ABSTRACT: A rotary impact wrench mechanism having a hammer including a hammer carrier carrying a pivoted hammer dog rotating around an anvil. The hammer carrier includes a pair of axially spaced plates interconnected by the pivot pin for the hammer dog fitting in aligned bores in the plates with a loose fit allowing the pivot pin and hammer dog to rock slightly along the axis of the pivot pin.
3,557,884

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IMPACT WRENCH MECHANISM

BACKGROUND OF INVENTION

This invention relates to rotary impact clutch mechanisms for use in rotary impact wrenches and more particularly to rotary impact clutch mechanisms of the type having a hammer dog pivoted on a longitudinally extending pivot which is radially offset from the hammer axis and which, when actuated between impact and nonimpact positions, applies the hammer to the workpiece while the hammer is in rotation. The hammer is integral with the spindle and is rotatably supported on a bearing located in the front nose of the hammer. A hammer 21 rotates around the anvil 15 and includes a hammer carrier 22 formed by a pair of axially spaced plates 23 and 24. The rear hammer plate 23 is rotatably mounted on the hammer shaft 9 and the front hammer plate 24 is rotatably mounted on the anvil 15. The two hammer plates 23 and 24 are connected together by a hammer pin 25 which slidably fits in aligned bores 26 provided in the two plates 23 and 24. The pin 25 is the sole member causing the two plates 23 and 24 to rotate in step, i.e., they are not rigidly interconnected by other means. The clearance between the pin 25 and the bores 26 can vary between .001 inches and .005 inches; hence, it is a sliding-fit clearance which allows the pin 25 to tilt slightly in the bores 26, thereby allowing the pin to rock slightly out of exact parallelism with the axis of the anvil 15 and the hammer 21.

Even if the pin 25 did not have the sliding fit in the plates 23 and 24, it is believed that the two plates 23 and 24 could rotate relative to each other sufficiently to allow the pin 25 to adjust itself slightly relative to the anvil axis. This is true because of the relatively flexible interconnection between the hammer carrier plates 23 and 24 provided by the pin 25. In addition, it is believed that the plates 23 and 24 could be interconnected by more than one pin and still be able to rotate slightly relative to each other to achieve the purposes of this invention. In other words, the gist of this invention is the idea of making the hammer carrier 22 of two spaced plates 23 and 24 and interconnecting such plates together by means that allows the plates to rotate relative to each other for the desired function of the hammer carrier.

A hammer dog 28 is rotatably mounted on the hammer pin 25 and carries a pair of impact surfaces 29 adapted to engage and impact with the anvil jaw 16 periodically as it rotates around the anvil 15. The hammer dog 28 carries a cam projection 30 extending from its rear end adapted to engage the driver cam 20. The driver cam 20 cooperates with the cam projection 30 to urge the hammer dog 28 to its engaged position with the anvil 15 immediately before each impact. FIG. 3 to 5 illustrate the operation of the engagement of the hammer dog 28 with the anvil 15. Immediately after impact, the torque on the driver cam 20 swings the hammer dog 28 to the disengaging position. For those unfamiliar with the operation of the type of mechanism, it is explained in U.S. Pat. No. 2,718,803 issued to F.A. Jimmerson.

By making the hammer carrier 22 of two spaced plates 23 and 24 connected nonrigidly together by the hammer pin 25, with the hammer pin 25 having a "sliding fit" in the plates, these plates 23 and 24 can rotate relative to each other slightly allowing the hammer pin 25 to rock slightly relative to a position in exact parallelism with the axis of the anvil. It is believed that this slight rocking movement of the hammer pin 25 allows the hammer dog 28 to rock lengthwise relative to the anvil axis so that the hammer surfaces 29 can automatically mate with the anvil jaw shoulders 17 without placing unduly high stresses on the hammer plates 23 and 24. Hence, it is believed that the ability of the plates 23 and 24 to rotate relative to each other slightly, rather than being rigidly fixed together, is an improvement in a rotary impact wrench mechanism.

Another advantage provided by making the carrier 22 of two spaced plates 23 and 24 locked together nonrigidly by the pin 25 is that it allows the hammer dog 28 to swing freely without interference from an interconnecting web on the carrier 22, as is the problem in the prior art. Thus, the hammer dog 28 can be arranged in various shapes and sizes which could not be done with the conventional carrier. This freedom to shape the hammer dog 28 enables a designer to provide the hammer mechanism with better balance characteristics.
Although a single embodiment of the invention is illustrated and described in detail, it will be understood that the invention contemplates other embodiments and variations covered by the attached claims.

I claim:

1. An impact clutch mechanism for a rotary impact mechanism comprising:
   an anvil having an impact jaw rotatable about an anvil axis and adapted to drive a fastener;
   a hammer rotatable on said anvil axis about said anvil jaw and including a pair of axially spaced plates pivoted on said anvil axis, a pivot axis extending between said plates and being offset from said anvil axis and a hammer dog pivoted on pivot means interconnected to said plates for swinging about said pivot axis between alternate positions of impacting and nonimpacting with said anvil jaw; and
   interconnection means nonrigidly holding said plates together for rotation in unison and including said pivot means, said plates and said interconnection means cooperating to allow the pivot axis of said hammer dog to rock slightly relative to the anvil axis allowing said hammer dog to automatically adjust itself during impact with said anvil jaw without placing dangerous loads on said hammer.

2. An impact clutch mechanism for a rotary impact mechanism comprising:
   an anvil having an impact jaw rotatable about an anvil axis and adapted to drive a fastener;
   a hammer rotatable on said anvil axis about said anvil jaw and including a pair of axially spaced plates pivoted on said anvil axis, a pivot axis extending between said plates and being offset from said anvil axis and a hammer dog pivoted on pivot means interconnected to said plates for swinging about said pivot axis between alternate positions of impacting and nonimpacting with said anvil jaw; and
   said pivot pin being connected to said plates and being the sole member holding said plates together for rotation in unison, said plates and said pivot pin cooperating to allow the pivot axis of said hammer dog to rock slightly relative to the anvil axis allowing said hammer dog to automatically adjust itself during impact with said anvil jaw without placing dangerous loads on said hammer.

3. An impact clutch mechanism for a rotary impact mechanism comprising:
   an anvil having an impact jaw rotatable about an anvil axis and adapted to drive a fastener;
   a hammer rotatable on said anvil axis about said anvil jaw and including a pair of axially spaced plates pivoted on said anvil axis, a pivot axis extending between said plates and being offset from said anvil axis and a hammer dog mounted on said pivot pin and swingable between alternate positions of impacting and nonimpacting with said anvil jaw; and
   said pivot pin being connected to said plates and being the sole member holding said plates together for rotation in unison, said plates and said pivot pin cooperating to allow the pivot axis of said hammer dog to rock slightly relative to the anvil axis allowing said hammer dog to automatically adjust itself during impact with said anvil jaw without placing dangerous loads on said hammer.

4. The impact clutch mechanism of claim 3 wherein said pivot pin is connected to said plates by slidably interfitting in longitudinally aligned bores in said plates and having a relatively loose fit in said bores thereby allowing said pin to tilt slightly in said bores.