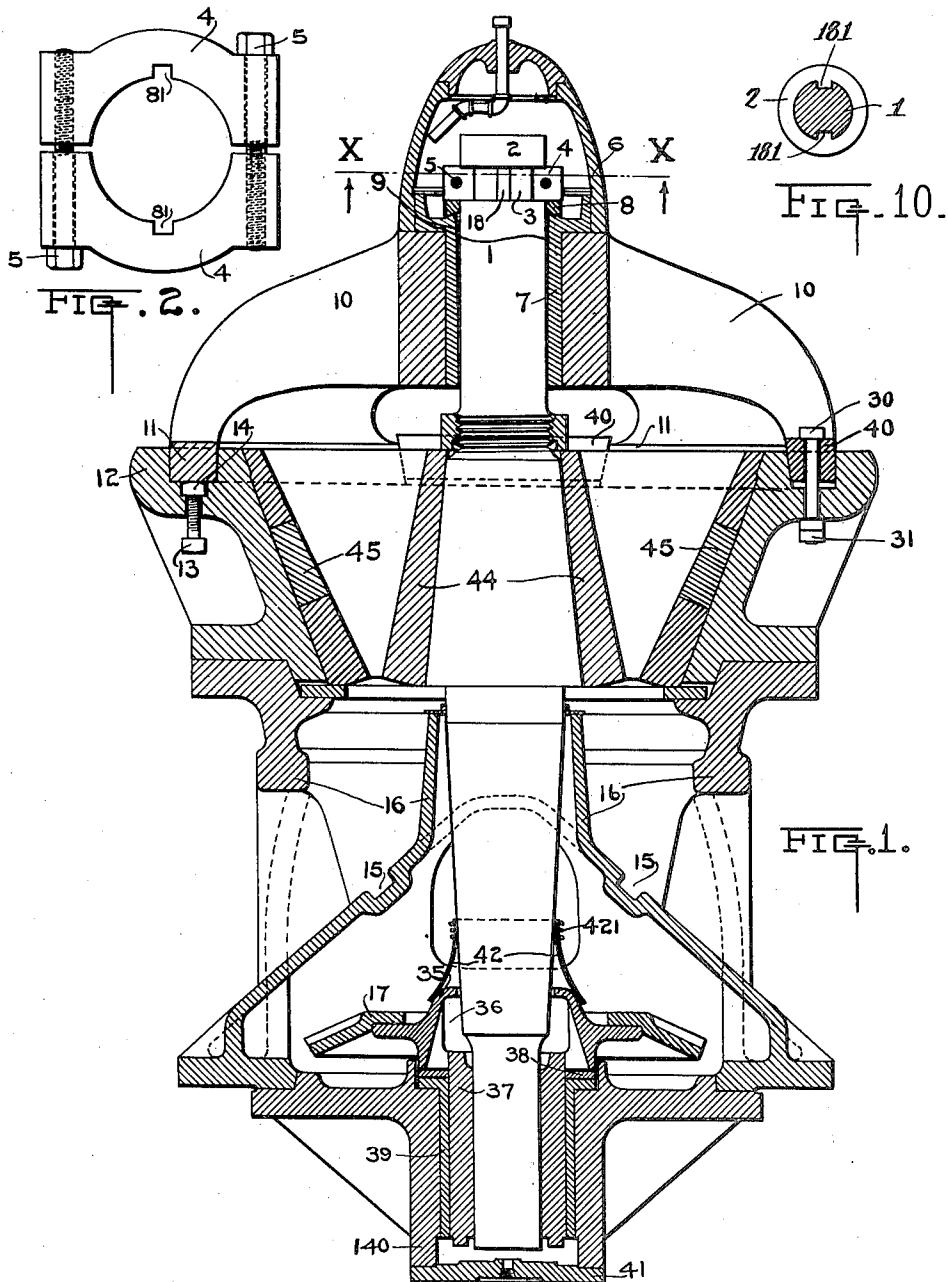


T. W. CAPEN.
GYRATORY CRUSHER.
APPLICATION FILED MAY 3, 1909.

1,110,887.

Patented Sept. 15, 1914.

2 SHEETS—SHEET 1.



WITNESSES =

Elta Brickell

W. H. Lieber.

T. W. Capen

INVENTOR

BY

G. J. G. Wein

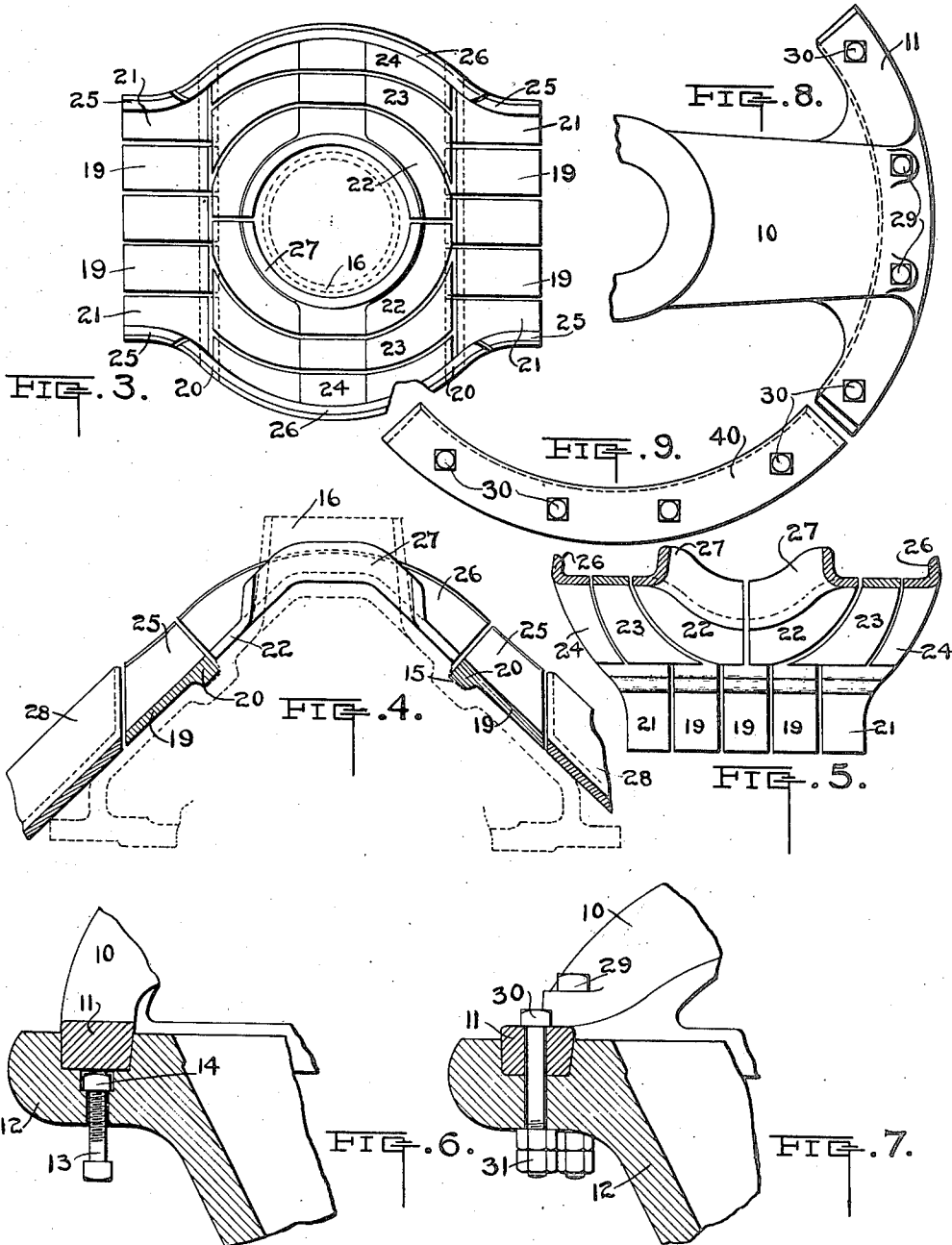
ATTORNEY.

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WITNESSES:

Edw. Brickell
W. H. Lieber

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UNITED STATES PATENT OFFICE.

THOMAS W. CAPEN, OF MILWAUKEE, WISCONSIN, ASSIGNOR, BY MESNE ASSIGNMENTS, TO ALLIS-CHALMERS MANUFACTURING COMPANY, A CORPORATION OF DELAWARE.

GYRATORY CRUSHER.

1,110,887.

Specification of Letters Patent.

Patented Sept. 15, 1914.

Application filed May 3, 1909. Serial No. 493,636.

To all whom it may concern:

Be it known that I, THOMAS W. CAPEN, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented a certain new and useful Improvement in Gyratory Crushers, of which the following is a specification.

This invention relates to improvements in the construction of rock crushers and in particular to such improvements as applied to that class known as gyratory crushers.

The object of the invention is to provide various improvements in the construction of large gyratory crushers which will increase the efficiency of the machine and at the same time simplify the construction thereof.

Some of the features herein disclosed are claimed broadly in a divisional application S. N. 789,385, filed Sept. 11, 1913.

A clear conception of the invention can be obtained by referring to the accompanying drawings in which like reference characters designate the same parts in different views.

Figure 1 is a central vertical section of a gyratory crusher with the improvements applied thereto. Fig. 2 is an enlarged plan view of the suspension collar for the shaft. Fig. 3 is a plan view of the lining used in the bottom shell. Fig. 4 is a central vertical section of the lining shown in Fig. 3 with the addition of fragmental sections through the discharge openings. Fig. 5 is a central vertical section of the lining taken on a line at right angles to the line of section of Fig. 4. Fig. 6 is an enlarged fragmental section of the top shell and spider. Fig. 7 is a similar view taken through another portion of these elements. Fig. 8 is a fragmental plan view of the spider. Fig. 9 is a plan view of the spider wedge block. Fig. 10 is a sectional view of the shaft on the line X—X of Fig. 1, looking in the direction of the arrow.

The gyratory crusher consists essentially of a main shaft 1, carrying the head 44, and is suspended from the spider 10. The spider 10 is rigidly connected to the top shell 12, whose interior is lined with concaves 45. The top shell 12 rests upon the bottom shell 16, to which is fastened a bottom plate 140. The lower bearing of the main shaft 1 is

formed in the bottom plate 140, the bottom plate 140 and cover 41 forming an oil chamber about said bearing.

The main shaft 1 is suspended from the spider 10 by means of a split suspension collar 4, see Figs. 2 and 10. This collar 4 is fitted into a groove 3 which is turned into the main shaft 1 at its upper end 2. The keys or feathers 18, which coact in the slots 81 of the collar 4, positively prevent the collar 4 from turning on the shaft by fitting the keys or feathers 18 into keyway 181 formed in the shaft 1 at the groove 3. The two halves of the collar 4 are clamped together by the bolts 5, see Figs. 1 and 2 thereby locking the key in place in the groove.

A wearing ring 8, having a spherical zone surface on its lower side, coacts with a corresponding convex upper surface of the spider bushing 7 on its lower side, and with a lower surface of the collar 4 on its upper plane surface. The spider bushing 7 which is supported in the spider 10 has a tapered bore 9 through which the main shaft 1 passes. A suitable dust cap 6 is provided over the working parts just described, and rests on the top of the spider 10.

The spider 10, see Figs. 1, 6, 7, 8, may have any number of arms desired. As shown in Fig. 1, there are four arms, two being shown, while Fig. 8 discloses a fragment of a two arm spider 10. The arc shaped bases 11 of the spider 10 are slightly tapered convergingly on their inner surfaces, and coact in a corresponding groove in the upper portion of the top shell 12, and are also tapered convergingly upwardly at their ends. This groove is concentric with the crusher, the portion of the groove which is not filled by the spider bases 11 being filled by the spider wedge blocks 40. These wedge blocks 40 are tapered convergingly downward on their inner and end surfaces, and are of sufficient length to form a wedge between two bases 11 when the wedge block 40 is inserted between them thus circumferentially wedging the bases 11 of the spider 10 within the top shell 12. The bolts 29, 30, are used for securing the spider 10 and wedge blocks 40 to the top shell 12, these bolts 29, 30, being locked into place by lock nuts 31, see Fig. 7. A series of standard or stock bolts 13, not specially machined

and carrying the nuts 14, are passed through cored holes in the top shell 12 below the bases 11 and the wedges 40, and serve as jack screws, see Fig. 6. The cored holes through the top shell 12 have square recesses to accommodate the nuts 14.

The bottom shell 16 forms a support for a number of liners 19, 21, 22, 23, 24, and for the discharge spouts 28, see Figs. 3, 4, 5. The liners 19, 21, which lie adjacent the spouts 28, have transverse ridges 20 upon their lower sides, which coact in channels 15 which are cast in the upper surface of the bottom shell 16. The outer liners 21, have side walls 25, the inner liners 19 being merely flat plates. The upper liners 22, 23, 24, are formed so as to make an arch connection between the two opposite sets of liners 19, 21, and they are laterally curved to provide a recess for the shaft 1. Of the upper liners 22, 23, 24, the inner and outer liners 22, 24, have their corresponding inner and outer edges formed with side walls 27, 26.

The bottom shell 16 also forms a covering for the driving gear 17 and the gear hub 35 to which the gear 17 is attached. This gear hub 35 is in one piece with or rigidly connected to the eccentric 37, through the eccentric hole of which the shaft 1 passes as usual. The upper portion of the hollow gear hub 35 is conical in shape and extends nearly up to the shaft 1, thus forming the oil chamber 36. A strip of fabric 42 is fastened to the shaft 1 in any convenient manner, as by tying same thereto at its upper end by means of cord 421, and the fabric 42 hangs down over the conical portion of the hub 35 to form an apron. The bushing 39 which is fastened to the bottom plate 140, forms the support for a wearing ring 38 upon which the gear hub 35 bears.

In operating the crusher, the shaft 1 is gyrated by means of a pinion, not shown, which meshes with the driving gear 17. The material to be crushed is fed upon the concaves 45 and is crushed by the action of the head 44, which has a gyratory motion by the rotation of the eccentric 37. Upon leaving the crushing members, the crushed material falls upon the sectional lining from which it is discharged by the discharge spouts 28. This sectional lining is easily removed, due to its sectional construction, which is a great advantage in case of repairs.

As it is necessary to keep a constant flow of oil around the lower bearing of the shaft 1 and eccentric 37, and as it is furthermore essential to keep gritty matter from this oil, some means of inclosing the oil chamber 36 must be provided. This inclosure is formed by the conical portion of the gear hub 35 and the fabric strip 42. The upper portion of the chamber 36 is formed conical so as to deflect the oil which rises due to the

centrifugal force, inward toward the shaft 1, from which it passes back to the bearing. The conical hub 35 is not made to touch the shaft 1 because the latter is not machined at this point. If the shaft were machined there could be a tight fit at this point as the shaft in this crusher is not vertically adjustable.

The supporting collar 4 at the top of the shaft 1 forms a rigid supporting means as well as one which can be easily removed in case repairs are found necessary.

The wedges 40 give an efficient means for locking the spider 10 to the top shell 12. The insertion of these wedges 40 between the bases 11 tends to spread the latter, thus forcing them against the outer wall of the groove in the top shell 12.

It is ordinarily difficult to remove the spider 10 from the top shell 12. To facilitate this removal the bolts 13 are provided. Similar bolts 13 or jack screws are also used for breaking the joint between the top shell 12 and the bottom shell 16 when these members are large and heavy. These are not shown in the present construction, but their arrangement would be the same as that of the bolts 13 which are shown.

It should be understood that it is not desired to be limited to the exact details of construction shown and described, for obvious modifications will occur to a person skilled in the art.

It is claimed and desired to secure by Letters Patent:

1. In a crusher, a plurality of superposed annular members, one of said members having a circular groove formed therein on an upright axis one of the opposite sides of which being tapered and an upper member thereof coacting with a lower member thereof at the opposite sides of said groove, and bolts directly coacting with the upper and the lower members for forcing said members together axially, said coaction at the tapered side of the groove serving to generate a radial pressure at the remaining side of the groove.

2. In a crusher, a plurality of superposed annular members, an upper member thereof coacting with a lower member thereof at a set of curved surfaces having a common upright axis, a block having wedge ends coacting with one of said members whereby said member is moved radially in contact with the other of said members, and a bolt for driving said block into position.

3. In a crusher, a shell having a groove therein having an inner tapered curved surface and an outer cylindrical surface, a spider having arms and arc shaped bases, said bases having inner and outer curved surfaces corresponding to said groove surfaces, wedge blocks forcing between the ends of said bases and lying in said groove, and

bolts for driving said blocks to spread the bases into tight contact with the outer wall of said groove.

3 4. In a crusher, a plane diaphragm at the discharge end of said crusher for protecting working parts and having a continuous groove formed in its upper side, and a lining in sections, the individual sections being formed with ribs fitting said continuous
10 groove.

5. In a crusher, a diaphragm spanning the

crusher discharge for protecting working parts, and a lining in sections therefor, the sections at the edge of the diaphragm being formed with side walls coacting with the 15 crusher wall.

In testimony whereof, I affix my signature in the presence of two witnesses.

THOMAS W. CAPEN.

Witnesses:

H. C. CASE,

G. F. DE WEIN.