

June 28, 1955

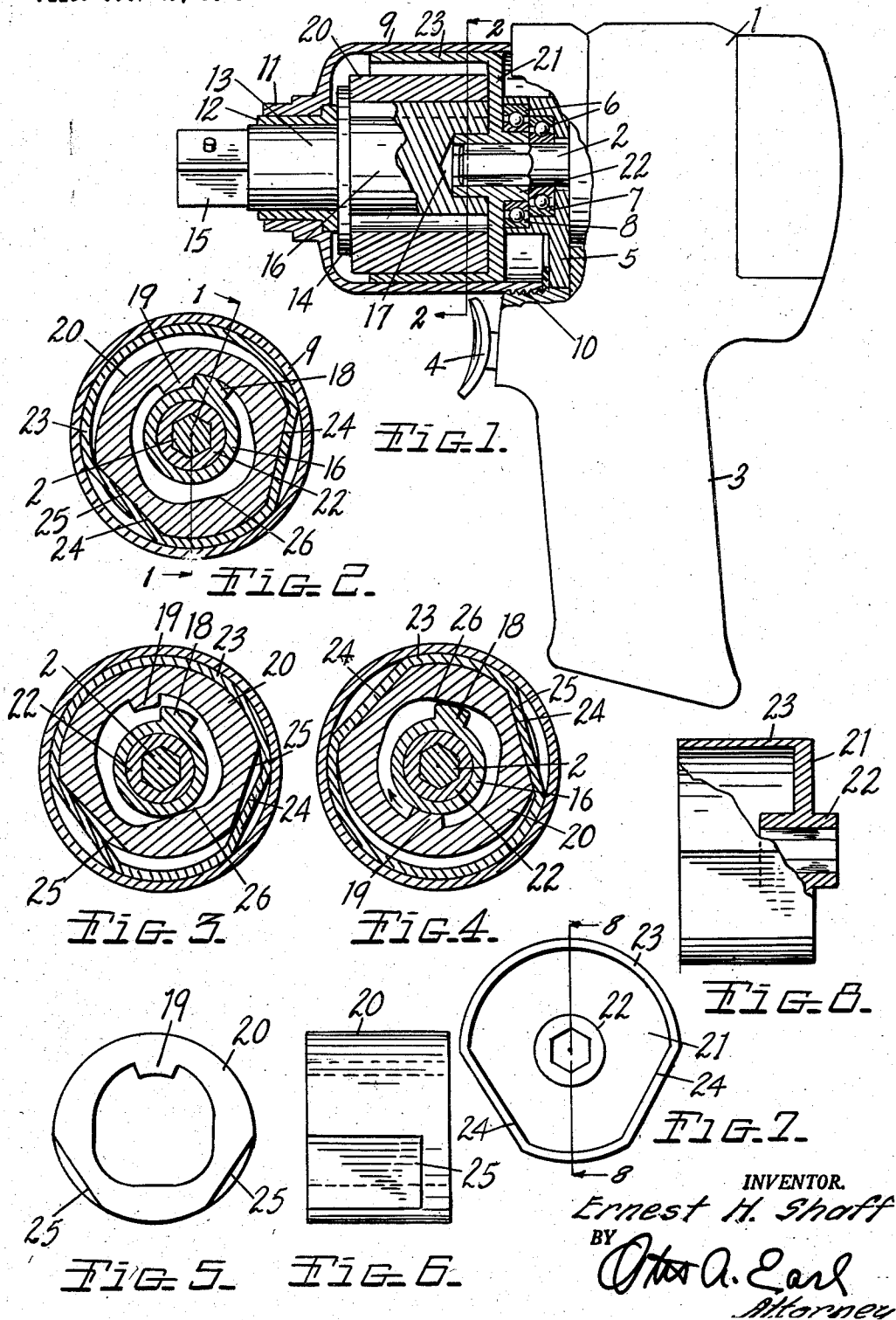
E. H. SHAFF

2,711,662

POWER OPERATED ROTARY IMPACT WRENCH

Filed Oct. 29, 1953

3 Sheets-Sheet 1



June 28, 1955

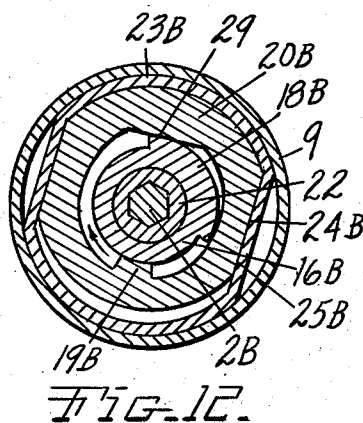
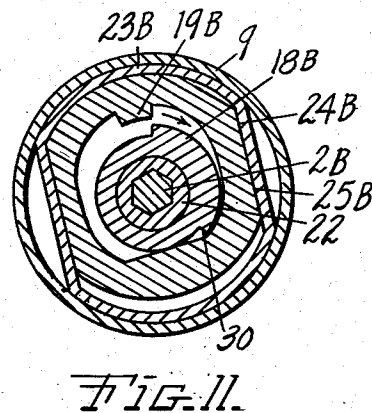
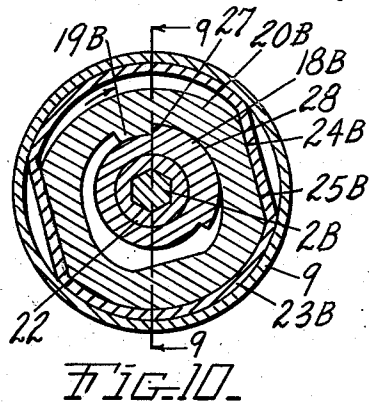
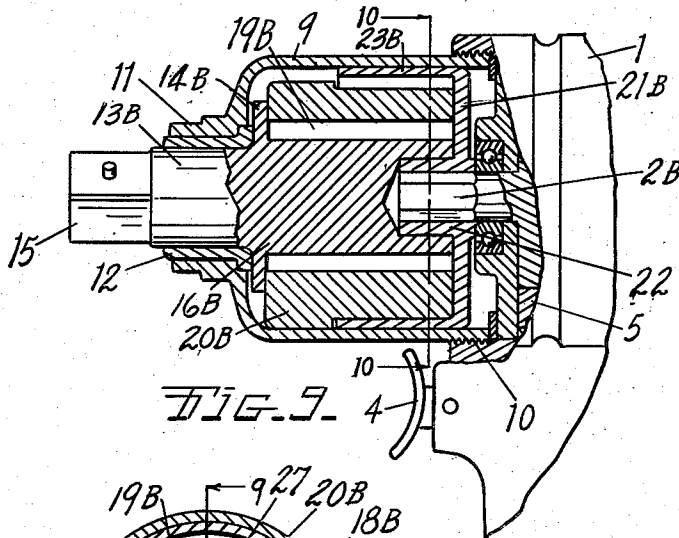
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POWER OPERATED ROTARY IMPACT WRENCH

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3 Sheets-Sheet 2



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June 28, 1955

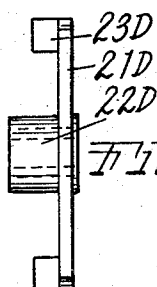
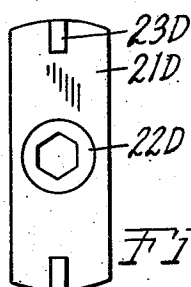
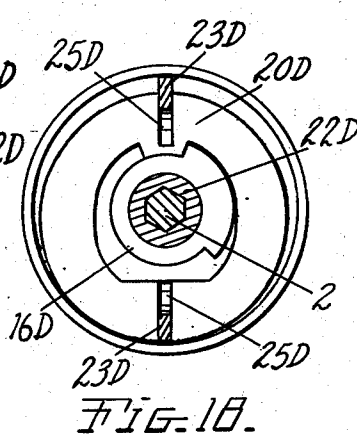
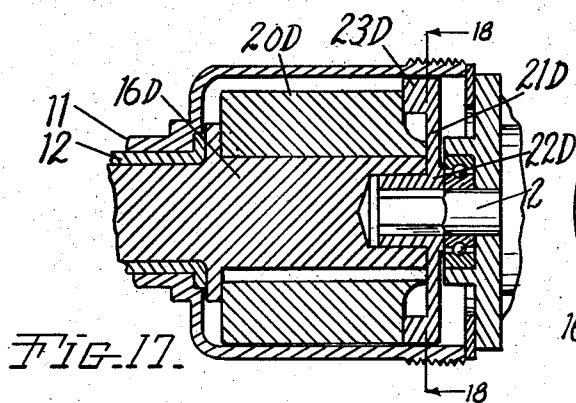
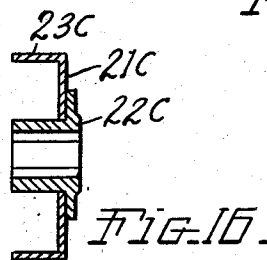
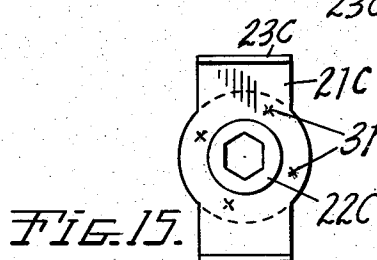
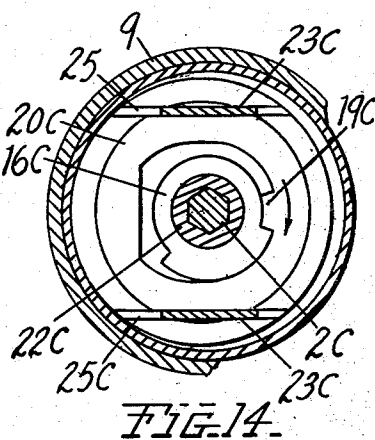
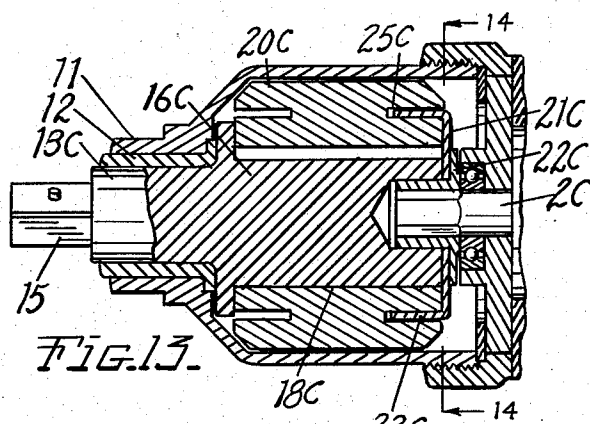
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POWER OPERATED ROTARY IMPACT WRENCH

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3 Sheets-Sheet 3



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2,711,662

POWER OPERATED ROTARY IMPACT WRENCH

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Application October 29, 1953, Serial No. 389,086

16 Claims. (Cl. 81—52.3)

This invention relates to improvements in a power operated rotary impact wrench. The principal objects of this invention are:

First, to provide a novel impact wrench having high power and relatively long life of its parts.

Second, to provide a novel impact wrench in which the impact member or hammer is automatically disengaged from the striker member or anvil by camming or twisting action of the drive connection to the hammer.

Third, to provide an impact wrench in which the impacting surfaces are engaged in a flat plane perpendicular to the direction of movement of the surfaces.

Fourth, to provide a novel form of impact wrench having a hammer which is reversible to double the useful life of the impact surfaces thereon.

Fifth, to provide an impact wrench which operates entirely upon the inertia of the parts thereof and does not require springs or levers which are liable to wear out.

Sixth, to provide a highly efficient impact wrench having a relatively few number of parts and which can be economically and inexpensively manufactured and assembled.

Other objects and advantages of the invention will be apparent from consideration of the following description and claims. The drawings of which there are three sheets illustrate four forms of a wrench embodying the main features of the invention.

Fig. 1 is a side elevational view, partially broken away in longitudinal cross section, of a first form of the wrench.

Fig. 2 is a transverse cross sectional view taken along the plane of the line 2—2 in Fig. 1 and illustrating the parts in impact delivering position.

Fig. 3 is similar to Fig. 2 but illustrates the parts in hammer disengaging position.

Fig. 4 is similar to Fig. 2 but illustrates the parts in hammer rotating position.

Fig. 5 is an end elevational view of the hammer shown in the previous figures.

Fig. 6 is a side elevational view of the hammer.

Fig. 7 is an end elevational view of the drive member shown in the other figures.

Fig. 8 is a side elevational view, partially broken away in longitudinal cross section, of the drive member.

Fig. 9 is a fragmentary longitudinal cross sectional view through a second form of the wrench.

Fig. 10 is a transverse cross sectional view taken along the plane of the line 10—10 in Fig. 9 and showing the parts in impacting relation.

Fig. 11 is a view similar to Fig. 10 by illustrating the parts in hammer disengaged position.

Fig. 12 is similar to Figs. 10 and 11 but illustrates the parts in hammer rotating position.

Fig. 13 is a fragmentary longitudinal cross sectional view through a third form of the wrench.

Fig. 14 is a fragmentary transverse cross sectional view

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taken along the plane of the line 14—14 in Fig. 13 and showing the parts in impacting relation.

Fig. 15 is an end elevational view of the drive member shown in Figs. 13 and 14.

Fig. 16 is a cross sectional view through the drive member shown in Fig. 15.

Fig. 17 is a fragmentary longitudinal cross sectional view through the fourth form of the wrench.

Fig. 18 is a cross sectional view taken along the plane of the line 18—18 in Fig. 17.

Fig. 19 is an end elevational view of the drive member shown in Figs. 17 and 18.

Fig. 20 is a side elevational view of the drive member shown in Fig. 19.

The form of the wrench illustrated in Figs. 13 to 16 has certain advantages from the standpoint of manufacturing economy and may, therefore, be considered a preferred form of the wrench. However, all forms illustrated have highly practical and desirable operating characteristics.

As is best illustrated in Fig. 1, the wrench includes a housing 1 that encloses a suitable motor having a shaft 2 projecting therefrom. The housing is provided with a handle grip 3 and a trigger 4 for controlling the motor. Desirably the motor is of the air operated type but the details of the motor are unimportant to the present invention and are therefore, not illustrated.

Set into the end of the housing 1 is a bearing plate 5 provided with stepped seats 6 for the roller bearings 7 and 8. The bearing plate 5 is retained in place by a cylindrical casing 9 threaded into the housing at 10. The bearing 7 rotatably supports the motor shaft while the bearing 8 supports a drive member as will be described.

The outer end of the casing 9 is formed into a throat 11 and provided with a bushing 12 for rotatably and axially supporting an anvil 13. A flange 14 on the anvil seats on the inner end of the bushing while the stem 15 of the anvil projects outwardly from the casing and is adapted to be secured to socket elements or other tools. An inner portion 16 on the anvil is generally cylindrical in shape and is provided with a centering recess 17 that receives the end of the motor shaft 2.

Formed along the side of the inner portion 16 of the anvil is a radially projecting axially extending striker rib 18 having radially disposed striker faces on its sides. The striker rib is adapted to coact with and be engaged by the side faces of an impact rib 19 which projects radially inwardly from the inner surface of a tubular hammer member 20. The hammer member 20 embraces the inner portion 16 of the anvil and seats at its outer end against the flange 14 on the anvil. The inner end of the hammer sits against the flat plate 21 of a drive member so that the hammer may move or oscillate radially with respect to the anvil and the striker rib 18.

The drive member of which the plate 21 is a part includes a central sleeve 22 which is drivingly engaged with the hexagonal end of the motor shaft 2 and is externally rotatably supported by the bearing 8. The periphery of the plate 21 is provided with a generally cylindrical flange 23 which rotates within the casing 9. The flange 23 embraces the hammer 20.

In order to drivingly connect the flange 23 of the drive member with the hammer 20 the flange 23 is provided with converging chordal surfaces 24 formed by shaping the sides of the flange 23 inwardly from the opposite ends of a diameter of the flange. This forms a wedge shaped pocket in the flange 23 and the exterior surface of the hammer 20 is provided with mating chordal surfaces 25 which permit the hammer to fit snugly in the pocket formed by the chordal surfaces 24. The chordal surfaces 25 on the hammer converge away from the impact

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rib 19 on the hammer and are formed on the opposite side of the hammer from the rib. Thus as is shown in Fig. 2 the hammer may rest in nested driving engagement in the pocket of the drive flange 23 until the impact rib 19 engages and is stopped by the relatively stationary striker rib 18 on the anvil.

Continued relative rotation of the flange 23 of the drive member causes the chordal surfaces 24 on the flange to wedge or squeeze the chordal surfaces 25 on the hammer out of the wedge pocket in the flange and move the hammer and impact rib 19 radially out of engagement with the striker rib 18 as is shown in Fig. 3. Further rotation of the flange 23 carries the hammer 20 around until the radially flattened inner surface 26 on the interior of the hammer cammingly engages the relatively stationary striker rib 18 and draws the hammer back into seated engagement in the pocket of the flange 23. This position of the parts is illustrated in Fig. 4 and continued rotation of the sleeve 23 and hammer 20 will bring the impact rib 19 into engagement with the striker rib 18 for a succeeding blow on the anvil.

The wrench will thus function to deliver repeated impact blows against the rib on the anvil whether or not the anvil moves appreciably. The wrench is therefore highly effective and the impacting surfaces thereof are not greatly subject to wear since they strike in parallel planes perpendicular to the path of movement of the driving member.

The form of wrench illustrated in Figs. 9 to 12 is very similar to that just described. It includes the corresponding principal elements of the first form of the wrench as follows: The drive shaft 2B engages and rotates a drive member 21B having an axially turned peripheral flange 23B embracing the tubular hammer 20B. The hammer surrounds the inner portion 16B of an anvil 13B and is axially retained between the drive member 21B and a flange 14B on the anvil 13B. The hammer is provided with an interior axially extending impact rib 19B and the inner portion of the anvil is provided with an axially extending striker rib 18B cooperative with the impact rib.

The principal differences between the two forms of the wrench are in the formation of the flat chordal surfaces 24B on the drive member and the corresponding chordal surfaces 25B on the hammer and in the shape of the striker rib 18B. The chordal surfaces 24B and 25B are arranged in parallel relation on the drive member and hammer on opposite sides of a diametrical plane passed through the impact rib 19B. The radial movement of the hammer 20B with respect to the anvil and drive member is therefore a sliding movement as compared to the tilting camming movement of the anvil 20 in the first form of the wrench. The striker rib 18B extends angularly around the inner portion of the anvil for a considerably greater distance than the corresponding striker rib 18. As is illustrated in Figs. 10 to 12 the striker rib 18B extends for over 90° around the inner portion 16B of the anvil. The widening of the striker rib provides a wider two-point contact between the anvil and the hammer at the point of impact of the two members. As is shown in Fig. 10 the hammer 20B will strike the anvil at 27 along the meeting sides of the two ribs and at 28 along the periphery of the striker rib. The angular widening of the striker rib also assures the relatively trailing edge of the striker rib will maintain contact with the opposite side of the hammer from the impact rib as at 29 in Fig. 12 to positively hold the hammer over in impacting position until the leading edge of the impact rib more closely approaches the striker rib 19B.

Fig. 11 illustrates the parts of the wrench just after radial disengagement of the impact rib 19B from the striker rib 18B and it will be noted that the leading edge of the striker rib 18B is terminated as at 30 so as to clear the flattened inside surface of the hammer opposite the

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impact rib as the hammer moves radially outwardly to disengage the ribs.

The form of the wrench illustrated in Figs. 13 to 16 includes a drive shaft 2C and anvil 13C that are similar to the corresponding parts in the previous forms of the wrench. The inner portion 16C of the anvil is provided with a similar striker rib 18C. The hammer 20C differs from the previous hammers in that it may have a circular cylindrical contour that is easily formed into a single turning operation. Interiorly the hammer 20C is provided with the same impact rib 19C as in the other forms of the wrench. The drive member is conveniently made in two parts and consists of an inner flanged coupling 22C machined to fit the hexagonal end of the drive shaft and a stamped plate 21C having axially turned parallel flanges 23C at its ends. The stamping 21C is spot welded to the coupling as at 31.

The ends of the cylindrical hammer 20C are provided with parallel chordal slots 25C corresponding in function to the chordal surfaces 25 and 25B in the first two forms of the hammer. The slots at one end of the hammer rotatably drivingly and slideably receive the axially extending flanges 23C on the drive member so that the hammer will function in all respects in the same manner as the hammer described in connection with the second form of the wrench shown in Figs. 9 to 12.

The construction shown in Figs. 13 to 16 has an advantage over the prior construction in that the single circular contour of the hammer and the chordal slots in the ends of the hammer are more easily formed than the corresponding parts of the other forms of the hammer. In addition the hammer 20C is reversible end for end in the wrench so that in the event that the edge of the impact rib 19C becomes worn after prolonged use of the wrench in one direction of operation the wrench may be disassembled and the hammer reversed to thus present the unworn opposite edge of the impact rib for continued use in the wrench.

The form of wrench illustrated in Figs. 17 to 20 is similar to the form of wrench just described and shown in Figs. 13 to 16. The hammer 20D is circular as in Figs. 13 to 16 and coacts with the same type of anvil 16D. However only one end of the hammer 20D is slotted and the slots 25D are formed along a diameter of the hammer so that the axially extending flanges 23D on the drive member 21D are aligned on opposite sides of the coupling portion 22D of the drive member. The drive member is illustrated as an integral machined part as distinguished from the two piece assembly 21C and 22C in the previous form of the wrench. The structure illustrated in Figs. 17 to 20 operates in the same manner as that illustrated in Figs. 13 to 16.

In all forms of the wrench the inner portion of the anvil and the striker rib thereon is desirably formed of slightly harder material than the hammer and the impact rib thereon. This causes any wear or deformation to occur in the impact rib rather than in the striker rib so that the wrench may be reconditioned when necessary by installing a new hammer. However, the wear in the wrench parts is slight because the coating surfaces of the impact rib and striker rib are engaged in flat parallel relation in a plane normal to the path of movement of the hammer and the impact rib. The entire impact force is distributed evenly over the coacting surfaces, and there is no sliding abrasive action at the time of impact. The sliding disengagement of the coacting faces occurs after the impact has been delivered to the anvil and the friction force between the surfaces is not great during the disengaging motion of the ribs.

I have thus described four highly practical forms of the wrench so that others may reproduce the same without further disclosure. I have not attempted to show all possible combinations of elements and features of the different forms illustrated or modifications thereof as it is believed that such variations as may be desired may be

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made without departing from the theory of the invention as defined in the following claims.

Having thus described my invention what I claim to be new and desire to secure by Letters Patent is:

1. An impact wrench comprising, a housing having a motor therein with a shaft extending axially of the housing, an anvil journaled in said housing coaxially with said shaft and having a stem projecting from the opposite end of the housing from said shaft, said anvil having an inner portion with an axially extending radially projecting segmental striker rib along one side, a generally cylindrical hammer embracing said inner portion of said anvil and having an axially extending radially inwardly projecting impact rib cooperative with said striker rib, the interior opening in said hammer between the inside of said impact rib and the opposite side of the hammer being slightly wider than the diameter of the inner portion of said anvil at said striker rib whereby said hammer may move radially to disengage said impact rib radially outwardly from said striker rib and whereby said striker rib will engage the opposite side of said hammer from said impact rib to return said hammer and impact rib radially inwardly to striker rib engaging position, a drive member rotatably connected to said shaft and having an axially extending cylindrical flange embracing said hammer, and coacting converging chordal surfaces formed on said flange and the exterior of said hammer to rotatively drive said hammer, the interior of said flange along a diameter extending between said chordal surfaces being wider than said hammer to permit radial movement thereof, the chordal surfaces on said hammer converging away from said impact rib and being located on the opposite side of the hammer therefrom.

2. An impact wrench comprising, a housing having a motor therein with a shaft extending axially of the housing, an anvil journaled in said housing and having a stem projecting from the opposite end of the housing from said shaft, said anvil having an inner portion with an axially extending radially projecting segmental striker rib along one side, a generally cylindrical hammer embracing said inner portion of said anvil and having an axially extending radially inwardly projecting impact rib cooperative with said striker rib, the interior opening in said hammer between the inside of said impact rib and the opposite side of the hammer being slightly wider than the diameter of the inner portion of said anvil at said striker rib whereby said hammer may move radially to disengage said impact rib radially outwardly from said striker rib, a drive member rotatably connected to said shaft and having an axially extending cylindrical flange embracing said hammer, and coacting chordal surfaces formed on said flange and said hammer to rotatively drive said hammer, the interior of said flange along a diameter extending between said chordal surfaces being wider than said hammer to permit radial movement thereof, the chordal surfaces on said hammer converging away from said impact rib and being located on the opposite side of the hammer therefrom.

3. An impact wrench comprising, a housing having a shaft extending axially of the housing, an anvil journaled in said housing coaxially with said shaft and having a stem projecting from the opposite end of the housing from said shaft, said anvil having an inner portion with an axially extending radially projecting segmental striker rib along one side, a tubular hammer embracing said inner portion of said anvil and having an axially extending radially inwardly projecting impact rib cooperative with said striker rib, the interior opening in said hammer between the inside of said impact rib and the opposite side of the hammer being slightly wider than the diameter of the inner portion of said anvil at said striker rib whereby said hammer may move radially to disengage said impact rib radially outwardly from said striker rib and whereby said striker rib will engage the opposite side of said hammer from said impact rib to return said hammer and impact rib radially inwardly to

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striker rib engaging position, a rotatable drive member drivingly connected to said shaft and having an axially extending cylindrical flange axially overlapping said hammer, and coacting converging chordal surfaces formed on said flange and the exterior of said hammer to rotatively drive said hammer, the interior of said flange along a diameter extending between said chordal surfaces being wider than said hammer to permit radial movement thereof, the chordal surfaces on said hammer converging away from said impact rib and being located on the opposite side of the hammer therefrom.

4. An impact wrench comprising, a housing having a shaft extending axially of the housing, an anvil journaled in said housing and having a stem projecting from the end of the housing, said anvil having an inner portion with an axially extending radially projecting segmental striker rib along one side, a tubular hammer embracing said inner portion of said anvil and having an axially extending radially inwardly projecting impact rib cooperative with said striker rib, the interior opening in said hammer between the inside of said impact rib and the opposite side of the hammer being slightly wider than the diameter of the inner portion of said anvil at said striker rib whereby said hammer may move radially to disengage said impact rib radially outwardly from said striker rib and whereby said striker rib will engage the opposite side of said hammer from said impact rib to return said hammer and impact rib radially inwardly to striker rib engaging position, a rotatable drive member drivingly connected to said shaft and having axially extending flanges axially overlapping said hammer, and coacting chordal surfaces formed on said flanges and said hammer to rotatively drive said hammer.

5. An impact wrench comprising, a housing, an anvil journaled in said housing and having a stem projecting therefrom, said anvil having an inner portion with an axially extending radially projecting segmental striker rib along one side, a tubular hammer embracing said inner portion of said anvil and having an axially extending radially inwardly projecting impact rib cooperative with said striker rib, the interior opening in said hammer between the inside of said impact rib and the opposite side of the hammer being slightly wider than the diameter of the inner portion of said anvil at said striker rib whereby said striker rib will engage the opposite side of said hammer from said impact rib to return said hammer and impact rib radially inwardly to striker rib engaging position, a rotatable drive member in said housing and having an axially extending drive portion axially overlapping said hammer, and coacting chordal surfaces formed on said drive portion and said hammer to rotatively drive said hammer, said hammer and said drive portions being relatively movable transversely of the axes of rotation thereof to permit radial movement of the hammer.

6. An impact wrench comprising, a housing having a motor therein with a shaft extending axially of the housing, an anvil journaled in said housing and having a stem projecting from the opposite end of the housing from said shaft, said anvil having an inner portion with an axially extending radially projecting segmental striker rib along one side, a generally cylindrical hammer embracing said inner portion of said anvil and having an axially extending radially inwardly projecting impact rib cooperative with said striker rib, the interior opening in said hammer between the inside of said impact rib and the opposite side of the hammer being slightly wider than the diameter of the inner portion of said anvil at said striker rib whereby said hammer may move radially to disengage said impact rib radially outwardly from said striker rib, a drive member rotatably connected to said shaft and having an axially extending flat surface disposed in chordal relation to the axis of rotation of said drive member, and a coacting chordal surface formed on said hammer to rotatively drive said hammer, said chordal surfaces extending at an angle of substantially less than 90° from a diameter through the rib on said hammer

to permit radial movement thereof away from said striker rib.

7. In an impact wrench having a rotatable anvil member and a drive member rotatable about a fixed axis parallel to the axis of said anvil member, means forming a driving connection between said members comprising, an interior axial portion on one of said members having a radially extending striker rib thereon, axially extending flat drive surfaces on the other of said members disposed in chordal relation to the axis of rotation thereof, and a tubular hammer disposed between said members and around said interior portion, said hammer having an impact rib projecting radially inwardly from the inside thereof and cooperative with said striker rib, the opening in said hammer being wide enough to permit radial movement of the hammer and the impact rib thereon out of engagement with said striker rib, said hammer having flat axially extending areas formed thereon in chordal relation cooperative with said flat drive surfaces, said flat areas being disposed at substantially less than 90° from a diametrical plane passed through said impact rib.

8. An impact wrench comprising, a housing having a motor with a shaft disposed axially of the housing, an anvil journaled in said housing coaxially with said shaft and having a stem projecting from the housing at the opposite end thereof from said shaft, an inner portion on said anvil having relatively rotatable centering engagement with said shaft, a tubular hammer embracing the inner portion of said anvil, a radially projecting striker rib on the inner portion of said anvil, a radially inwardly projecting impact rib on the inside of said hammer cooperative with said striker rib, the interior diameter of said hammer at said impact rib being slightly greater than the diameter of the inner portion of said anvil at said striker rib whereby said hammer can move radially to disengage said impact rib outwardly from said striker rib, a drive member relatively non-rotatably connected to said shaft and projecting over the end of said hammer, axially turned parallel flanges on the ends of said drive member, both ends of said hammer having parallel chordal slots formed therein parallel to said impact rib with the slots at the end of the hammer adjacent said drive member slidably and drivingly engaging the flanges on said drive member, said hammer being retained axially between said drive member and a flange on said anvil.

9. An impact wrench comprising, a housing having a motor with a shaft disposed axially of the housing, an anvil journaled in said housing and having a stem projecting from the housing at the opposite end thereof from said shaft, an inner portion on said anvil, a tubular hammer embracing the inner portion of said anvil, a radially projecting striker rib on the inner portion of said anvil, a radially inwardly projecting impact rib on the inside of said hammer cooperative with said striker rib, the interior diameter of said hammer at said impact rib being slightly greater than the diameter of the inner portion of said anvil at said striker whereby said hammer can move radially to disengage said impact rib outwardly from said striker rib, a drive member relatively non-rotatably connected to said shaft and projecting over the end of said hammer, axially turned parallel flanges on the ends of said drive member, both ends of said hammer having parallel chordal slots formed therein parallel to said impact rib with the slots at the end of the hammer adjacent said drive member slidably and drivingly engaging the flanges on said drive member.

10. An impact wrench comprising, a housing having a motor with a shaft disposed axially of the housing, an anvil journaled in said housing and having a stem projecting from the housing at the opposite end thereof from said shaft, an inner portion on said anvil, a tubular hammer embracing the inner portion of said anvil, a radially projecting striker rib on the inner portion of said anvil, a radially inwardly projecting impact rib on the inside of said hammer cooperative with said striker rib, the interior

diameter of said hammer at said impact rib being slightly greater than the diameter of the inner portion of said anvil at said striker rib whereby said striker rib engages the inside of said hammer opposite said impact rib to move said impact rib inwardly to striker rib engaging position, a drive member relatively non-rotatably connected to said shaft and projecting transversely over the end of said hammer, axially turned parallel flanges on the ends of said drive member, the end of said hammer adjacent said drive member having parallel chordal slots formed therein parallel to said impact rib with the slots slidably and drivingly engaging the flanges on said drive member.

11. An impact wrench comprising, a housing, an anvil journaled in said housing, an inner portion on said anvil, a tubular hammer embracing the inner portion of said anvil, a radially projecting striker rib on the inner portion of said anvil, a radially inwardly projecting impact rib on the inside of said hammer cooperative with said striker rib, the interior diameter of said hammer at said impact rib being slightly greater than the diameter of the inner portion of said anvil at said striker rib whereby said hammer can move radially to disengage said impact rib outwardly from said striker rib, a drive member rotatably mounted in said housing and projecting transversely of its axis of rotation over the end of said hammer, axially turned parallel flanges on the ends of said drive member, the end of said hammer adjacent said drive member having parallel chordal slots formed therein parallel to said impact rib with the slots slidably and drivingly engaging the flanges on said drive member.

12. An impact wrench comprising, a housing, an anvil journaled in said housing, an inner portion on said anvil, a tubular hammer embracing the inner portion of said anvil, a radially projecting striker rib on the inner portion of said anvil, a radially inwardly projecting impact rib on the inside of said hammer cooperative with said striker rib, the interior diameter of said hammer at said impact rib being slightly greater than the diameter of the inner portion of said anvil at said striker rib whereby said hammer can move radially to disengage said impact rib outwardly from said striker rib, a drive member rotatably mounted in said housing and projecting transversely of its axis of rotation over the end of said hammer, the adjacent ends of said hammer and drive member having a tongue and groove in slidable driving engagement disposed generally parallel to said impact rib.

13. An impact wrench comprising, a housing having a motor with a shaft disposed axially within the housing, an anvil journaled in said housing coaxially with said shaft, an inner portion on said anvil having relatively rotatable centering connection with said shaft and having an axially extending radially projecting striker rib formed along its side, a tubular hammer embracing the inner portion of said anvil and seated axially on a flange on said anvil, a radially inwardly projecting and axially extending impact rib formed on the inside of said hammer, the diameter of the inner portion of said anvil at the striker rib thereon being slightly less than the interior diameter of said hammer at the impact rib thereon whereby the hammer and impact rib may move radially outwardly from said striker rib, a drive member having a relatively non-rotatable driving engagement with said shaft and extending across the end of said hammer, a peripheral flange on said drive member embracing said hammer and rotatively guided by the interior of said housing, axially extending converging chordal surfaces formed on said flange, and corresponding chordal surfaces formed on said hammer and converging from opposite sides of a diameter drawn through said striker rib whereby the hammer may move radially from between said chordal surfaces on said flange.

14. An impact wrench comprising, a housing having a motor with a shaft disposed axially within the housing,

an anvil journaled in said housing coaxially with said shaft, an inner portion on said anvil having relatively rotatable centering connection with said shaft and having an axially extending radially projecting striker rib formed along its side, a tubular hammer embracing the inner portion of said anvil and seated axially on a flange on said anvil, a radially inwardly projecting and axially extending impact rib formed on the inside of said hammer, the diameter of the inner portion of said anvil at the striker rib thereon being slightly less than the interior diameter of said hammer at the impact rib thereon whereby the hammer and impact rib may move radially outwardly from said striker rib, a drive member having a relatively non-rotatable driving engagement with said shaft and extending across the end of said driving member, a peripheral flange on said drive member embracing said hammer and rotatively guided by the interior of said housing, axially extending parallel chordal surfaces formed on said flange, and corresponding chordal surfaces formed on said hammer and positioned on opposite sides of a diameter drawn through said striker rib whereby the hammer may move radially between said chordal surfaces on said flange.

15. An impact wrench comprising, a housing having a motor with a shaft disposed axially within the housing, an anvil journaled in said housing, an inner portion on said anvil having an axially extending radially projecting striker rib formed along its side, a tubular hammer embracing the inner portion of said anvil, a radially inwardly projecting and axially extending impact rib formed on the inside of said hammer, the diameter of the inner portion of said anvil at the striker rib thereon being slightly less than the interior diameter of said hammer at the impact rib thereon whereby the hammer and impact rib may move radially outwardly from said striker rib, a drive member having a relatively non-rotatable driving engagement with said shaft and extending across the end of said hammer, said striker rib extending around said anvil through an arc of between

20 and 90 degrees, a peripheral flange on said drive member embracing said hammer, axially extending chordal surfaces formed on said flange, and corresponding chordal surfaces formed on said hammer and positioned on opposite sides of a diameter drawn through said striker rib whereby the hammer may move radially between said chordal surfaces on said flange.

16. In an impact wrench having a rotatable anvil member and a drive member rotatable about fixed axes, means forming a driving connection between said members comprising, an interior axial portion on one of said members having a radially extending striker rib thereon, drive surfaces on the other of said members disposed in chordal relation to the axis of rotation thereof, and a tubular hammer disposed between said members and around said interior portion, said hammer having an impact rib projecting radially inwardly from the inside thereof and cooperative with said striker rib, the opening in said hammer being wide enough to permit radial movement of the hammer and the impact rib thereon out of engagement with said striker rib, said hammer having areas formed thereon in chordal relation cooperative with said drive surfaces, said areas being disposed at substantially less than 90° from a diametrical plane passed through said impact rib.

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