

April 30, 1963

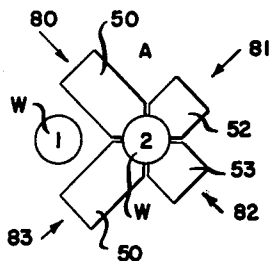
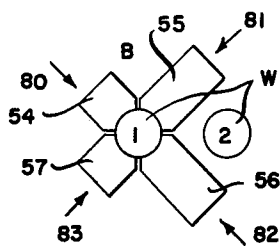
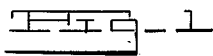
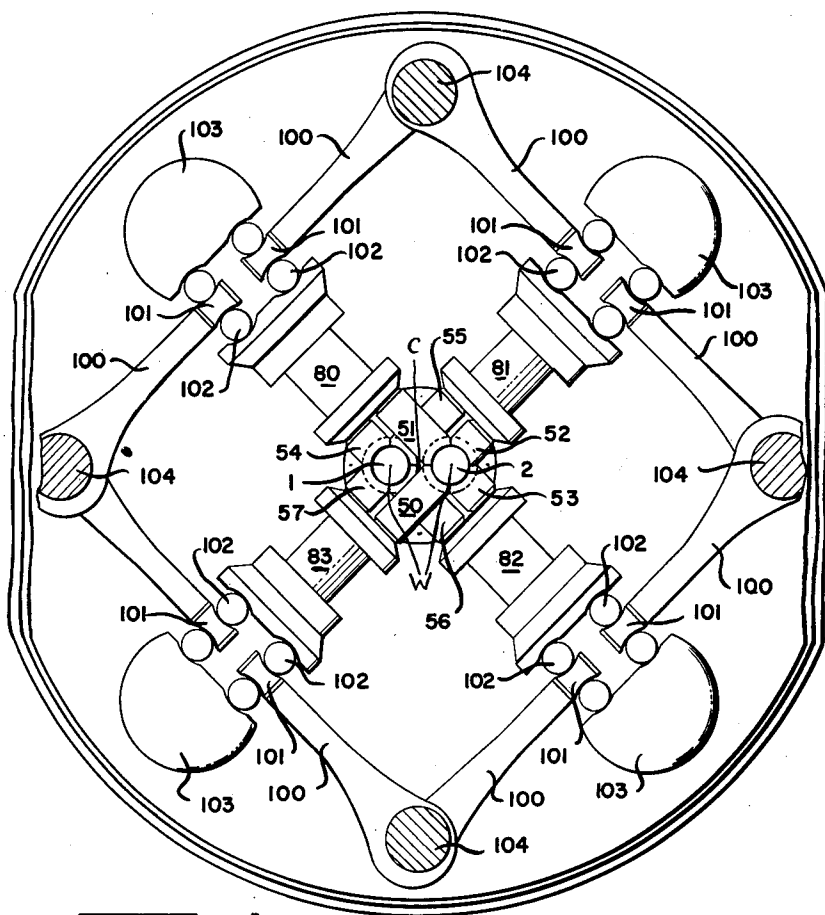
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3,087,361

MACHINE FOR WORKING ON WORKPIECES

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3 Sheets-Sheet 1



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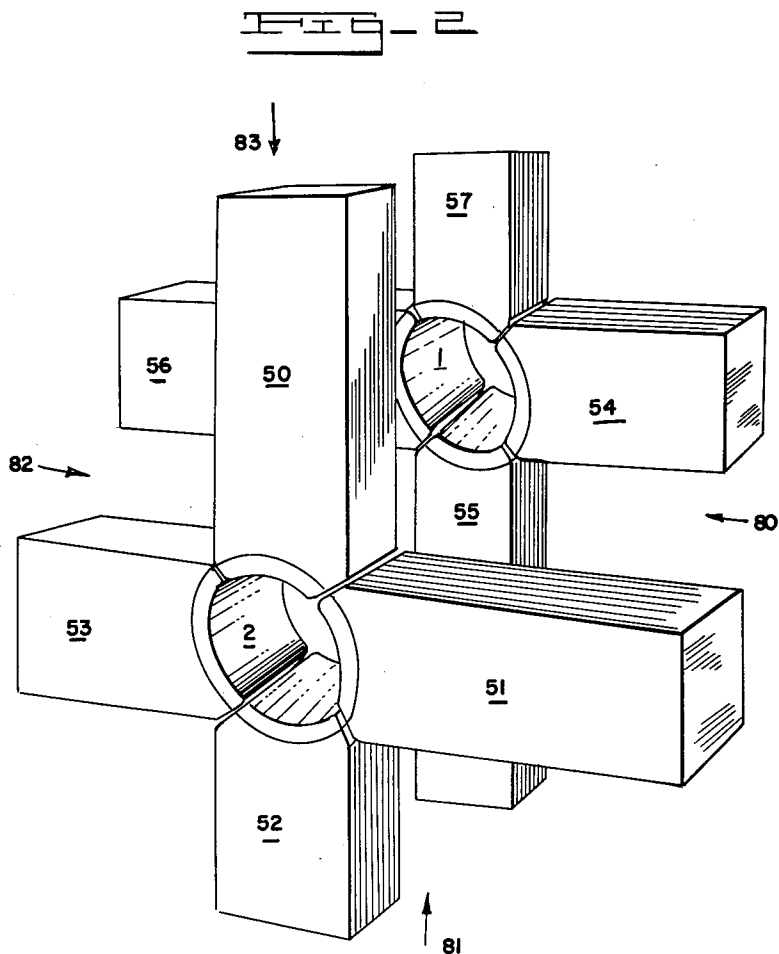
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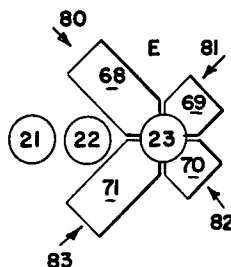
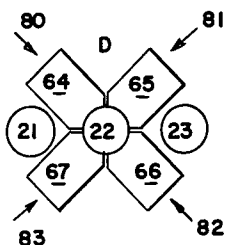
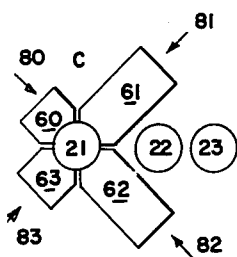
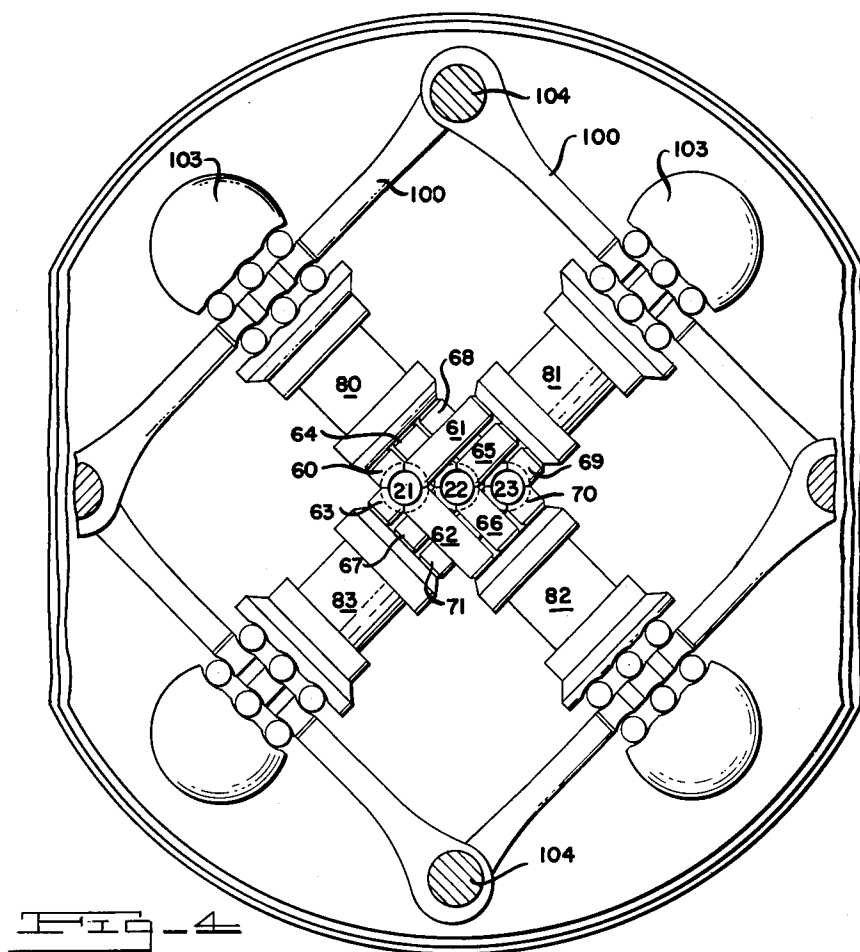
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MACHINE FOR WORKING ON WORKPIECES

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3 Sheets-Sheet 3



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3,087,361

MACHINE FOR WORKING ON WORKPIECES

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Substitute for abandoned application Ser. No. 622,289,
Nov. 15, 1956. This application Apr. 27, 1959, Ser.
No. 809,151

2 Claims. (Cl. 78—21)

This application relates to machines, and particularly to machines for working on a plurality of workpieces.

A prior British Patent No. 797,518 of July 2, 1958, discloses a machine in which a workpiece is worked upon, i.e., cold formed, by radially moving working members, i.e., dies. This application discloses a machine generally similar to the one of said patent but arranged for working on a plurality of workpieces simultaneously; and incorporates the disclosure of said patent, inasmuch as the machine hereof differs from the one of said patent only in the provision of and arrangement of two or more groups of working members whereas the patented machine discloses only one group of working members.

The object of the present invention is to provide a machine for working on a plurality of workpieces arranged side by side and with the two workpieces being worked upon at longitudinally spaced points.

The foregoing object is obtained by the machine of the invention, embodiments of which are disclosed in appended drawings.

In these drawings:

FIG. 1 is an end view of one form of the machine arranged for working on two workpieces simultaneously.

FIG. 2 is a perspective view showing two different groups of working members of a machine for working on two workpieces simultaneously with the workpieces being side by side and with the working points being longitudinally separated.

FIG. 3 shows parts diagrammatically.

FIG. 4 is a view like FIG. 1, but showing the machine arranged for working on three workpieces simultaneously, and

FIG. 5 is a diagrammatic view of parts of FIG. 4.

Referring to the drawings and particularly FIGS. 1-3, it will be observed that these figures show a machine diagrammatically. The machine comprises a head (not shown), through which passes a plurality of workpieces 1 and 2 with their own central axis being indicated at W, these sub-axis being on opposite sides of and laterally displaced from the central axis C of the machine.

In a forward plane, viewing the parts of FIG. 1, is a working member group A which is arranged around workpiece 2 and comprises four working members, which may be dies, 50-53. Behind group A is a second group of working members B arranged around workpiece 1 and comprising four working members such as dies, 54-57. FIGS. 2 and 3 illustrate the two groups of working members A and B.

For moving the various working members radially, there are provided a plurality of driving members 80-83, outside the working members.

For moving the driving members radially, there are provided, outside the driving members, a plurality of opposing driver rods 100 having cams 101 and rollers 102 which cooperate with backing elements 103 whereby movement of the driver rods oppositely and simultaneously in paths transverse to the radial axis of movement of the driving members 80-83 will cause the driving members and the working members to move radially.

Movement of the driver rods 100 is effected by the provision of eccentrics on shafts 104 and other moving

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apparatus outside the driving members, all as clearly disclosed in said prior patent whose disclosure is incorporated hereinto by reference. Briefly, such moving apparatus includes a motor whose shaft is connected through a clutch and by a pinion to a large ring gear meshing with pinions on the four shafts 104.

The construction and arrangement of the eccentrics, the driver rods, the cams, the rollers, the backing elements, and in relation to these parts, the construction and arrangement of the driving members is disclosed in the prior patent and the present invention is directed specifically to the combination with the foregoing parts of the working members and the arrangement of these working members and the foregoing parts in relation to one another.

Working members of different working groups A and B are moved by a common driving member. Thus, driving members 80-83 radially move working members 51 and 54, 55 and 52, 53 and 56, and 50 and 57 respectively.

The provision of two working groups A and B spaced longitudinally along the central axis C and laterally of such axis C enables two workpieces 1 and 2 to be worked upon simultaneously and at longitudinally spaced points along the workpieces. The portion of workpiece 2 that is worked upon by group A is forward of the portions of workpiece 1 that is worked upon by group B.

Whereas FIGS. 1-3 show but two groups of working members arranged for working upon two workpieces 1 and 2, FIGS. 4-5 show an arrangement wherein three workpieces are simultaneously worked upon by three working member groups. The three workpieces are referenced 21-23 and the three working member groups are referenced C-E. Group C for workpiece 21 includes working members 60-63; D for 22 comprises 64-67 and D is behind C; E, behind D, for 23 includes 68-71. FIG. 5 illustrates the three groups C-E diagrammatically.

It will be observed that the four shafts 104 are arranged radially around and equally distant from the central axis C of the machine which is midway between the two workpieces 1 and 2 and their sub axis W and that these shafts 104 have their own axis extending longitudinally and parallel to that central axis, and these shafts are rotatable on their own axes. The machine further includes the transversely arranged reciprocating driver rods 100 and these are operatively connected to the shafts 104 and are reciprocated by them.

The machine further includes the four radially movable driving members 80-83 radially arranged around and equally distant from the central axis C and to which the driver rods 100 are operatively connected and that driving members 80-83 are radially reciprocated to and from the central axis C by the driver rods 100 in their reciprocation. The driving members 80-83 are spaced a considerable distance from the central axis C.

The machine further includes two parallel groups of working members A and B in the area inside the driving members 80-83; the two groups A and B are longitudinally spaced along the central axis C but are sufficiently close together so as to be longitudinally encompassed by the driving members 80-83 so that the latter straddle and thus simultaneously engage and drive the two groups A and B inside them.

Each working group comprises a working member for and in radial alignment with each driving member. For example, group A has working members 50-53 for the four driving members 80-83. Each group has its working members radially movable and arranged radially about the group sub-axis W inside the driving members and the sub-axis or workpiece axis W is parallel to the central axis C of the machine but is laterally displaced from such central axis. The working members of each

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group are of unequal radial length as shown best in FIG. 3 to compensate for the inequality of lateral distance between the sub-axis W of a group and the driving members. The working members of each group have their inner ends radially spaced equally from the sub-axis W of that group and at the same time have their outer ends radially spaced equally from the central axis C so that the working members of a group are engaged simultaneously by the driving members.

The sub-axis W of one group is laterally displaced relative to the central axis C and one group is longitudinally displaced along the central axis from the other group.

The machine further has four driving members, four shafts, and four working members per group, in the preferred form, all arranged 90° apart. In each group shown, there are two longer working members 55—56 for example and two shorter working members 54—57 for example with a longer member 55 opposing and aligned with a shorter member 57.

While the working members herein disclosed are illustrated for use in forging of workpieces and comprise dies, it will be understood that it is not necessary that the working members be dies or that the work done be forging.

This application is a substitute for a prior application Ser. No. 622,289, filed November 15, 1956, now abandoned.

Now having described the machine herein disclosed, reference should be had to the claims which follow.

We claim:

1. In combination; at least three shafts arranged radially around and equidistant from a central axis with their own axes extending longitudinally and parallel to the central axis; with the shafts being rotatable on their own axes; transversely arranged reciprocating driver rods operatively connected to the shafts and reciprocated by them;

at least three radially movable driving members radially arranged around and equidistant from the central axis and to which the driver rods are operatively

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connected and which are radially reciprocated to and from the central axis by the driver rods in their reciprocation; with the driving members spaced a considerable distance from the central axis;

at least two parallel groups of working members in the area inside the driving members, longitudinally spaced along the central axis but longitudinally encompassed by the driving members so that these straddle and thus simultaneously engage and drive the two groups inside them;

each group comprising one working member for and in radial alignment with each driving member; there being thus at least three radially arranged, equally spaced, opposing working members in each group, with their inner ends arranged adjacent and facing one another to form a completely circular workpiece encircling throat;

each group having its working members radially movable and arranged radially about a sub axis inside such area and parallel to the central axis but laterally displaced therefrom, with the working members of each group being of unequal radial length to compensate for the inequality of lateral distance between that group's sub axis and the driving members; the working members of each group having their inner ends radially spaced equally from its sub-axis and having their outer ends radially spaced equally from the central axis to be engaged simultaneously by the driving members;

the sub-axis of one group being laterally displaced relative to the sub-axis of the other group and with one group being longitudinally displaced from the other group along the central axis.

2. A construction according to claim 1 wherein, in each group, there are two longer working members and two shorter working members, with a longer member opposing and aligned with a shorter member.

References Cited in the file of this patent

FOREIGN PATENTS

797,518 Great Britain ----- July 2, 1958