Aug. 13, 1929. A. SCHUCHARDT 1,724,318

ATTRITION MILL

Filed June 18, 1928 4 Sheets-Sheet 1

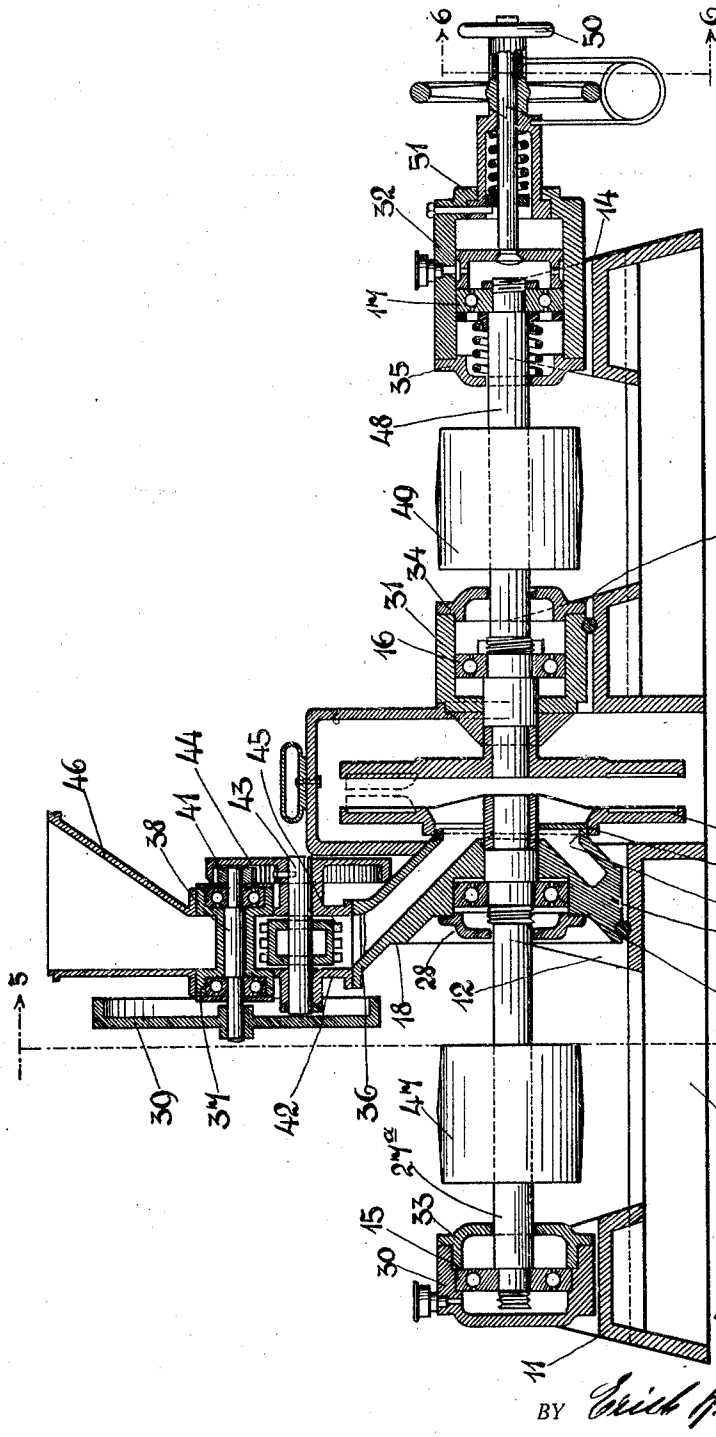


Fig. 1.

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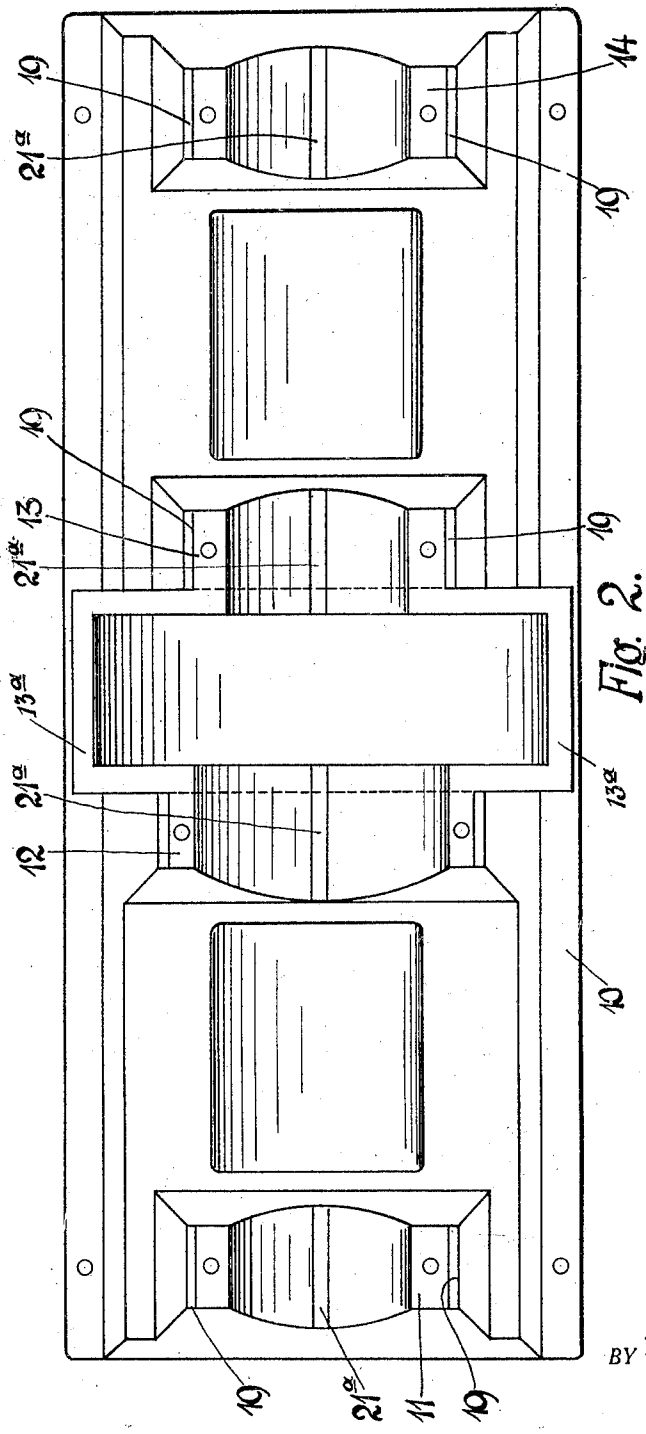


Fig. 2.

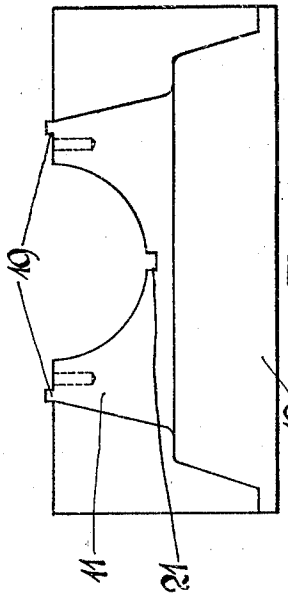


Fig. 4.

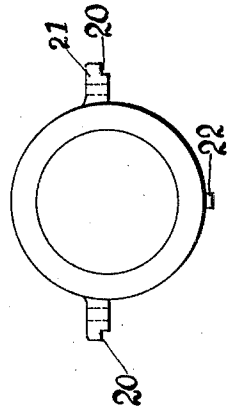


Fig. 3.

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ATTRITION MILL

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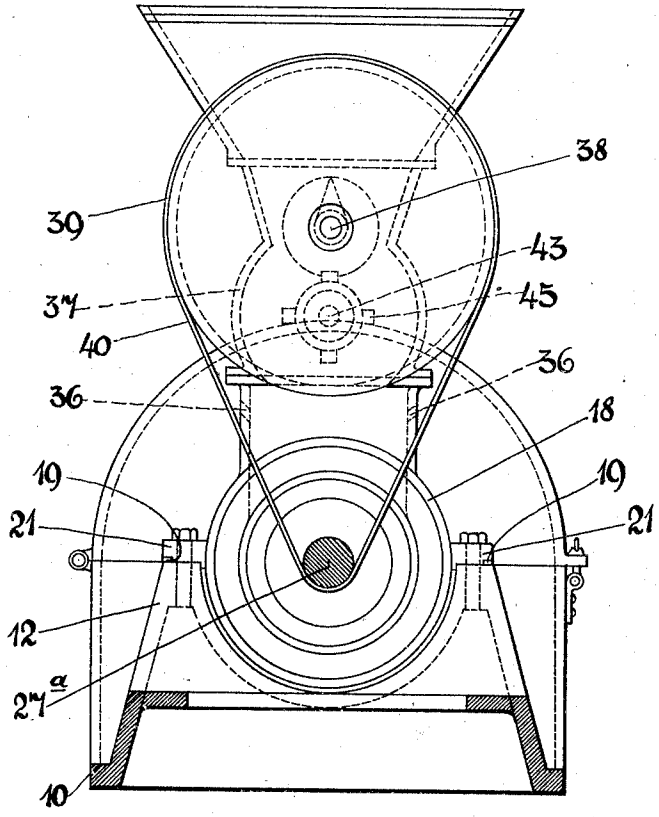


Fig. 5.

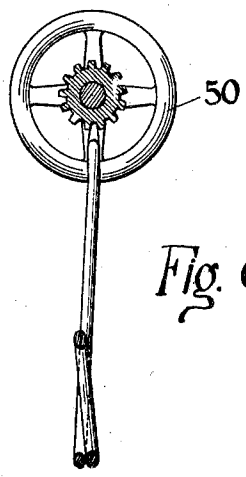


Fig. 6.

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ATTRITION MILL

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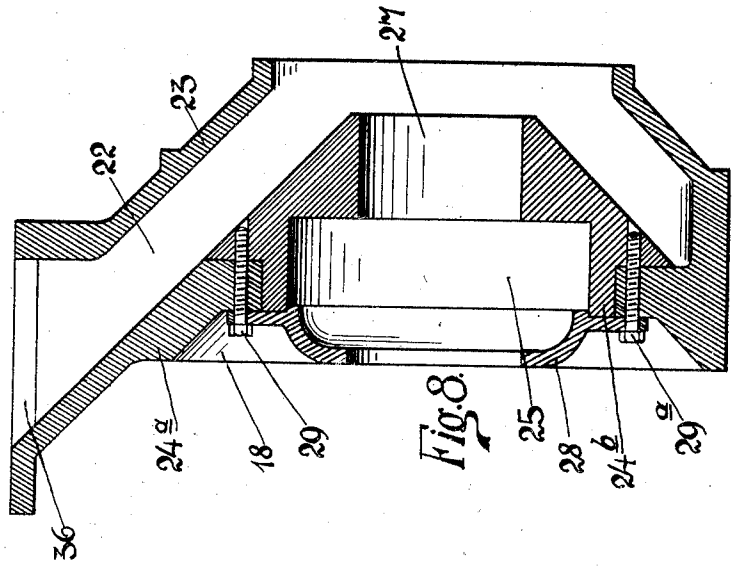


Fig. 8.

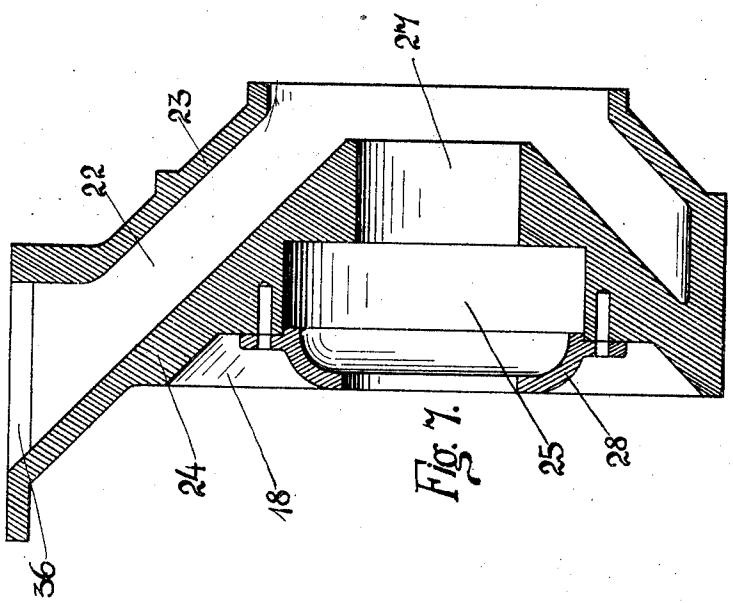


Fig. 7.

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Patented Aug. 13, 1929. 1,724,318

UNITED STATES PATENT OFFICE.

AUGUST SCHUCHARDT, OF WINONA, MINNESOTA.

ATTRITION MILL.

Application filed June 18, 1928. Serial No. 286,170.

The invention relates to attrition mills and more especially to that type known under the name of double head attrition mills.

The object of the invention is to provide a mill of the class indicated, the pedestals whereof are cast integrally with the base.

A further object of the invention is to provide an attrition mill, the two centrally located pedestals whereof are cast integrally with the lower casing, so that said two pedestals are rigidly connected with each other by means of the walls of the lower casing, whereby this central portion of the base will be greatly strengthened.

Another object of the invention is to provide an attrition mill the pedestals whereof are of such height, that the upper edge thereof approximately coincides with the axes of the milling shafts, so that the bearings will be supported in the manner of hanging bearings and not of standing bearings.

A still further object of the invention is to provide an attrition mill, the pedestals whereof are cast integrally with the base, the centrally located pedestals being connected with each other by integrally cast walls and forming with said walls the lower casing and the upper edge of all pedestals and of the lower casing being arranged in one horizontal plane.

An additional object of the invention is to provide an attrition mill the pedestals and bearing shells whereof have cooperating means for aligning the bearings on the base.

Another object of the invention is to provide an attrition mill, the feeder shoe whereof forms at the same time the housing for one of the centrally located bearings, this bearing can be arranged as near as possible to the working mill head. By thus shortening the length of shafting between the bearing and said mill head vibratory movement of the shaft is eliminated as far as possible.

Other objects of the invention not specifically mentioned may be easily ascertained and understood from the following description in connection with the accompanying drawings forming a part thereof. It is, however, to be understood that the invention is not to be limited or restricted to the exact constructions or formations shown in the drawings and described in the specification, but that said invention is only to be limited by the scope of the claims appended hereto.

In the drawings illustrating some preferred embodiments of the invention:

Fig. 1 is longitudinal vertical section through the attrition mill according to the invention.

Fig. 2 is a top view of the base of said mill.

Fig. 3 is an end view of a casing of a bearing for the milling shafts of said mill.

Fig. 4 is an end view of the base of said mill.

Fig. 5 is a vertical cross section of the mill taken on line 5—5 of Fig. 1.

Fig. 6 is a cross section on line 6—6 of Fig. 1.

Fig. 7 is a vertical longitudinal section through the feeder shoe.

Fig. 8 is a view similar to Fig. 7 but of a slightly modified form.

The base 10 is cast in one piece and the head pedestal 11, the feeder pedestal 12, the center pedestal 13, and the tail end pedestal 14 are cast integrally with said base. The base of an attrition mill has to sustain the greatest strain right between the two centrally located pedestals i. e., between the feeder pedestal and the center pedestal where the actual work of the milling is done. In order to strengthen the base at this place walls 13^a are provided connecting the two central pedestals, and forming at the same time the lower casing. The top surfaces of all pedestals and of the side walls 13^a of the lower casing are located on the same level, so that these surfaces may be machined simultaneously. These surfaces are arranged at such height, that they are located approximately in the same horizontal plane with the axes of the milling shafts. Through this arrangement it becomes easier to close the casing tightly and in addition to that the machining of the upper casing is facilitated.

On the head pedestal 11 the head bearing 15 is supported. The center pedestal 13 carries the center bearing 16 and the tail end pedestal 14, the tail end bearing 17.

The feeder pedestal 12 supports the feeder shoe 18. This shoe forms, as will be described later, the housing for the feeder shoe bearing 18^a. Alignment ledges 19, are cut into the top supporting surfaces of the different pedestals. Since, as stated above, these surfaces are all located in the same horizontal plane, said alignment ledges can

all be cut simultaneously. The housing of each of the milling shaft bearings, including the feeder shoe, which forms the housing for the feeder shoe bearing 18^a, has a pair of supporting wings or arms 21 which are provided with shoulders 20 co-operating with the ledges 19 to align the housings of the bearings and the feeder shoe on the base of the mill. By means of the shoulder 20 on the supporting arms 21 it is possible to bore all the housings and the feeder shoe on the same jig, so that these bores will be properly aligned when the parts are assembled on the base of the mill. The lower or supporting surface of the arms 21 of the different housings and of the feeder shoe are arranged approximately in the same horizontal plane as the axis of the bore of each housing, so that the top surface of each pedestal will be positioned approximately at the same height with the axes of the milling shafts, after the mill is assembled. The indicated location of the supporting arms 21 on the housings of the bearings makes it possible for the bearings to hang in the pedestals instead of to stand thereon.

In addition to the alignment ledges 19 all the pedestals may be provided with an alignment groove 21^a cut into the lowermost portion of the supporting surface of each pedestal and extending axially over the entire length of each pedestal. If desired the alignment ledges may be omitted and the alignment grooves only may be provided. If such alignment grooves are provided each of the housings of the bearings 15, 16 and 17 and the feeder shoe 18 is provided with a corresponding key 22, as indicated in Fig. 3, to co-operate with said grooves.

The feeder shoe is illustrated in Figs. 1, 5, 7 and 8. In the first three figures a preferred embodiment of said feeder shoe is shown, while the last named figure represents a somewhat modified form. In the preferred form the feeder shoe is cast in one integral piece, while in the modification, said member consists of a plurality of pieces.

The feeder passage 22 is formed by and is located between the feeder shoe shell 23 and the feeder shoe proper 24. In the preferred form the feeder shoe proper is cast in one piece, while in the modification illustrated in Fig. 8 it consists of the two members 24^a and 24^b. In each case the feeder shoe has a hollowed out space 25 adapted to receive the bearing 18^a, so that, as stated above, the feeder shoe forms the housing for said bearing. The lower or bottom portion 26 of the feeder shoe is of semi-cylindrical shape. From the hollowed out space 25 a central bore 27 leads through the feeder shoe to permit the head mill shaft 27^a to extend therethrough. A cover 28 is fastened to the head end of the feeder shoe in any convenient manner for instance by means of bolts 29^a. In the modification of Fig. 8 these bolts may also hold the parts 24^a and 24^b together. The material to be treated slides over the feeder shoe proper, which is of conical shape. To facilitate the feeding of the material the feeder shoe is provided at both sides with inclined slide surfaces extending laterally to the inner walls of the feeder shoe housing. The material being fed into the mill has the tendency to follow the rotary movement of the open milling head 29, and the inclined surfaces serve in addition to the purpose already mentioned, to prevent said material from such rotary movement, which would be detrimental to a proper feeding action. On the open milling head 29^c a female seal ring 29^d is provided and the feeder shoes housing has a funnel shaped prolongation 29^b forming a male seal ring co-operating with the ring 29^d. It is, however, to be noted that the male seal ring may be made as a separate piece and may be fastened in any convenient manner to the feeder shoe shell.

By locating the feeder shoe bearing inside the feeder shoe, the distance between the bearing and the end of the milling shaft 27^a to which the open mill head 29 is fastened is reduced to the smallest possible minimum, so that the vibrations of said shaft caused by the working action of the mill head are also reduced as far as possible. In older mills these vibrations had to be taken care of by using shafts and bearings of comparatively big diameters and by reinforcing the mill head with a heavy hub. These heavy parts do not only cost more than the lighter ones adapted to be used in connection with the present invention, but took up more space, so that the area of the feeder passage was reduced as compared with the present construction.

As shown in Fig. 1 the housings of the bearings 15, 16, and 17 consist each of a body 30, 31, and 32 respectively. The lubricant for the bearing will be introduced, as indicated, on the end of the bearing opposite the cover. Through this arrangement the lubricant will be forced through the bearing toward the cover, so that when it is desired to remove the used grease, it is only necessary to take off the cover, and the old, dirty and stale grease can be taken out easily.

It has been customary to provide air slots in the end walls of the feeder shoe housing. In the present construction air slots 36 are provided in the side walls. This arrangement prevents any dust, dirt, etc., escaping through said slots from falling near the place where the shaft penetrates the feeder shoe.

On top of the feeder shoe shell and the feeder shoe, the feeder housing 37 is arranged. Adjacent the upper end of said housing a drive shaft 38 is journalled. Out-

side of the housing on the end of said shaft extending toward the head end of the mill a pulley 39 is rigidly mounted. A belt 40 (Fig. 5) may be trained over the head milling shaft 27ª and said pulley to drive the latter. On the opposite end of the drive shaft 38 a small spur gear 41 is rigidly mounted outside the feeder housing. Underneath the drive shaft 38 a driven shaft 43 is journalled in the feeder housing and on one of its ends an internal spur gear 44 is rigidly mounted outside of the feeder housing and meshes with the small spur gear 41.

Feeder blades 45 are rigidly mounted on the driven shaft inside the feeder housing. The internal gear forms, so to say, a protective casing for the gear transmission of the feeder and these gears are also protected by being arranged between the feeder housing and the upper casing of the milling heads.

On top of the feeder housing the feeder hopper 46 is fastened.

The head shaft 27ª may be driven in any suitable and convenient manner. In the drawings a pulley 47 is shown on the shaft, and this pulley may be driven by a belt (not shown) from a motor or the like.

The tail shaft 48 is supported by the center bearing 18 and the tail bearing 17. This shaft may be driven also in any convenient and suitable manner, for instance by means of a drive pulley 49 as indicated in Fig. 1. This figure also illustrates the device for holding the tail shaft in working position in relation to the head shaft, and for permitting said tail shaft being moved axially away from said head shaft, if a stone or any other hard substance should happen to enter between the milling heads.

Fig. 6 shows the device permitting axial movement of the handwheel 50 in relation to the adjustment device but securing said wheel against relative rotary movement. Since said devices are of well known construction and do not constitute a part of the present invention they are not described in detail.

Having described my invention and how the same is to be performed I claim as new and desire to secure by Letters Patent:

1. In a device of the class described, a base having a head and a tail end, a plurality of pedestals on the head end, a plurality of pedestals on the tail end, said pedestals being integral with said base and of equal height, a bearing supported on each of said pedestals, means on said pedestals for aligning said bearings, means on said bearings for co-operating with said first mentioned means, a milling shaft journalled in the bearings on the head end, a second milling shaft journalled in the bearings on the tail end, milling heads arranged on the ends of said shafts adjacent to each other, a feeder shoe having a feeder canal ending adjacent said milling head, said shoe being supported by one of the pedestals on the head end and adjacent the mill head, and said shoe being adapted to receive and support one of said bearings, and a feeder mechanism on said feeder shoe.

2. In a device of the class described a base having a head and a tail end, a plurality of pedestals on the head end, a plurality of pedestals on the tail end, said pedestals being integral with the base and of equal height, the two centrally located pedestals being connected by integrally cast walls, a bearing on each of said pedestals, a milling shaft journalled in the bearings on the head end, a second milling shaft journalled in the bearings on the tail end, milling heads arranged on the adjacent ends of the milling shafts, a feeder shoe on the pedestal on the head adjacent the milling head, a feeder mechanism supported by said feeder shoe, means on said pedestals for aligning said bearings, means on said bearings and said feeder shoe for co-operating with said first mentioned means, and a housing for one of said bearings formed by and in said feeder shoe.

In witness whereof I affix my signature.

AUGUST SCHUCHARDT.