Oct. 20, 1953 P. VAN RUSSUM ET AL 2,655,911

PERCUSSION MECHANISM

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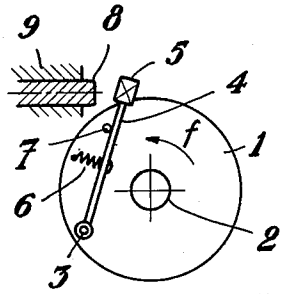


Fig. 1

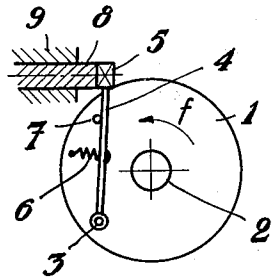


Fig. 2

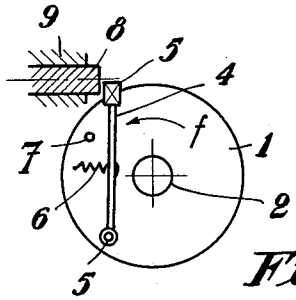


Fig. 3

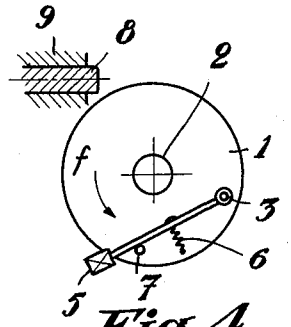


Fig. 4

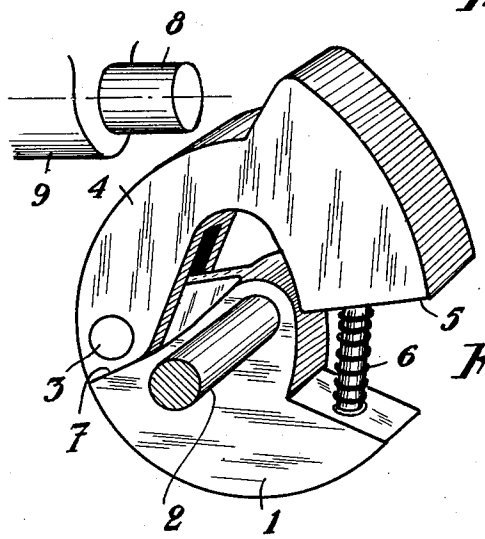


Fig. 5

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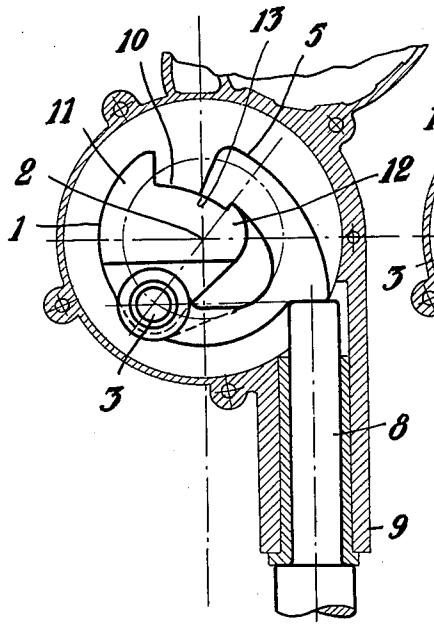


Fig. 6

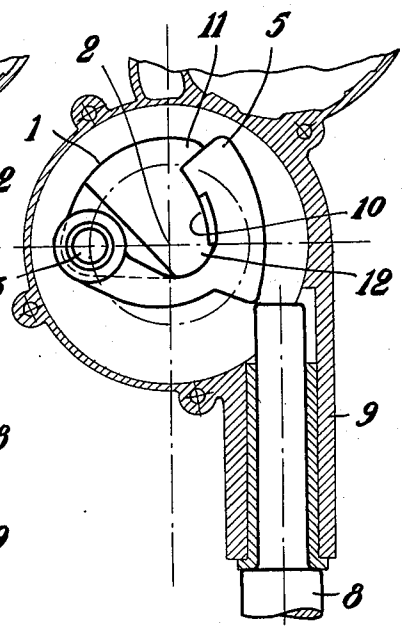


Fig. 7

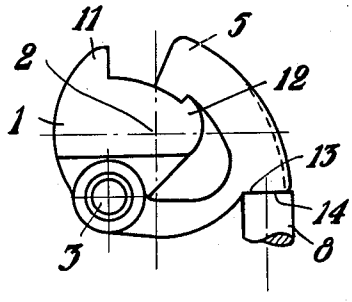


Fig. 8

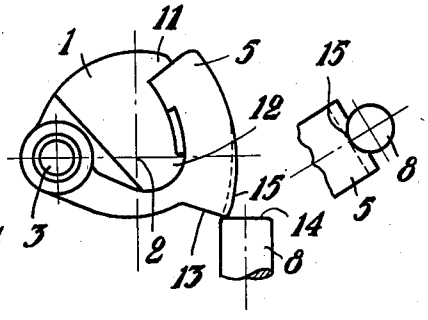


Fig. 9

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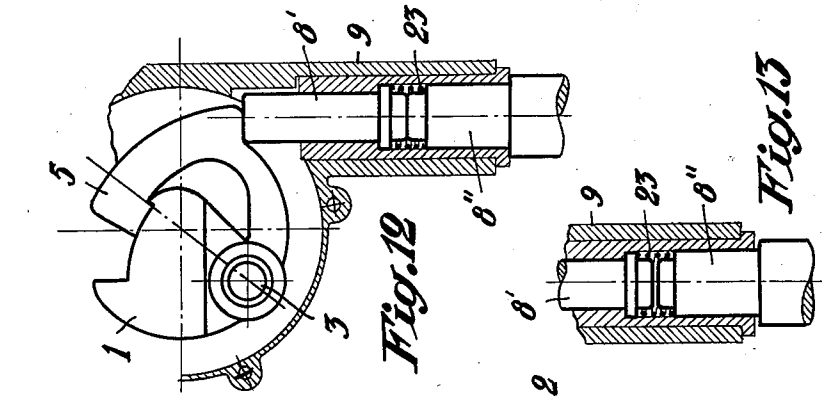


Fig. 12

Fig. 13

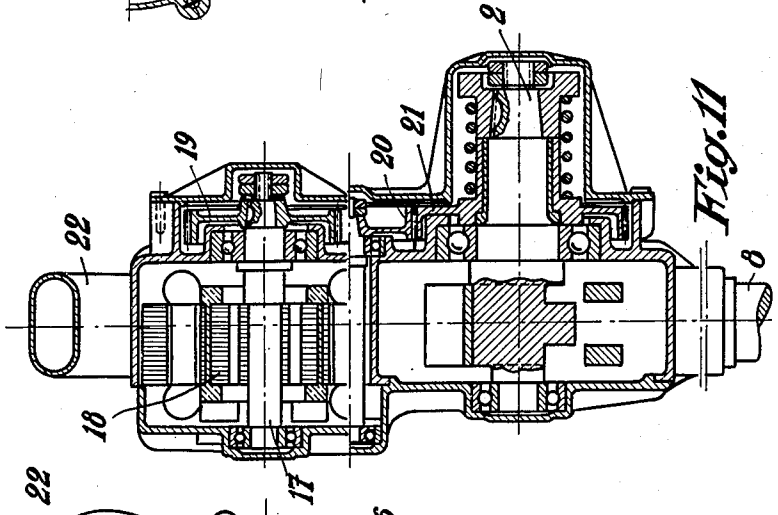


Fig. 11

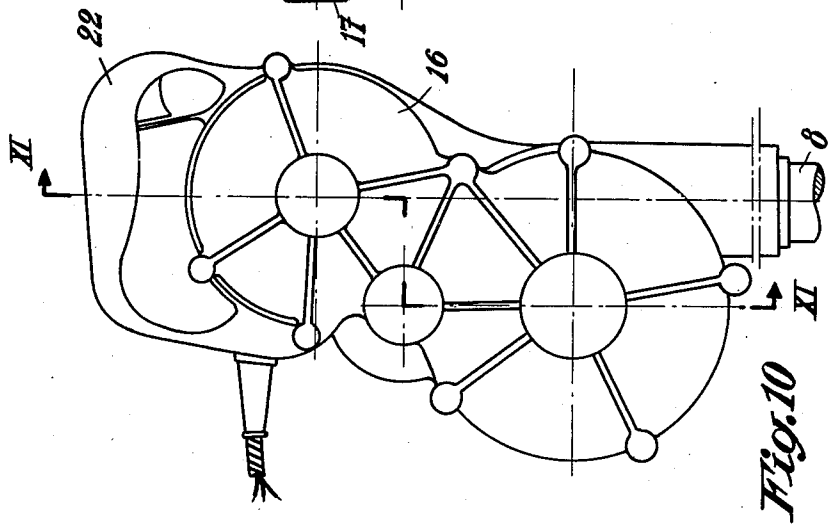


Fig. 10

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Patented Oct. 20, 1953 2,655,911

UNITED STATES PATENT OFFICE

2,655,911

PERCUSSION MECHANISM

Pierre Van Russum, Mariaburg, and Gonzales Schul, Kapellen, Belgium

Application October 19, 1949, Serial No. 122,276
In Belgium December 9, 1948

2 Claims. (Cl. 125—33)

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The invention has for main object a mechanism adapted to produce successive and rapid percussions, exclusively by mechanical means, so that devices operated by compressed fluid, respectively by compressed air may be advantageously replaced, the drawbacks of the last named devices being well known by men in the art.

The device according to the invention is essentially characterized by the fact that it is constituted with at least one mass driven in a circular movement and at the same time capable of swinging around a pivot which is driven in the same circular movement, the said mass being moreover resiliently sustained, so that the reaction efforts should be duly damped.

By this original arrangement, a simple mechanism is produced which, being driven in a continuous rotary motion, may be used in cooperation with any kind of tools, so as to permit the economical and efficient performing of all industrial operations, such as riveting, chiselling, cutting, ramming, etc. Furthermore the mechanism may be used as a vibrating device and also in any case where a percussion effect is required or capable of producing an industrial operation.

Preferably moreover, the rotary device described hereafter will be so conditioned that the percussive mass should be balanced by a convenient counterweight, so as to avoid the developing of a cycloidal resultant, and so to reduce or eliminate the vibrating effect which would result from the rotation of the eccentered percussive mass.

The so conditioned mechanism may be constructed in extremely variable forms, either by the shape and the dimensions of the constitutive parts, either by their relative position, or still by their combination with one or more receptive tools. In this way it will be possible to suit this new mechanism, of universal character, according to each particular case of application.

However, in view of making more apparent the object of the invention and its possibilities of application, the mechanism itself and a form of construction will be described in more details hereafter and illustrated in the accompanying drawings, in which:

Figures 1 to 4 illustrate diagrammatically explicating views of the mechanism, object of the invention, brought back to elementary forms.

Figure 5 is a diagrammatic perspective view of the main elements of the percussion mechanism according to the invention.

Figures 6 and 7 show diagrammatically two characteristic positions of the driving elements.

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Figures 8 and 9 show diagrammatically two characteristic relative positions between the striking element of particular shape and the striken element.

Figure 10 is a front elevation of a tool in which the mechanism of the invention is used.

Figure 11 is a section on line XI—XI of Figure 10.

Figure 12 is a partial radial section showing a particular arrangement of the stricken element.

Figure 13 is a partial view of a second position of the striken element according to Figure 12.

In Figures 1 to 4, it may be seen that the mechanism is formed with at least one disc 1 fixed on a shaft 2, this disc 1 bears, close to its periphery, a fixed pivot 3 around which a lever 4 may swing, the free end of this lever bears a mass 5 of a determined weight. This lever 4 may be permanently drawn outwards of the disc by a spring 6, while an abutment 7 limits its maximum movement. In the path of the mass 5 is arranged, at a convenient height, an abutment part 8 which is slidable in the frame 9 of the mechanism. This abutment part 8 forms the tool proper, or its support, upon which the percussion effect should be given.

From these main elements it may be seen that, if a rapid rotary motion in the direction of the arrow *f*, is imparted to the shaft 2, by means of any driving device, the mass 5, starting from the position of Figure 1 and reaching the position of Figure 2, will act energetically upon the abutment part 8 and this stress is itself transmitted upon the work-piece with which the tool is in contact. Continuing the rotary movement (Figure 3), the mass 5 slides progressively down the end face of the abutment part 8 under reduced pressure, and afterwards, when the said mass 5 is again freed, it resumes its initial position (Figure 4) and this whole cycle is reproduced at the rotation speed of the shaft 2.

Providing an adaptation of these main elements, and more specially of their dimensions, relative position, weight, etc., this particularly simple conception may be suited to each practical case in consideration.

In the forms of embodiment of Figures 6 to 13 the driving elements have been shaped in a particularly rational manner and it has been deemed useless to insert a return spring between the two driving elements. The driving element 1 has a guide way 10 limited by two beaks, respectively 11 and 12. On the guide way 10 is permanently sliding a corresponding face 13 of the striking element 5. The latter is profiled so as to present

an arm 4 which is linked to the pivot 3, the latter being fixed on the driving mass 1.

According to a modified form of embodiment, the striking element 5 is so shaped that the surface 13 with which it comes in contact with the abutment face 14 of the striken element 8, should always be ensured of a superficial contact, and would never be brought to a punctate contact, as it is the case in the examples described herebefore. The small supplementary view of Figure 9 shows such superficial contact which has a progressively reduced recess, so that the specific pressure upon the striken element 8 never transgresses the limits harmful for the metal.

For this purpose, it has been provided upon the striking element 5 a groove 15 of progressively decreasing depth, the transverse section of this groove being profiled with relation to the section of the stricken element 8. In this way it is secured that the face 13 of the striking element always affords a superficial contact with the stricken face 14 of the element 8, up to the very moment where both faces will separate. This particular shape of the striking element of the mechanism cooperates to increase the duration of the tool.

Figures 10 and 11 show an industrial embodiment in which the aforesaid percussion mechanism and an electric motor have been combined in a rational and compact way, within the same casing 16. In fact, the shaft 17 of the electric motor 18 is prolonged at one side and supports a gear 19 which drives the gear 21 mounted on the shaft 2 of the percussion mechanism, by means of the pinion 20. The mechanism is embodied in one of the forms described herebefore. This construction presents the characteristic of occupying a minimum of volume and having a rational shape for all kinds of manipulations. The manipulation handle 22 is arranged at right angles to the parallel shaft 17 and 2, respectively of the electric motor and of the percussion mechanism. The stricken element itself is arranged in the prolongation of the longest dimension of the casing, this being also favourable to manipulations.

Finally, another modification consists in constructing the stricken element in two separate portions 8'—8'', a helical spring 23 being inserted between the two portions. This spring acts by expansion and is permanently tending to slightly spread apart the two portions 8'—8'', as illustrated in Figure 13.

In this way it is possible to regulate the effective kinetic energy by adjusting the pressure with which the stricken element is engaged upon the piece to be worked. Indeed if this pressure is

light or nihil, a spreading of the portions 8'—8'' will persist, which is proportional to said pressure effort, and a great part of the kinetic energy will be lost, since it will operate during the approaching of the portions to each other. The greater the space will be between the two portions, the greater is the quantity of lost effective kinetic energy of the apparatus. If contrarily, the stricken element is engaged upon the work-piece with a certain pressure, for instance a pressure for securing the initial contact between the two portions 8'—8'', the apparatus will work as if the stricken element is made in one single piece.

As may be seen, this arrangement affords to the apparatus a greater suppleness of work and increases the applications thereof.

As a result, supplementary arrangements may be multiplied so as to produce a whole series of tools perfectly appropriated to the different applications to be proposed.

What we claim is:

1. A percussion mechanism in combination with a stricken element, the mechanism comprising a driving element having an axis of rotation, a pivot carried by said driving element and situated outside of said axis, the driving element being extended toward the opposite side of said axis and having a guideway formed in the periphery of the extended portion, a striking element pivotally disposed on the pivot of the driving element, the striking element having a portion coacting with the guideway and a second portion coacting with the stricken element on each rotation of the disc, and means for reducing the specific pressure of the second portion on the stricken element.

2. A percussion mechanism according to claim 1 in which the means for reducing the specific pressure of the second portion on the stricken element comprises in an end of the second portion having a recess formed on the outside surface thereof, the recess being progressively decreased in depth from the end upwardly.

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GONZALES SCHUL.

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