,	Strike , be smart , _ friction
Sticky , medium hardness _	friction , blow

When using grinding methods, it is desirable to take into account the physical and chemical properties of solids, including the laws of interaction with liquids. The crushing method is more effective when breaking down raw materials with high moisture content.

The following requirements are imposed on all grinding machines: uniformity of the particles of the crushed product; continuous release of crushed product particles from the crushing chamber; reduce dust formation to the extent possible; the ability to adjust the grinding level; ensuring low energy consumption [12; b, 201-204].

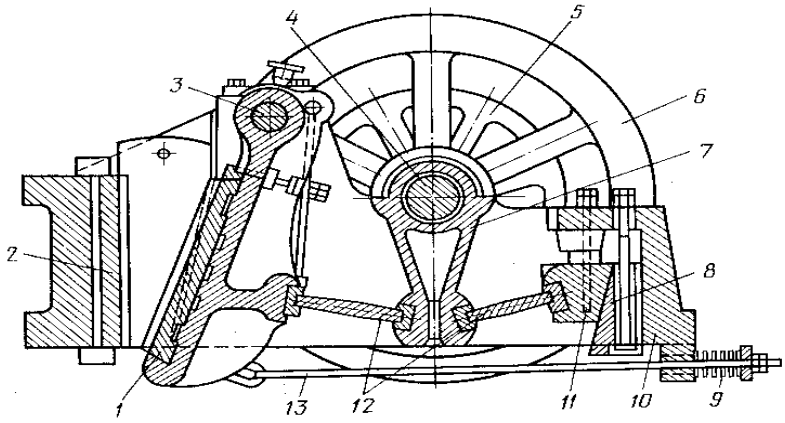
Roller grinders are used for medium, small and fine grinding of hard materials (Fig. 2).



2 - picture . With a shaft grinder

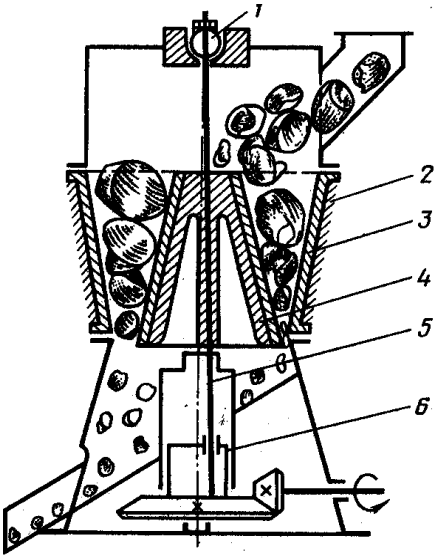
1 - room; 2 - spring; 3 - movable roller; 4 - bunker; 5 - fixed roller.

In this mill, the role of the working body is made up of horizontally located rollers moving in the opposite direction. Conical grinders large, medium and soft in grinding is used (Figure 3).



Picture 3. Cheeky grinder

1 - Excitable jaw; 2 - immovable jaw; 3 - excitable jaw arrow _ 4 - eccentric shaft; 5 - pulley; 6 - flywheel; 7 - connecting rod; 8, 11 - adjuster ponies; 9 - spring; 10 - room; 12 - lever; 13 - tyaga.



Picture 4 . _ Conical grinder

1-ball support; 2- corps; 3 - plate; 4 - head; 5 – vertical, 6.shaft

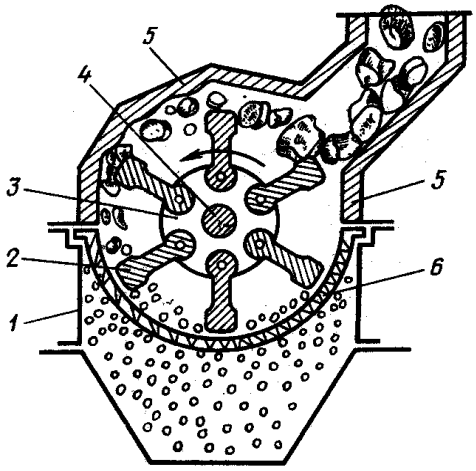


Figure 5. Hammered chopper

1- corps; 2- hammer; 3- disc; 4- shaft; plate 5; Grid; 6 - eccentric.;

Hammered grinder high- speed disc and to him hinged attached of hammers consists of Product through hopper to the camera falls and hammers tattoo and to the wall of the case hit at the expense of it is crushed . Crushed product fence through comes out (picture 5) .

Disintegrator and of dismemberer on disks concentric circles across blow giver fingers placed _ One on disk fingers row second on disk two fingers row with small

Turkish harvest does _ Product fingers with hit it is crushed and of the car bottom in the part is located release hole through is issued . of disks number of revolutions 200-1200 min $^{-1}$. Job productivity 0.5-20 t/ h . (Figure 6) .

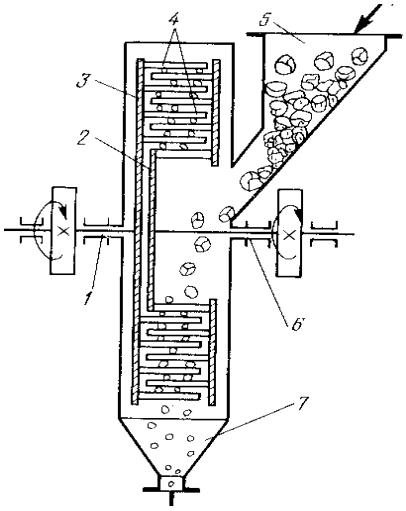


Figure 6. Disintegrator.

1, 6 - shafts ; 2,3 - discs ; 4 - fingers ; 5 - loading funnel ; 7 – discharge funnel.

Dismembrators have one rotating disc, and the second disc acts as a shredder cover. On the cover, in a fixed position, fingers are placed along concentric circles [14; b, 236-239].

The main working bodies of the above-mentioned grinders, hammer, disk, and fingers are made of corrosion-resistant manganese steel.

In ball mills the product empty horizontal cylindrical enclosed in a shell sh ars using it is crushed . Balloons steel or from china is prepared . Balloons size crumbly product to size according to is selected and 34-175 mm. constitutes _ 30-35% of the camera volume sh as with is filled (picture 7).

Products grinding process sh as blow and sh as between friction at the expense of done the soup is cooked . Cylindrical shell when it turns the inner wall of the shell friction with i at the expense of rotation in the direction of known up to height will rise and then down rolling falls. Camera with balloons rotation speed increase with from the center the escape power increases, rise up corner too increases.

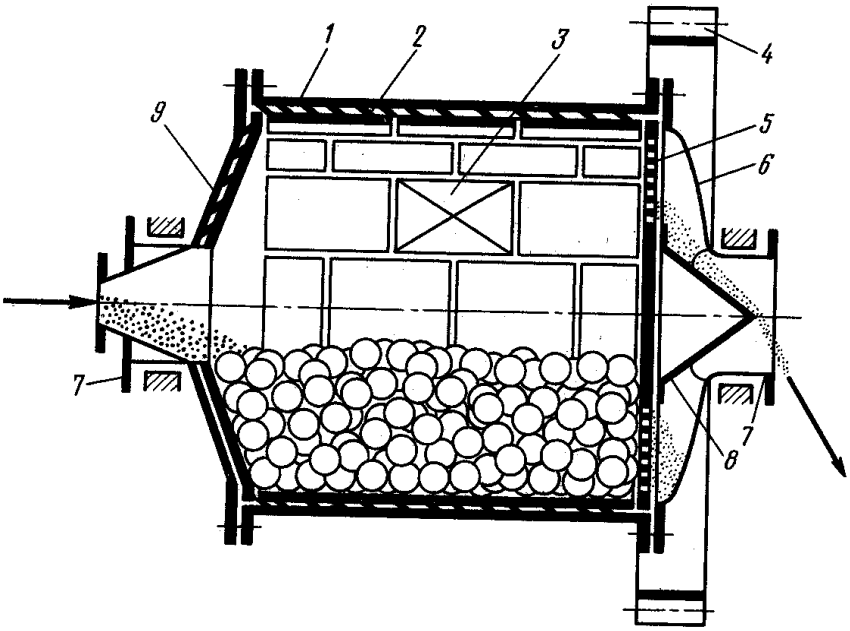


Figure 7 . _ Ball grinder .

1 - drum body ; 2 - plate; 3 - hatch; 4 – leading gear; 5 fences ; 6 - cover; 7 - stupa; 8 - guide cone; 9 - cover .

The degree of crushing is controlled by changing the rotation speed of the hammers and the opening of the sieve holes at the outlet. Grinding of large and medium-sized products is mainly done by hammering , while small-sized solid particles are crushed by rubbing on the grid.

Figure 8. Hammer mill (under laboratory conditions)

A hammer crusher designed for crushing dry components of coal briquettes in laboratory conditions (Fig. 8). The principle of operation of this grinder is based on the high-speed rotation of hammers inside a closed housing.

CONCLUSION

Coal grinding pieces of coal and bio-bio binders fall into the housing through the consumption regulator and collide with the hammers rotating around the rotor axis. As a result of the repeated beating of the raw material on the hammers and the

body, grinding to a powdery state occurs. In order for the crushed product to leave the working chamber, the housing has a rectangular grid that provides the required level of crushing.

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