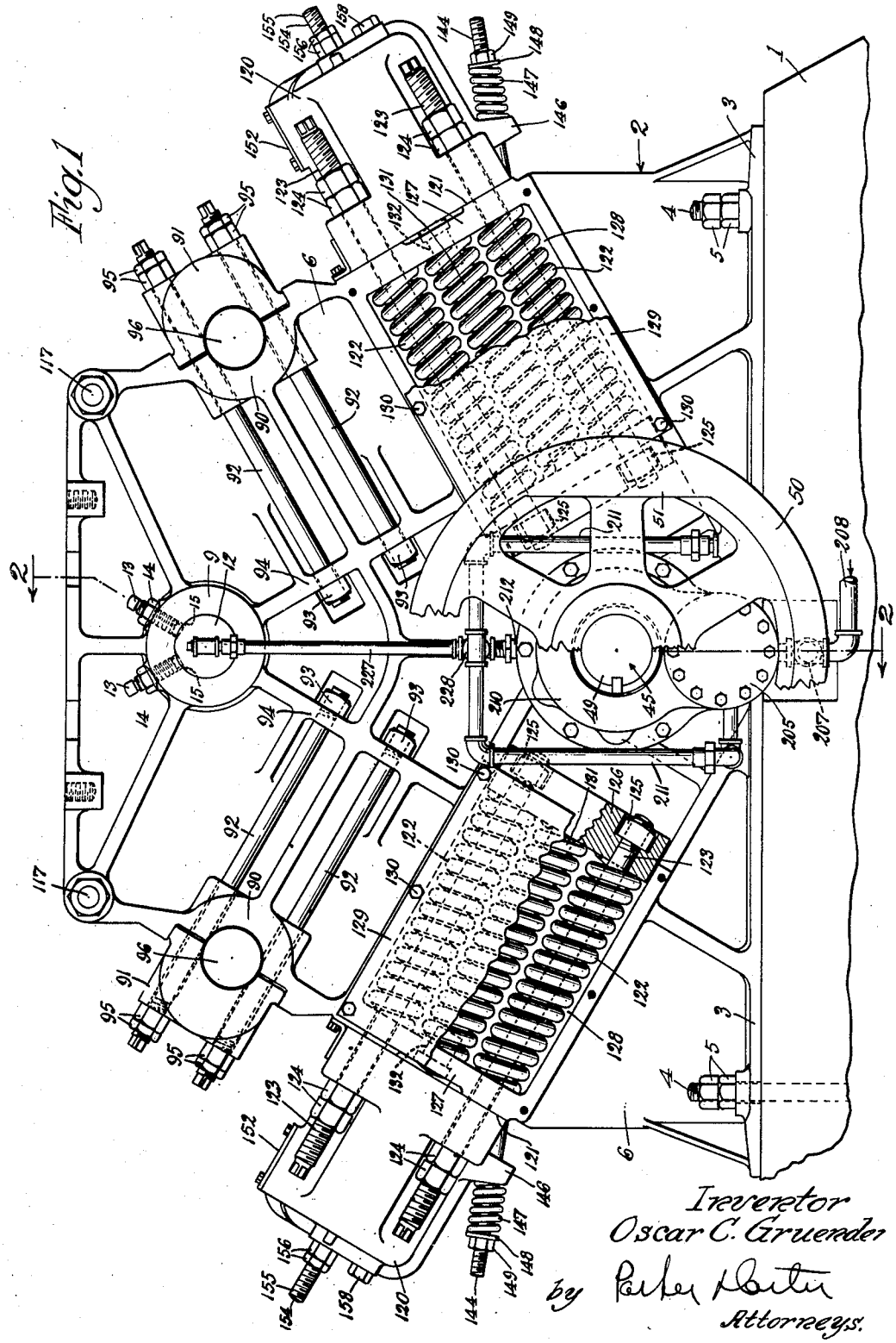
Oct. 24, 1939. O. C. GRUENDER 2,177,524

JAW CRUSHER

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Fig. 1



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JAW CRUSHER

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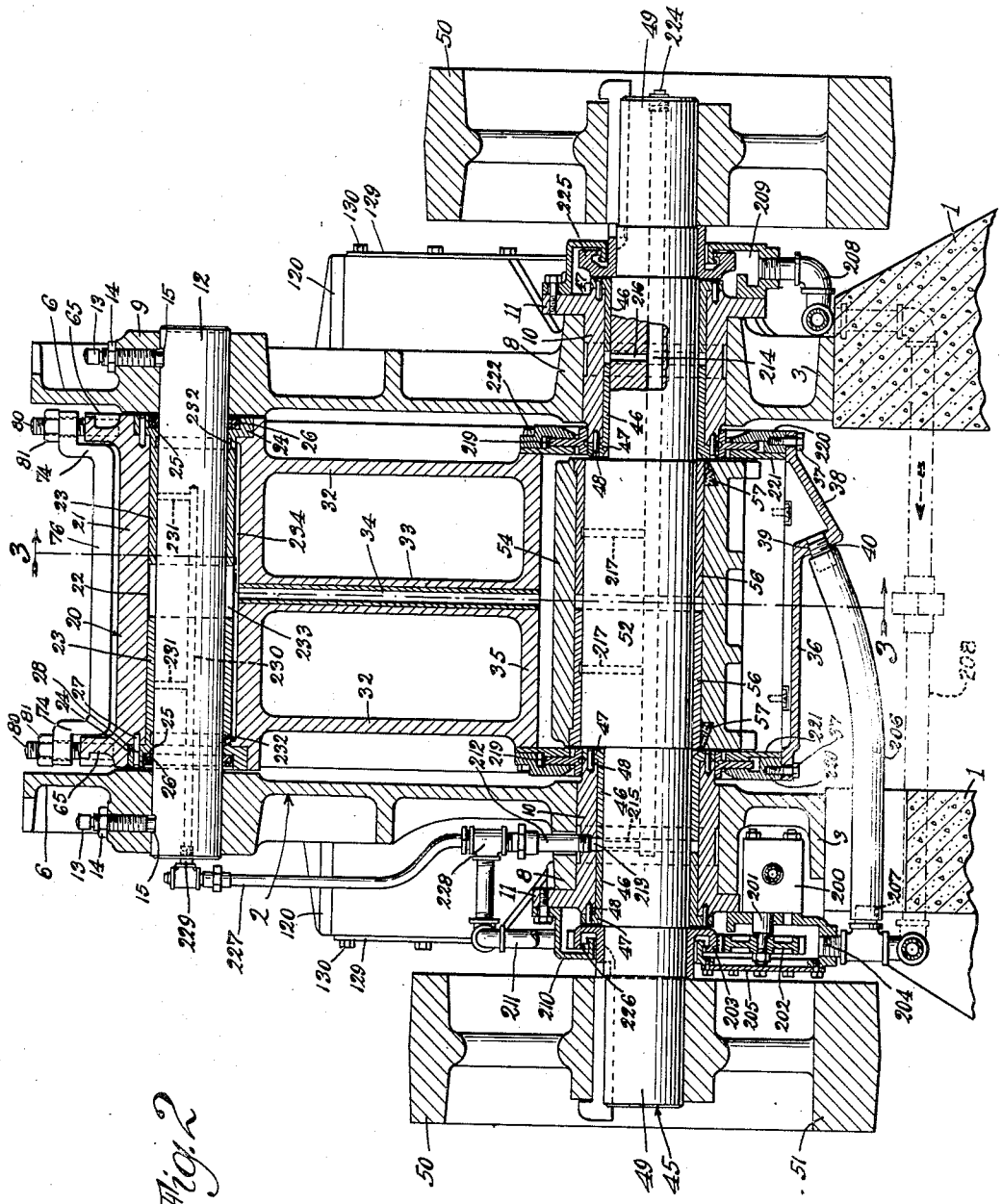


Fig. 2

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JAW CRUSHER

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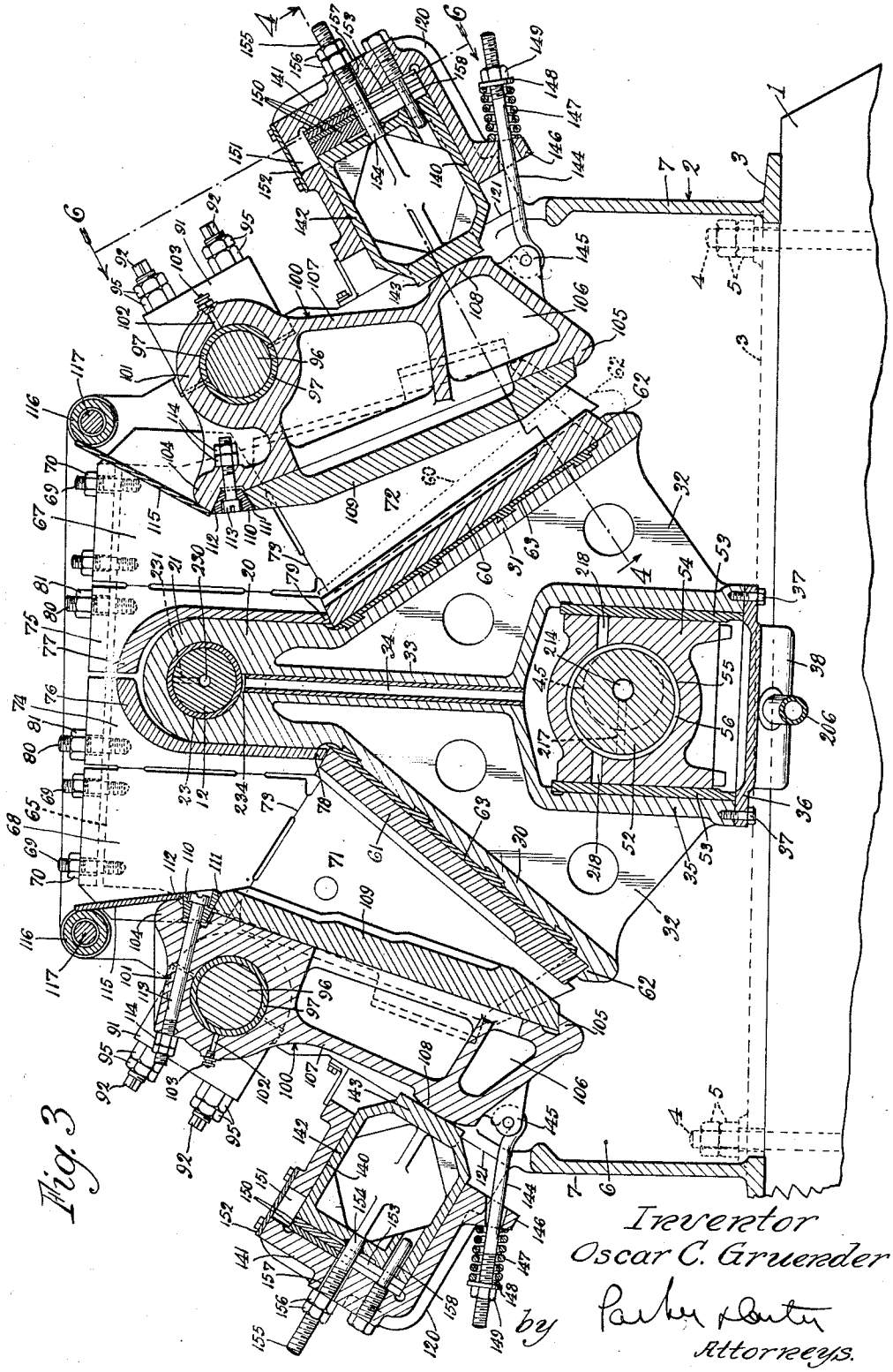


Fig. 3

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JAW CRUSHER

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Fig. 4

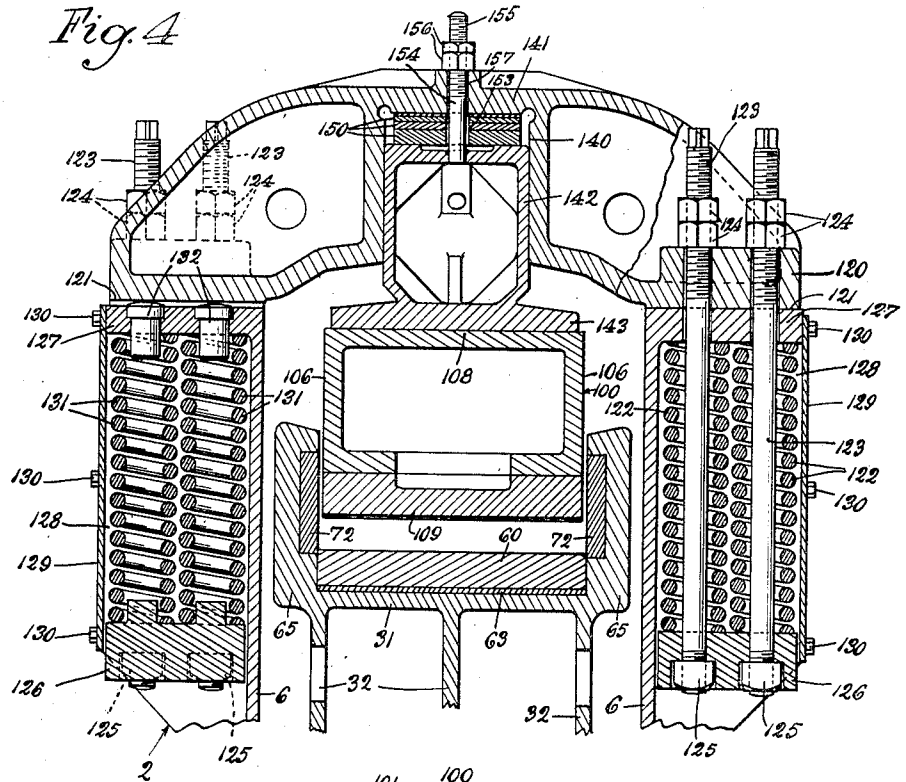
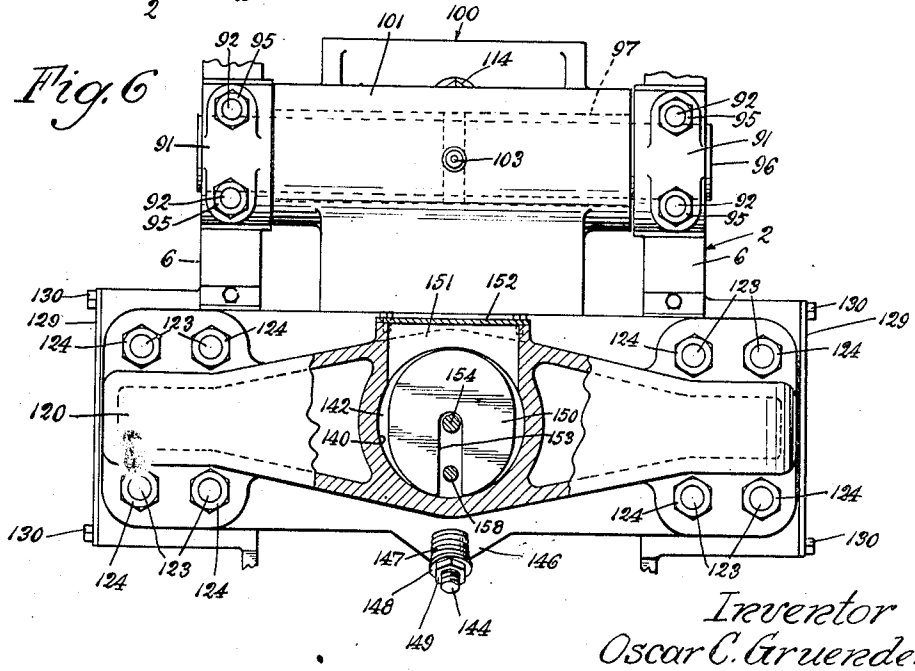


Fig. 6



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JAW CRUSHER

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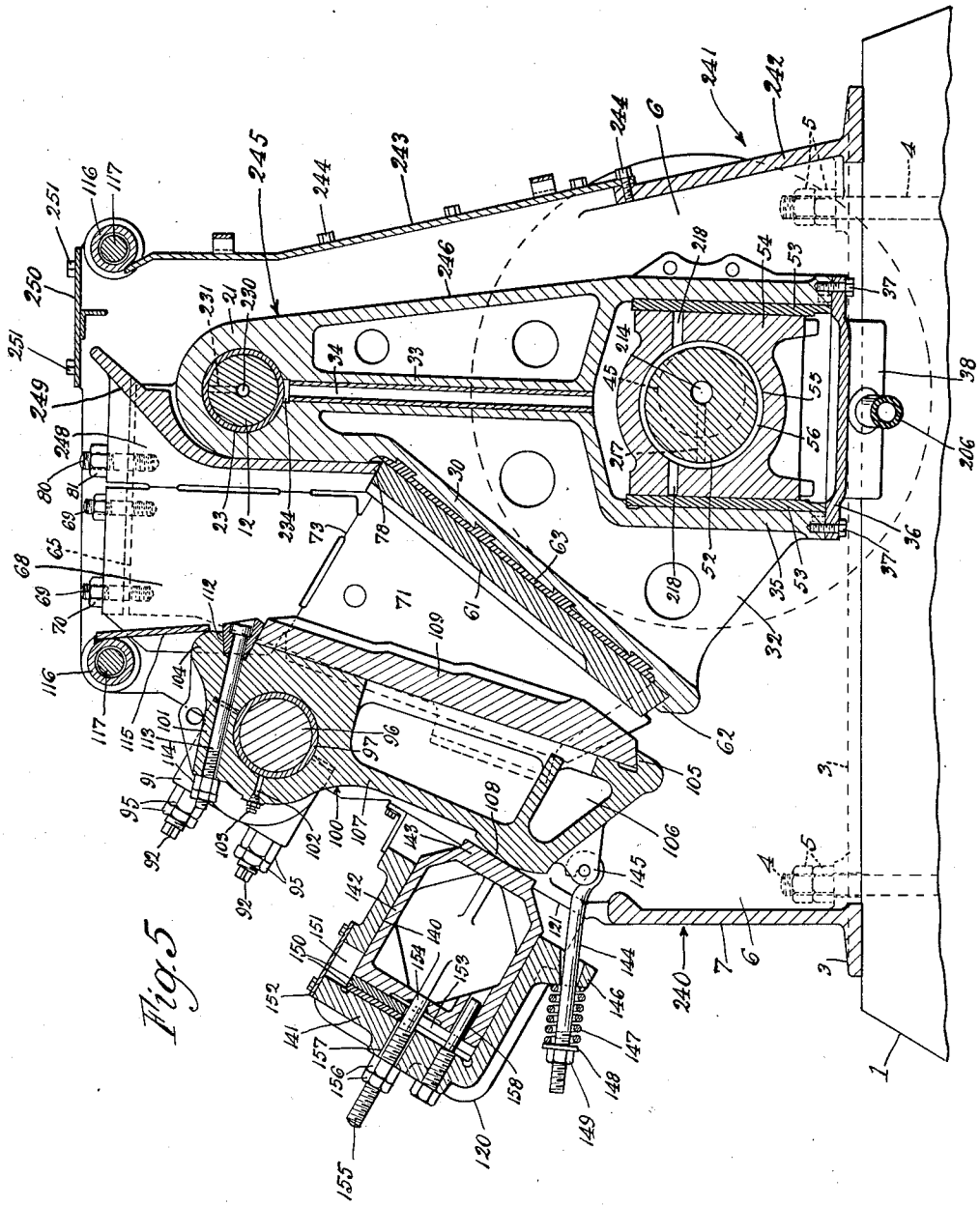


Fig. 5

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UNITED STATES PATENT OFFICE

2,177,524

JAW CRUSHER

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Application May 9, 1936, Serial No. 78,809

2 Claims. (Cl. 83—53)

My invention relates to an improvement in jaw crushers. One purpose is the provision of improved means for supporting the moving jaw of such a crusher.

Another purpose is the provision of improved means for actuating the moving jaw of such a crusher.

Another purpose is the provision of means for normally holding the fixed jaw in predetermined fixed position, while permitting it to recede from the moving jaw in response to predetermined excess crushing pressure, as when tramp iron or other uncrushable material penetrates the crushing zone, or when the particles undergoing crushing pack into an uncrushable mass.

Another purpose is the provision of an improved frame for such a crusher.

Other objects will appear from time to time in the course of the specification and claims.

I illustrate my invention more or less diagrammatically in the accompanying drawings, wherein

Figure 1 is a side elevation with parts broken away;

Figure 2 is a section on the line 2—2 of Figure 1, with the parts in slightly different position;

Figure 3 is a vertical section on the line 3—3 of Figure 2;

Figure 4 is a section on the line 4—4 of Figure 3;

Figure 5 is a view similar to Figure 3 illustrating a single jaw crusher; and

Figure 6 is a section on the line 6—6 of Figure 3.

Like parts are indicated by like symbols throughout the specification and drawings.

Referring to the drawings, 1 illustrates any base or foundation structure upon which the crusher is mounted. 2 generally indicates any suitable base frame structure herein shown as having bottom webs or flanges 3. Any suitable means may be employed for securing the base frame in position upon the base 1. I illustrate for example a plurality of bolts 4 with lock nuts 5, the bolts passing through portions of the bottom flanges 3 and anchored in any suitable fashion in the base 1. The frame may include for example a plurality of upstanding side frame portions 6 connected by transverse end webs 7, 7 at the opposite ends of the crushers, as shown for example in Figure 3.

The side frame members 6 are provided with generally cylindrical sleeve portions 8 and 9, arranged in pairs in general vertical alinement. Mounted in the lower sleeves 8, 8 are generally cylindrical sleeve inserts 10, 10, each with a terminal flange 11 which serves to position the sleeve and to limit its penetration within the surrounding sleeve portion 8, of the frame member 6.

Mounted in the upper sleeve portions 9 is a fixed shaft 12 secured against rotation for example by set screws 13 with lock nuts 14, the ends of the set screws engaging apertures or flattened portions 15 of the shaft 12, whereby the shaft is held against rotation.

Mounted for rotation or for oscillatory movement about the shaft 12 is the head structure generally indicated at 20. It includes an upper portion 21, apertured as at 22, and provided, within said aperture, with a pair of bearing sleeves 23, each provided at its outer end with a flange 24 recessed as at 25 to receive any suitable washer ring 26 which may, for example, be of leather. Rotation of the sleeve 23 is prevented by any suitable members such as the dowel pins 27 which pass through apertures 28 in the flanges 24, and penetrate a suitable distance into the head portion 21. The head or moving jaw crusher includes a pair of downwardly and outwardly turned surface members 30, 31, connected by a plurality of transverse reinforcing webs 32. One of said webs includes an enlarged central portion 33 which may be apertured to receive any suitable pipe or conduit 34, the purpose of which will later appear. The webs 32 are broken away to form space for a box or housing member 35, which may be formed integrally therewith and is provided with an open bottom closed by a closure plate 36 removably held in position for example by the screws 37. It is provided with a bottom enlargement 38 apertured as at 39 to receive a drain nipple 40.

45 generally indicates an actuating shaft mounted for rotation in the sleeves 10. Each of said sleeves 10 may be provided with a plurality of bearing sleeves proper indicated at 46, each of said sleeves having a terminal flange 47 apertured to receive dowels 48, whereby rotation in relation to the member 10 is prevented. Shaft 45 is further provided with reduced outer end portions 49 which may be connected to pulleys or fly wheels 50 which may be counterweighted as at 51. If desired each or either of these pulleys may be employed to receive any suitable drive belt, not herein shown, whereby the crusher may be driven from any suitable motor or equivalent power source. The intermediate portion of the shaft 45 is provided with an enlarged eccen-

tric portion of substantial extension, indicated at 52.

Positioned within the box 35, and vertically slidable in relation to the wear plates 53 is the sliding drive member 54, which is apertured as at 55 and provided, in said aperture, with the wear taking sleeves 56, which may be secured in position as by the locking portions or members 57. It will be understood that the inner faces of the members 56 conform to the outer face of the eccentric portion 52 of the shaft whereby, when the shaft 45 is rotated, the sliding drive member 54 is imparted a vertical and lateral movement of substantial amplitude. Inasmuch as it is in sliding relationship with the wear plates 53, the resultant movement of the head member 20 is a rotary oscillation about the axis of the fixed shaft 12.

The crushing is performed by crushing plates or jaw plates 60, 61, which may be gripped at their bottom edges as by an overhanging lip 62 of the members 30 and 31. It may be seated upon any suitable liner 63, of zinc or the like.

The upper edges of the two jaw plates 60, 61 are held clamped in position by the following structure. Each end of the jaw structure is formed as a side plate, as at 65 which may, for example, form part of a single casting of which the previously described head structure 20 is also part. Secured to it are removable wear taking plates. I illustrate for example side plate members 67, 68, which may be held in position as by studs 69 and nuts 70. Lower plates 71, 72 may be wedged or otherwise secured in position, with edges 73 opposed to corresponding edges of the members 67, 68. The space between the plates 67 and 68 is filled by a pair of opposed removable liner plates 74, 75, the opposite pairs of said plates being connected by partially arcuate bridge members 76, 77, which overlie the upper portion of the jaw structure 20, and conform generally to it. The bridge portions 76, 77 are provided with bottom thrust portions or edges 78, 79, adapted to thrust against the upper edges of the jaw plates 60, 61.

80, 80 are studs and 81, 81 lock nuts whereby the plates and bridges above described are drawn downwardly toward the jaw structure 20, in such fashion that the upper edges of the jaw plates 60 and 61 are positively clamped or locked, and the jaw plates held firmly against movement. It will be clear, from Figure 3, that there is a certain clearance between the bridge portions 76, 77 and the jaw member 20, to provide for irregularities in size or shape or to permit the use of unfinished or partly finished castings and also to provide for the take-up and variation in size of the jaw plates 60 and 61.

It will be understood that, in the operation of my device, normally fixed jaw members are opposed to the jaw plates 60 and 61 of the oscillated head structure 20. Inasmuch as, in the double jaw structure, both normally fixed jaws are identical, I will describe but one, corresponding symbols being employed in the drawings for both of these jaws. The normally fixed jaws are mounted to tilt or rotate outwardly away from the moving jaw, means being provided, as below described, for normally holding said jaws against such movement, during the continuance of normal crushing pressure.

Each outside end frame member 6 is provided with an enlarged half sleeve generally indicated as 90, to which is opposed a mating half sleeve member or cap 91, which may be held in position as by the long bolts 92, headed, or provided with a nut, as at 93, and passing through a web portion 94 of the member 6. The bolts 92 pass through the members 90 and 91 and may be secured at their outer ends as by any suitable nuts 95. Any suitable shaft 96 may be locked between the members 90 and 91. The intermediate portion of the said shaft may be surrounded by any suitable bearing sleeve or sleeves 97. Such bushings or sleeves prevent binding, as by rust or the like.

Rotatable about the shaft 96, but normally fixed against movement, is the jaw structure generally indicated as 100. It includes a cylindrical knuckle or sleeve portion 101, within which is the wear taking sleeve 97 above referred to. 102 is any suitable oil or greasing inlet, closed by any suitable fitting 103. 104 is an upper flange and 105 a lower, and undercut flange, the two being connected by any suitable webs 106. 107 indicates a back plate, which has integral therewith a rocker bearing portion 108. 109 is any suitable jaw plate which is locked in position, at its upper edge, as by the wedge 110 which is interposed between the upper bevel 111 of the plate 109 and the opposed beveled face 112 of the flange 104. 113 is any suitable locking bolt and 114 are locking nuts whereby the wedge 110 is drawn into locking position and the jaw plate 109 is locked firmly in place on the jaw structure. 115 indicates a deflector or wear plate which is secured to any suitable bushing 116 mounted on a transverse shaft or pin 117, which spans the two side frame members 6. Its lower edge rests against the flange 104 but is movable in relation thereto.

Spanning the end space between the side frame members 6, above the transverse end webs 7, is the bridge structure generally indicated as 120 which abuts against inclined edges of the members 6, as at 121. This bridge is normally locked in position in relation to the side members which it spans, being held in such position by a plurality of springs 122 which are threaded on bolts 123. The upper ends of these bolts are secured to the bridge 120 in any suitable fashion. I illustrate for example lock nuts 124. The lower ends of these bolts 123 may be headed as at 125 or provided with nuts, which engage any suitable bottom abutment 126 whereby the springs 122 are compressed against the top abutment portion 127, formed integrally with the side frame member 6. It will be observed that the springs are seated in a pocket generally indicated as 128 in the side frame member 6 and the pocket may be closed by any suitable removable cover 129 held in place for example by screws 130. Intermediate springs, without guiding bolts, may be employed as at 131, which may be guided or positioned by any suitable stud or studs 132.

The bridge is provided with a central aperture 140, generally cylindrical in cross section but provided with an end cover or limit portion 141. Slidable in the cylindrical portion 140 is any suitable slide member, herein indicated as 142. It is provided with an end bearing plate 143, indicated as flat and as extending substantially throughout the width of the jaw. It is shown as directly opposed to the rocker portion 108, of the jaw. The jaw is normally held in the position shown in Figure 3, by the employment of a tension rod 144 which may for example be hooked to the jaw as at 145 and which passes through an apertured lug 146 on the bridge structure. 147 is a spring compressed between a lug 146 and any suitable washer 148 which may be adjustably positioned

upon the tension rod 144, as by the nut 149. Therefore, the jaw is held against the member 143. In order to adjust the member 142, 143 in relation to the bridge, to permit adjustment of the normally fixed jaw, I provide a plurality of shims 150 which may be inserted through the aperture 151, normally closed by any suitable cover plate 152. These shims may be made in horseshoe form, slotted as at 153, to bridge the stem 154 which is welded or otherwise secured to the member 142. The stem 154 is screw-threaded as at 155, to receive locking nuts 156, and passes through the plates 141, as by the aperture 157. It will be understood that, after any desired shim or shims have been dropped into place, the nuts 156 may be employed to lock the assembly firmly in position. A dowel 158 may be employed to prevent rotation of the member 142 and, incidentally, of the shims.

The oiling system includes any suitable oil pump generally indicated as 200. It may for example be driven by any suitable pump shaft 201, with a gear 202 in mesh with a gear 203, keyed to the shaft portion 49, as shown at the left side of Figure 2. 204 is an oil inlet passage for the pump housing 210, the space about the gear 202 being closed by any suitable plate 205. 206 is a flexible oil return conduit mounted at one end on the nipple 40 and at the other on the nipple 207. 208 is another oil return passage extending from the oil collecting housing generally indicated as 209, at the opposite end of the shaft.

The oil return passage 208 is partly diagrammatically indicated in dash and dot lines in Figure 2. Oil under pressure is delivered from the oil pump 200 by ducts 211, to an inlet duct 212 communicating with an inlet port 213 in one of the cylindrical sleeves 10. The space between the bushings 46 serves as a chamber or passage for the oil. The shaft 45 is provided with an oil passage 214, from which a passage 215 communicates with the oil inlet pass 213 above described. A similar passage 216 may deliver lubricant between the space of the bushings 46 at the opposite end of the shaft. The sliding drive member 54 is lubricated by means of the oil ducts 217 in the eccentric portion 52, of the shaft. The wear plates 53 receive lubricant by means of the ducts 218 in the drive member 54, communicating with the space between the bearing sleeves 56. It will be understood that the lubricant delivered to the various bearings drains back to the oil collecting housings 209, 210, and the sump formed by the housing member 35 and the bottom plate 36. The open end of the oil duct 214 is normally closed by a pipe plug 224.

The open ends of the housing member 35 are provided with any suitable sealing means, which may comprise fixed plates 219 supported upon the flange 47 of the bearing sleeves 46, and the adjacent sleeve inserts 10 and pairs of plates 220, 221, in sliding relationship with the plates 219. The plates 220, 221, secured to the housing member 35 by any suitable means, for example screws 222, diagrammatically illustrated in Figure 2, straddle the plates 219, thus providing an efficient seal for the oil chamber of the housing. Any suitable sealing rings 225 and 226, keyed to the reduced end portions 49 of the shaft 45 prevent leakage from the oil housings 209 and 210. The sealing ring 226 may be formed integral with the gear 203, as indicated in Figure 2. Lubricant for the bearing sleeves 23 of the head structure 20 about the shaft 12 is delivered through a pipe line 227 connected by means of a fitting 228 with the oil lines 211. A nipple 229 connects the oil line 227 with an oil duct 230 in the shaft 12, from which ducts 231 lead to the inner periphery of the bearing sleeves 23 respectively. The oil, as it passes between the shaft and the bearings is received in the collecting channels 232 and the space 233 between the bearing sleeves 23 from whence the lubricant flows into the channel 234 formed in the head structure portion 21, and drains to the housing 35 through the pipe 34. This lubricant serves partly to lubricate the wear plates 53. The washer rings 26 form a seal about the shaft 12 and prevent escape of the oil about the open ends of the bearing sleeves 23.

Figure 5 illustrates a single jaw crusher which is similar in construction to the double jaw crusher above described, and similar parts are indicated by like numerals.

The base frame, generally indicated by 240, is formed similarly to the base frame 2. However, it is cut away as at 241 to shorten the frame. The side frame portions, indicated by like numerals 6, are connected by a web 242, corresponding to one of the webs 7. The remaining open space is covered by a closure plate 243 secured, for example, by screws 244 to the web 242 and side frame members 6. The head structure 245 is similar in construction to the head structure 20 previously described and like parts are indicated by like numerals. One of the downwardly inclined surface members 30 has been omitted, and a web 246 is provided in its place, connecting the webs 32 of the head structure. The removable liner plate 248, similar to the liner plate 74, is formed with an inclined bridge member 249, adapted to direct the material into the crushing cavity defined by the opposed crushing members 61 and 109.

Part of the upper open end may be closed by a closure plate 250 secured to the side frame member 6 by any suitable means, for example, bolts 251.

Lubricating means may be identically as described and illustrated in previous figures.

It will be realized that, whereas I have described and illustrated a practical and operative device, nevertheless many changes may be made in the size, shape, number and disposition of parts without departing from the spirit of my invention. I therefore wish my description and drawings to be taken as in a broad sense illustrative or diagrammatic, rather than as limiting me to the precise showing, of the description and drawings.

I claim:

1. In a jaw crusher, a frame, a movable jaw mounted on said frame and means for actuating it, a normally fixed jaw mounted on said frame, means for varying the distance between the opposed crushing faces of the crushing cavity thus formed, including an abutment opposed to said normally fixed jaw, yielding means for urging such jaw against said abutment and means for adjusting said abutment toward and away from the crushing cavity, including a cylindrical sleeve member associated with the frame, a cylindrical abutment member axially slidable in said sleeve member and having said abutment associated and movable therewith, and means for adjusting the location of said member in said sleeve, including generally circular shims adapted to penetrate said sleeve member, the side of said sleeve member being provided with a side aperture for the admission of such shims.

2. In a jaw crusher, a frame, a movable jaw

mounted on said frame and means for actuating it, a normally fixed jaw mounted on said frame, means for varying the distance between the opposed crushing faces of the crushing cavity thus formed, including an abutment opposed to said normally fixed jaw, yielding means for urging such jaw against said abutment and means for adjusting said abutment toward and away from the crushing cavity, including a cylindrical sleeve member associated with the frame, a cylindrical abutment member axially slidable in said sleeve member and having said abutment associated and movable therewith, and means for adjusting the location of said member in said sleeve, including generally circular shims adapted to penetrate said sleeve member, the side of said sleeve member being provided with a side aperture for the admission of such shims, and unitary means for preventing rotation of said cylindrical abutment member and said shims.

OSCAR C. GRUENDER.