

Dec. 12, 1944.

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2,364,980

SAFETY DEVICE

Filed Sept. 5, 1942

2 Sheets-Sheet 1

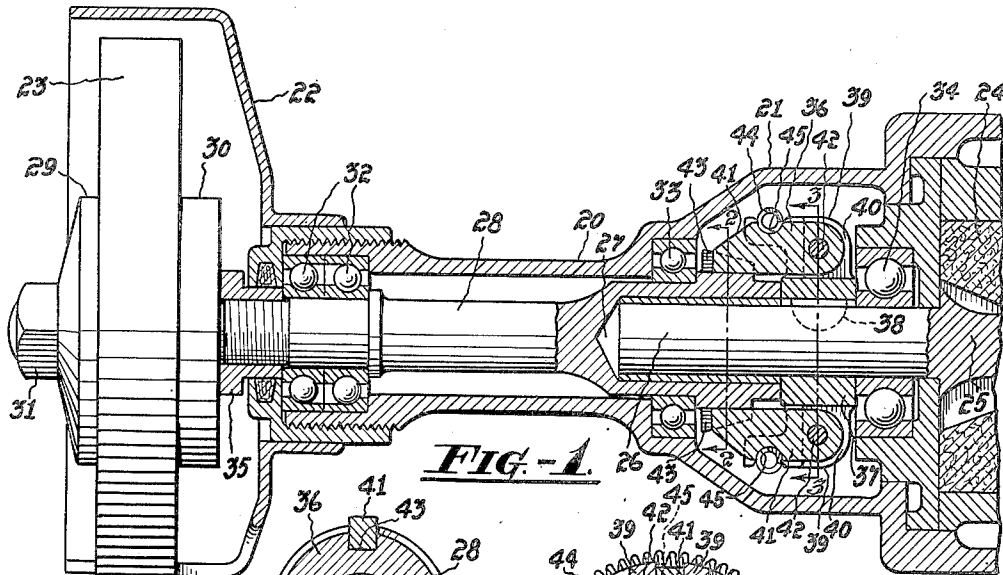


FIG. - 1.

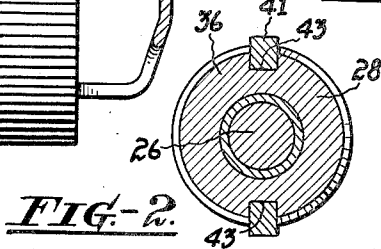


FIG.-2.

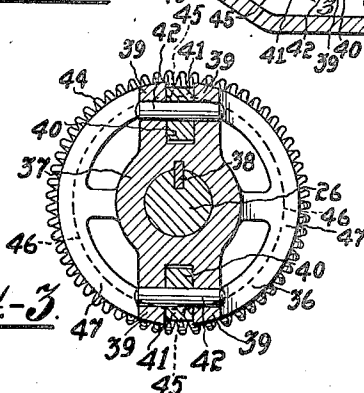


FIG-3.

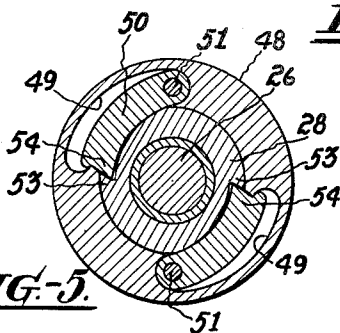


FIG-5.

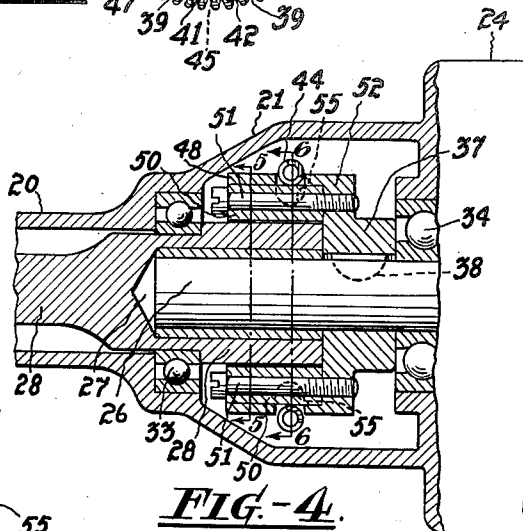


FIG.-4

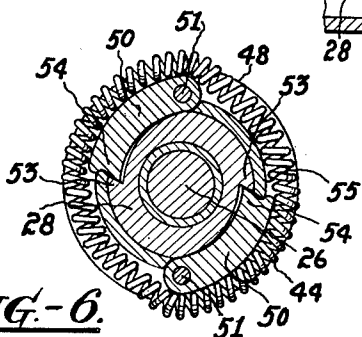


FIG.-6.

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2 Sheets-Sheet 2

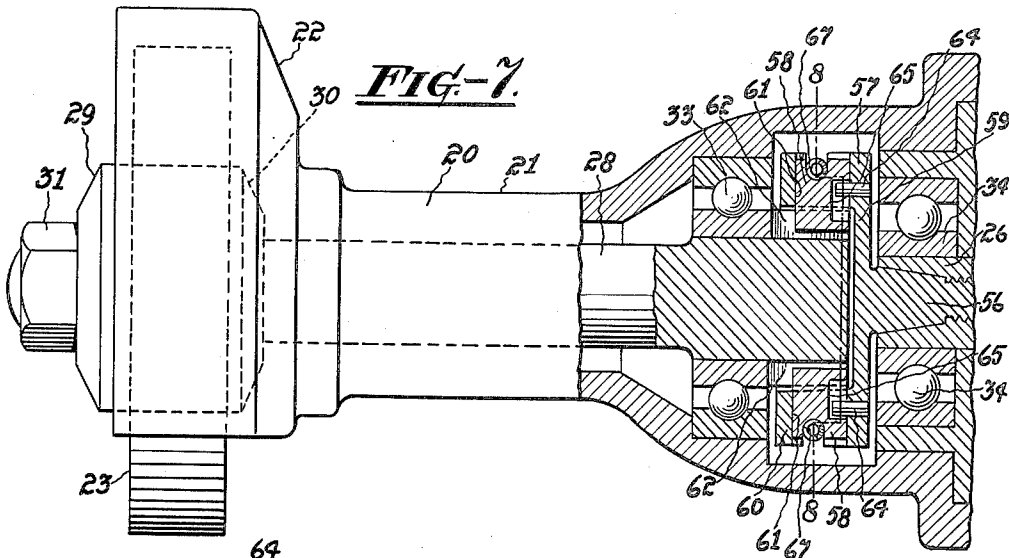


FIG. 7.

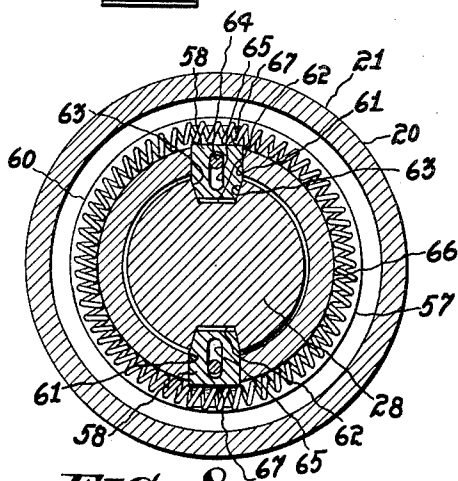


FIG. 8.

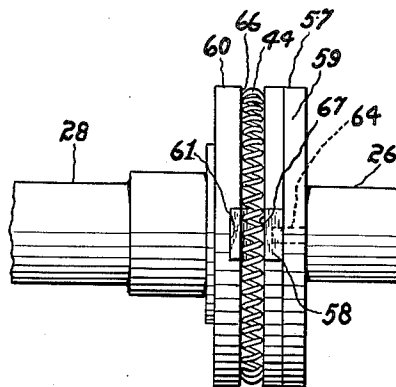


FIG. 9.

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UNITED STATES PATENT OFFICE

2,364,980

SAFETY DEVICE

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3 Claims. (Cl. 192-104)

This invention relates to safety devices, and more particularly to a safety device acting in response to a predetermined rate of speed for disconnecting a driving member from a driven member.

One object of the invention is to prevent the operation of a driven member at speeds in excess of a predetermined rate.

Other objects will be in part obvious and in part pointed out hereinafter.

In the drawings accompanying this specification and in which similar reference numerals refer to similar parts,

Figure 1 is a longitudinal view, partly broken away, of a grinding machine equipped with a safety device constructed in accordance with the practice of the invention,

Figures 2 and 3 are transverse views taken through Figure 1 on the lines 2-2 and 3-3, respectively,

Figure 4 is a view similar to Figure 1 showing a modified form of the invention,

Figures 5 and 6 are transverse views taken through Figure 4 on the lines 5-5 and 6-6, respectively,

Figure 7 is a longitudinal view, partly broken away, of another modified form of the invention,

Figure 8 is a transverse view taken through Figure 7 on the line 8-8, and

Figure 9 is a longitudinal side view of a detail.

Referring to the drawings and at first more particularly to Figures 1, 2 and 3, 20 designates a grinding machine to which the invention is applied and has a casing 21 and a hood 22 at one end thereof to serve as a guard for a grinding wheel 23.

Any suitable motor 24 may be provided for driving the grinding wheel, as for example one of the slidable vane type, as indicated, the rotor 25 of which is shown as having a shaft 26 that extends loosely into a socket 27 of an arbor 28 carrying the grinding wheel. The grinding wheel 23 is arranged between a pair of plates 29 and 30 and the plates are clamped to the wheel by a nut 31 threaded upon the arbor.

The arbor 28 is provided with anti-friction bearings 32 and 33 arranged, respectively, near the grinding wheel and the inner end of the arbor. An anti-friction bearing 34 is also arranged in the casing 21 immediately forwardly of the rotor 25 for the shaft 26, and a sleeve 35 threaded on the arbor and seating against the inner race of the bearing 32 serves as an abutment for the innermost plate 30.

In accordance with the practice of the inven-

tion, the machine 20 is provided with a clutch device, designated in its entirety by 36, to form a driving connection between the shaft 26 and the arbor 28. The clutch device comprises a

holder, in the form of a sleeve 37 arranged between the inner end of the arbor 28 and the anti-friction bearing 34 and secured to the shaft 26 by a key 38. On diametrically opposite sides of the sleeve are pairs of lugs 39 to define slots 40 for the accommodation of arms 41 that are mounted pivotally at one end upon pins 42 seated in the lugs 39.

The arms 41 are of such length that they may extend forwardly of the sleeve 37 to overlie the peripheral surface of the adjacent portion of the arbor 28 which has longitudinally extending slots 43 to receive the free end portions of the arms 41.

As a preferred arrangement, all of the arms 41, two in the present instance, are held in the slots 43 by a common retainer 44 shown as being in the form of an endless tension spring. The retainer lies in notches 45 in the outer surfaces of the arms 41, and the portions of the retainer 44 between the arms 41 lie in grooves 46 located in the same transverse plane as the notches 45 and in the peripheral surfaces of arcuate brackets 47 on the forward ends of the lugs 39.

During the operation of the device and when the rotative parts of the grinding machine are running at speeds below that predetermined rate at which the tension of the retainer 44 is calibrated to yield to the centrifugal force of the arms 41, the retainer 44 holds the arms in the slots 43. The rotary movement of the rotor 25 will then be transmitted through the arms 41 to the arbor 28 for rotating the grinding wheel 23.

In the event that the motor speed reaches a rate at which the centrifugal force of the arms 41 may overcome the resistance of the retainer 44 the said arms will fly outwardly about their pivot pins 42 and will move out of the slots 43 and disconnect the shaft 26 from the arbor 28. When the motor speed again decelerates the force exerted by the retainer 44 upon the free ends of the arms 41 will move said arms inwardly and reestablish the driving connection between the shaft 26 and the arbor 28.

In the form of the invention shown in Figures 4, 5 and 6, the shaft 26 also extends loosely into the end of the arbor 28, and the sleeve 37 has a forwardly projecting skirt portion 48 that encircles the end of the arbor. In the inner sur-

face of the skirt 48 are recesses 49 all of which lie in the same transverse plane to accommodate pawls 50 of arcuate shape that are pivoted at one end upon bolts 51 threaded into the end wall 52 of the skirt 48.

On the peripheral surface of the portion of the arbor 28 lying inside of the skirt 48 are teeth 53 that extend longitudinally of the arbor and serve as abutments for the free ends 54 of the pawls 50. The pawls are held in engagement with the said teeth 53 by the retainer 44 which is arranged in an annular groove 55 in the periphery of the skirt 48 and rests upon the outer surfaces of all the pawls.

In operation, this form of the invention differs from that previously described mainly in that the pawls oscillate in a plane extending transversely of the axis of the shaft 26. They will swing thus in an outwardly direction when the centrifugal force of the pawls exceeds the tension of the retainer which, as is understood, is calibrated to yield to such force at a predetermined rate of speed of the shaft for disconnecting the arbor from the motor in order to avoid operating the grinding wheel at a dangerous speed.

In the form of the invention shown in Figures 7 to 9 inclusive, the shaft 26 terminates adjacent the outer end of the anti-friction bearing 34 and has threaded therinto a stem 56 of a holder 57 for clutch members 58. The holder 57 comprises a plate portion 59 that lies between the inner end of the arbor 28 and the bearing 34 and has a forwardly extending skirt 60 wherein are formed radial recesses 61 that extend entirely through the skirt to slidably receive the clutch members 58. Suitable clearance exists between the peripheral surface of the arbor 28 and the inner surface of the skirt 60 so that these elements may rotate freely with respect to each other, and in the periphery of the portion of the arbor lying within the skirt are longitudinally extending slots 62 to receive the inner ends of the clutch members 58 for locking the shaft 26 to the arbor.

The side walls 63 of the slots 62 are tapered to provide a flared opening for the slots and the inner ends of the clutch members are correspondingly tapered to facilitate the entrance of the clutch members into the slots. Preferably, means are provided to limit the outward movement of the clutch members, as for example pins 64 seated in the plate portion 59 of the holder and extending into oblong recesses 65 in the adjacent surfaces of the clutch members.

In this form of the invention a single retainer 44 also serves to resist the outward movement of all the clutch members 58. It lies in an annular groove 66 in the periphery of the skirt 60 and portions thereof lie in notches 67 in the outer ends of the clutch members 58 and in the same transverse plane as the groove 66.

In operation, the clutch members are normally held in their innermost limiting positions

to extend into the slots 62 by the retainer 44 and will be held thus until the centrifugal force of the clutch members reaches a value above that which the retainer is able to resist. The clutch members will then slide radially outwardly until they move out of the slots 62 to disconnect the shaft 26 from the arbor 28.

When the speed of the motor again falls below the predetermined rate at which the clutch members are intended to act to release the arbor from the motor the clutch members will be urged inwardly by the retainer and into the slots 62 to reestablish the driving connection between the motor and the arbor 28.

I claim:

1. A safety device, comprising rotary driving and driven members, clutch elements carried by the driving member to interlockingly engage the driven member and being operated by centrifugal force for moving the clutch elements out of engagement with the driven member, pivots in the driving member for the clutch elements, and a common retainer encircling the driving member interlockingly engaging the clutch elements and the driving member for holding all the clutch elements normally in engaging position and yielding to the centrifugal force of the clutch elements at a predetermined rate of speed of the members for permitting the clutch elements to move out of engagement with the driven member.

2. A safety device, comprising rotary driving and driven members, clutch elements carried by the driving member to interlockingly engage the driven member and being actuated out of engagement with the driven member by centrifugal force, pivots in the driving member for the clutch elements, there being grooves in the driving member and in the clutch elements, and a single retainer in the grooves acting against all the clutch elements to hold said clutch elements in engagement with the driven member and yielding to the centrifugal force of the clutch elements at a predetermined rate of speed of the members for permitting the clutch elements to move out of engagement with the driven member.

3. A safety device, comprising rotary driving and driven members, clutch means carried by one member to interlockingly engage the other member and being actuated out of engagement with said other member by centrifugal force, said clutch means being pivotally connected to said one member for oscillatory movement radially of the members, and means encircling the driving member interlockingly engaging the driving member and the clutch means for normally holding the clutch means in interlocking engagement with said other member and being yieldable to permit the clutch means to move out of engagement with the said other member at a predetermined rate of speed of the members.

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