THRUST TRANSMITTING DEVICE
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This invention relates to a thrust transmitting device for hydraulically-operated jaw crushers of the type comprising a power-driven reciprocating plunger and a jaw-propelling ram.

In prior United States Patent 2,986,345, means are described for the hydraulic transmission of thrust from the ram to the jaw by liquid pressure developed by the plunger in the ram cylinder and applied to a bearing surface on the jaw.

It is an object of this invention to provide an improved thrust transmitting means for hydraulically-operated jaw crushers, such means being of simple construction, subject to varying operating conditions, and having increased operational effectiveness and life.

The present invention contemplates, in a hydraulically-operated jaw crusher having a jaw and a reciprocating ram for propelling said jaw, the provision of means for transmitting thrust from the ram to the jaw comprising a thrust bearing interposed between said ram and said jaw and having mating surfaces, said bearing having an element of non-porous material on which one of said mating surfaces is formed and an element of porous material on which the other of said mating surfaces is formed, and means for delivering fluid under pressure to said porous element for transmitting therethrough to said mating surfaces and tending to separate said mating surfaces.

The single figure of the drawing illustrates, in sectional side elevation, one embodiment of the invention.

Referring to the drawing, 19 is the moving jaw of a hydraulically-operated jaw crusher having a ram 11 mounted for reciprocation in a ram cylinder 12. The ram is driven in conventional manner by means of fluid pressure in the ram cylinder as delivered by the hydraulic system of the crusher.

Force is transmitted from the ram to the jaw by means of a thrust link 13 interposed therewith and having a bearing surface 14 at one end thereof adjacent the jaw and a bearing surface 15 at the other end thereof adjacent the ram. As shown, each surface 14 and 15 is part-spherical in form (concave as illustrated). However, it will be understood that such surfaces may be of other suitable configuration, such as cylindrical.

Seated in a bearing projection 16 carried by the jaw is a bearing element 17 of any suitable sintered porous bearing material and having a part-spherical (convex as shown) bearing surface 18 mating with bearing surface 14. Seated in the end of the ram is a bearing element 19 of porous bearing metal and having a part-spherical (convex as shown) bearing surface 20 mating with bearing surface 15.

Fluid under pressure, developed in the ram cylinder 12 by the power-driven plunger (not shown) is transmitted through a duct 21 in the ram to a recess 22 in bearing element 19 therethrough a duct 23 in the thrust link to a recess 24 in the bearing element 17. The fluid is thus transmitted through the elements 19 and 17 to the mating surfaces 14, 18 and 15, 20 and tends to separate these surfaces.

As shown, the bearing element 19 is of less diameter than the ram and is totally enclosed between the ram and thrust link by the non-porous material forming the parts. The whole thrust cannot, therefore, be transmitted hydraulically by the pressure developed on the ram and exerted through the porous elements 19, between the mating surfaces 15, 20.

Part of the thrust must, therefore, be transmitted by direct mechanical contact between the mating surfaces 15, 20, whence it follows that leakage in appreciable amount cannot occur between these surfaces, and that the fluid pressure is uniformly distributed throughout the porous bearing element.

The same may apply to the bearing on the jaw and would apply if the surface area of the porous bearing element 17 were less than that of the ram.

When part of the thrust is transmitted by direct contact between the mating surfaces, that contact must extend over a certain area to which fluid pressure cannot extend.

If, however, the area of the surface of the porous bearing element were greater than that of the ram it would be possible to transmit nearly the whole thrust hydraulically leaving only a small proportion to be transmitted by direct contact between the mating surfaces. In such cases these surfaces would be in contact; and if the porous element should be completely encased in non-porous material, leakage in appreciable amount could not occur between the mating surfaces. If the diameter of the porous element should be greater than that critical amount the whole thrust could be carried hydraulically, the mating surfaces would be forced slightly apart and some leakage would take place between them.

Flow would then be occurring through the porous material and there would be a corresponding pressure drop the effect of which would be that the outflow of fluid would so adjust itself that the whole thrust would be carried by fluid escaping between the mating surfaces at a mean pressure lower than that exerted by the ram.

It would, of course, be practicable to transmit thrust from the ram to the jaw through one or both bearings by fluid delivered under pressure from an independent source into the duct 23 in the thrust link. In such a case, the duct 21 in the ram would not be provided.

I claim:

1. In a hydraulically-operated jaw crusher having a jaw and a reciprocating ram for propelling said jaw, the combination of means for transmitting thrust from the ram to the jaw comprising a thrust link of non-porous material having a bearing surface at each end thereof, a bearing projection on said jaw having a recess therein, a body of porous bearing material seated in said recess and having a surface mating with and engaging the major portion of a first one of said thrust link bearing surfaces, said first thrust link bearing surface extending beyond the entire periphery of said porous body mating surface whereby said body is substantially completely enclosed, said ram having a recess therein, a second body of porous bearing material seated in said ram recess and having a surface mating with and engaging the major portion of a second one of said thrust link bearing surfaces, said second thrust link bearing surface extending beyond the entire periphery of said second body mating surface whereby said body is substantially completely enclosed, said thrust link having a duct extending therethrough and communicating with each of said bodies of porous bearing material, and means for delivering liquid under pressure to said duct.

2. In a hydraulically-operated jaw crusher having a jaw, a ram cylinder, and a ram reciprocatingly mounted in said cylinder for propelling said jaw, the combination of means for transmitting thrust from the ram to the jaw comprising a thrust link of non-porous material having a bearing surface at each end thereof, a bearing projection on said jaw having a recess therein, a body of porous bearing material seated in said recess and having a surface mating with and engaging the major portion of a first one of said thrust link bearing surfaces, said first thrust link bearing surface extending beyond the entire periphery of said
3,160,353

porous body mating surface whereby said body is substantially completely enclosed, said ram having a recess therein, a second body of porous bearing material seated in said ram recess and having a surface mating with and engaging the major portion of a second one of said thrust link bearing surfaces, said second thrust link bearing surface extending beyond the entire periphery of said second body mating surface whereby said second body is substantially completely enclosed, said thrust link, said porous bodies, and said ram each having a duct extending axially therethrough, said ducts being aligned and in communication with each other for delivery of liquid under pressure from said cylinder to said porous bodies.

References Cited in the file of this patent

UNITED STATES PATENTS

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2,986,345 Gauldie ............................ May 30, 1961