Dec. 23, 1930. W. W. CRILEY 1,786,006

SAFETY DEVICE

Filed May 7, 1927 2 Sheets-Sheet 1

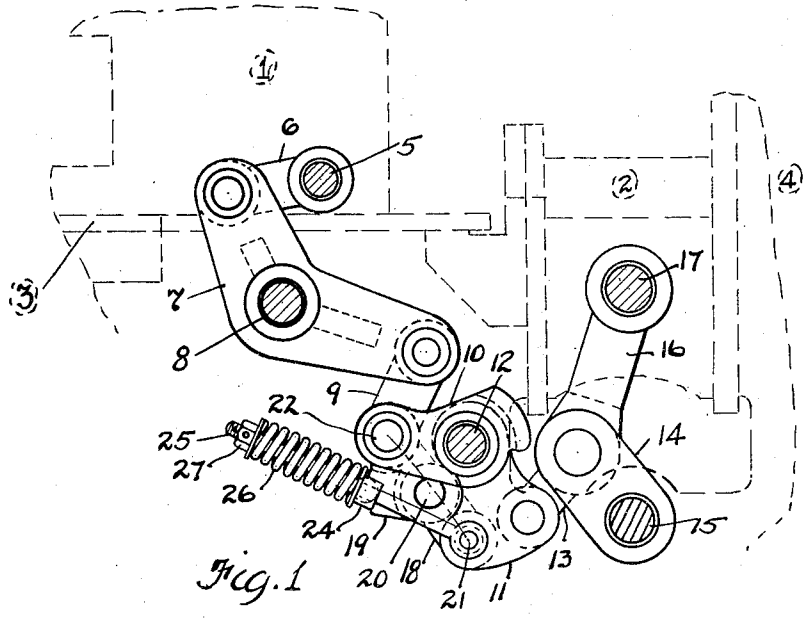


Fig. 1

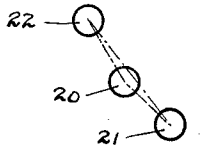


Fig. 3

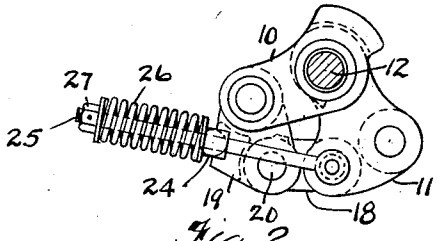


Fig. 2

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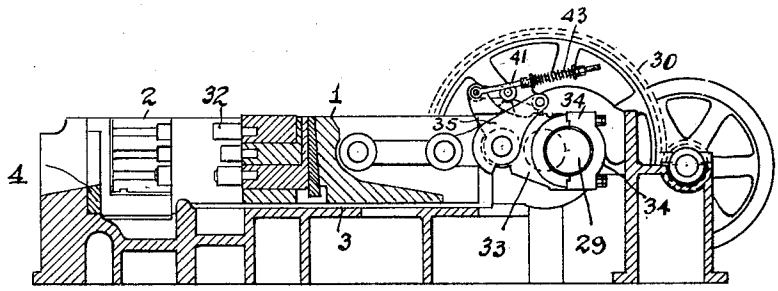


Fig. 4

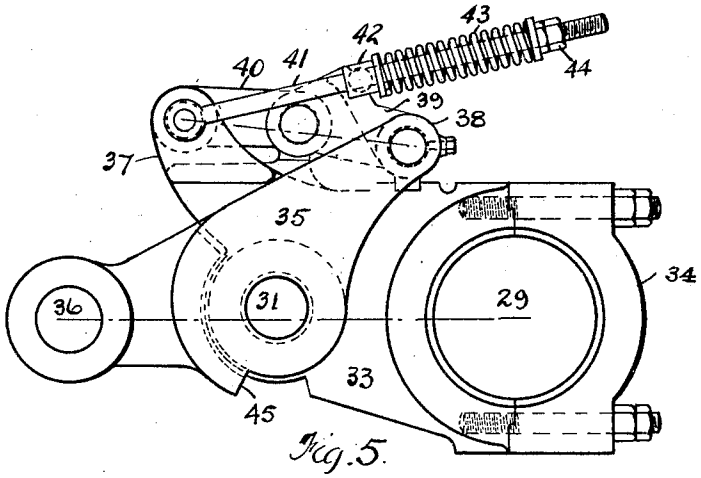


Fig. 5.

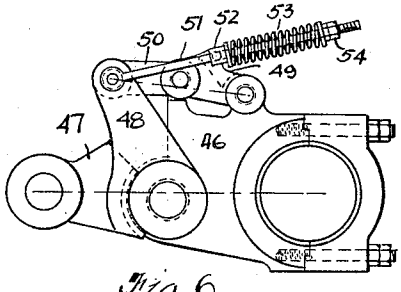


Fig. 6.

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UNITED STATES PATENT OFFICE

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SAFETY DEVICE

Application filed May 7, 1927. Serial No. 189,504.

This invention relates to safety devices, and more particularly safety connections in forging machines, punches, presses, and the like. In machines of such character, it is desirable to provide means for preventing breakage or stalling of the machine in the event of jamming by oversized, misplaced or under-heated material; and it is among the objects of the invention to provide a construction affording full safety for the machine, and in a manner simple and reliable. Other objects will appear as the description proceeds.

To the accomplishment of the foregoing and related ends, the invention, then, consists of the features hereinafter fully described, and particularly pointed out in the claims, the annexed drawing and the following description setting forth in detail but one of the various ways in which the principle of the invention may be employed.

In said annexed drawing:—

Fig. 1 is a detail view of mechanism in accordance with the present invention; Fig. 2 is a fragmentary showing of such mechanism in its release position; Fig. 3 is a diagrammatic view showing the normal position of the toggle points; Fig. 4 is a longitudinal section through a machine showing a pitman embodying the principles of the invention; Fig. 5 is an enlarged detail; and Fig. 6 is a similar view of a modification, on slightly smaller scale.

Referring more particularly to the drawing, the reference numerals 1 and 2 designate slides in a forging machine of well known type, the slide 1 being operated in the frame 3 along the guides by a pitman, and the slide 2 operating in its guides 4 at right angles to the path of the slide 1, the slides carrying forging dies or the like which cooperate in the well known manner. On the slide 1, a pin 5 carries a link 6 which is pivoted to a knuckle 7 in turn pivotally mounted on a fixed pin 8 on the frame of the machine. The other arm of the knuckle 7 is pivotally connected with a link 9 which in turn is pivoted to an oscillating outside safety knuckle 10. The latter and an inside knuckle 11 are pivoted in common on a pin 12 fixed to the frame of the machine. From the inside safety knuckle 11 a link 13 connects to knuckle 14 pivoted on a pin 15 fixed to the machine frame. The same link 13 also connects with a link 16 which is connected by pin 17 to the slide 2.

Another link system comprising closed link 18 and open link 19 is applied between the knuckles 10 and 11, the said links being pivotally joined together at 20 and the link 18 being pivoted at its other end at the point 21, and the link 19 being pivoted to the knuckle 10 at the pin 22. This link system 18, 19, constitutes a toggle, between the lever ends of the knuckles 10 and 11. Normally, this toggle is maintained in slightly disaligned position, as indicated in Fig. 1, by a yieldable holding means. This comprises preferably a yoke bar 24 which seats in recesses in the back of the link 19; and extending through openings in the end of the bar bolts 25 pivoted from pivot pin 21. The bolts 25 are surrounded by compression springs 26 which are held at their outer extremities by adjusting nuts 27.

In operation, it will be seen that the slides 1 and 2 reciprocate in their respective paths, at right angles to each other, motion being communicated from the one slide, for instance slide 1 to the other slide, through the chain of links and knuckles forming the associated connecting drive. Normally the knuckle 7 is rocked about its fulcrum 8, and in turn rocks the knuckle 11, which through link 13 straightens the toggle 14, 16, over the fixed fulcrum 15, thus operating the slide 2. If now an unusual resistance to the movement of the slide 2 be encountered as may happen from a misplaced blank in the gripping dies of the device, or an oversized blank, as the chain of links and knuckles encounters the resistance, the toggle system 18, 19, will yield, against the spring 26, as shown more specially in Fig. 2. That is, this toggle system yields to an extent sufficient to allow the points 21 and 22 in the system to come closer together and allow the slide 1 to make its usual excursion, as thrown by its crank for instance, although the slide 2 is absolutely blocked. No harm is thus done to any portion of the mechanism, and on the return stroke of the slide 1, the springs 26 immediately straighten up the toggle sys-

tem 18, 19 into its slightly disaligned position, and the mechanism proceeds on in its accustomed fashion.

A direct motion mechanism, such for instance as a pitman, may be equipped on similar lines. A pitman on a crankshaft 29, Fig. 4, operated by a gear drive 30 is shown as actuating slide 1 carrying tools 32, the pitman being made up of members 33, 34 and 35. The members 33 and 35 are pivoted together at 31 and the former is provided with an extension 37 and the latter, an extension 38. Connecting these extensions in turn are links 39 and 40 which are pivoted together intermediately. A yoke bolt 41, or a pair of such, is pivoted to extension 37 and carries a yoke 42 adapted to rest in a recess in the back of link 39, as backed up by a compression spring 43 and its adjusting nut 44.

With such mechanism, if undue resistance be encountered, the joint at pivot 31 bends out from its normally slightly disaligned position, a strop 45 forming a final limit, and the yielding of spring 43 allows the toggle system 39, 40 to also bend out from its normally slightly disaligned position, thus giving a shortening of distance between points 29 and 36, or a shortening of stroke as required to prevent injury to the press. On the return stroke or withdrawal the spring action straightens the toggles back to their normally slightly disaligned position and the press functions as usual.

In the form shown in Fig. 6, a lateral lug on pitman member 47 with its lateral lug 48 has a link 50 which is pivoted to link 49, and yoke bolt 51 carries a yoke 52 adapted to rest in a recess in the back of link 49 as backed up by a compression spring 53 and its adjusting nut 54. If undue resistance be encountered at the die or the like which the mechanism is operating, the members 46, 47, toggle out from their normal position, the toggle system 49, 50 also yielding under the spring, and damage is prevented. On the return stroke, the pitman straightens back to its normal slightly disaligned position, as indicated by the centering, and operates as usual.

It will thus be seen that in accordance with my invention, various jointed thrust members in presses, punches, etc., can be provided with an auxiliary connection which is yieldable when required, to allow the joint to further move, and entire safety for the machine in all its operating portions is provided, and at the same time there is nothing to be replaced or reset after the safety release. A resulting gain in operating time is accordingly realized. Moreover especially skilled repairmen are not required in attendance.

Other modes of applying the principle of the invention may be employed, change being made as regards the details disclosed, provided the means stated in any of the following claims, or the equivalent of such, be employed.

I therefore particularly point out and distinctly claim as my invention:—

1. In a device of the character described, the combination of pivotally connected thrust members, reciprocating means for imparting motion therethrough, and an auxiliary connection between said members allowing yielding compensatively on abnormal resistance, said connection including pivoted toggle links and a spring yoke extending across one said toggle link to the other.

2. In a device of the character described, the combination of pivotally connected thrust members, reciprocating means for imparting motion therethrough, and an auxiliary connection between said members allowing yielding compensatively on abnormal resistance, said connection including two toggle links having their adjacent ends pivoted together and their other ends pivoted respectively to the said members, and a spring yoke bridging the toggle.

3. In a device of the character described, the combination of an oscillating knuckle, reciprocating means for imparting motion therethrough, an oscillated knuckle, and a connection between said knuckles including two toggle links having their adjacent ends pivoted together and their other ends pivoted respectively to the said knuckles, and a spring yoke extending across one link to the other for normally maintaining the toggle extended.

4. In a device of the character described, the combination of an oscillating knuckle; an oscillated knuckle; and a connection therebetween including two toggle links having their adjacent ends pivoted together and their other ends pivoted respectively to the said knuckles, and a yieldable yoke extending from one knuckle to engage the back of the link pivoted to the other knuckle.

5. In a device of the character described, the combination of an oscillating knuckle; an oscillated knuckle; and a connection therebetween including two toggle links having their adjacent ends pivoted together and their other ends pivoted respectively to the said knuckles, yoke bolts extending from the point of pivoting of one knuckle with the corresponding toggle link, a yoke bar through which said bolts pass, said bar engaging the back of the other toggle link, and springs between the bolts and bar.

6. In a device of the character described, the combination of an oscillating knuckle; an oscillated knuckle; and a connection therebetween including two toggle links having their adjacent ends pivoted together and their other ends pivoted respectively to the said knuckles, paired yoke bolts extending from the point

of pivoting of the oscillated knuckle with the corresponding toggle link, a yoke bar having openings through which said bolts pass, said bar engaging seats in the back of the other toggle link, compression springs about said bolts beyond the yoke bar, and adjusting nuts holding said springs.

Signed by me this 2 day of May, 1927.

WILLIAM W. CRILEY.