To all whom it may concern:

Be it known that I, DAVID C. KLAUSMEYER, a citizen of the United States, and residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented a new and Improved Automatic Throw-Out for Power Feed, of which the following specification is a full disclosure.

This invention deals with mechanism wherein a member is shifted by a power-driven nut-and-screw and the improvement relates more particularly to a safety arrangement whereby the power is automatically thrown out as soon as the threads of the nut become sufficiently worn to be unreliable for the purpose of sustaining the weight or opposing the counter-force of the shiftable member; this application being a division of my copending case entitled Safety Nut Interlock with Feed Control Lever, filed November 17, 1920, Serial No. 494,800, patented April 25, 1922, No. 1,414,327.

Other objects and advantages will be in part indicated in the following description and in part rendered apparent therefrom in connection with the annexed drawings.

To enable others skilled in the art to so fully comprehend the underlying features hereof that they may embody the same in the various ways contemplated by this invention, drawings depicting a preferred typical construction have been annexed as a part of this disclosure, and in such drawings like characters of reference denote corresponding parts throughout all the views of which:

Fig. 1 is a vertical section diagrammatically depicting one embodiment of this invention and showing means for automatically disconnecting the power and for positively preventing the power from being thereafter turned on until the unduly worn nut has been replaced. Fig. 2 is a detail in side elevation showing the engagement normally existing between the main nut and an auxiliary idler nut. Fig. 3 is a horizontal section through line 3—3 of Fig. 1 showing the parts in their retracted position. Fig. 4 is a detail showing the position occupied by the warning element whereby the power control is retained in its inoperative setting.

Continuing now by way of a more detailed description of the embodiment selected for purposes of explanation, it may be stated that this invention is applicable to any apparatus or mechanism wherein a screw cooperates with a nut or its equivalent, for the purpose of effecting an approach or separation between the two parts or castings such, for example, as the frame elements A and B. This separation or approach is accomplished against the resistance of some counter tendency such as gravity or other pressure and it ordinarily is accomplished by effecting a relative rotation between a nut such as C and a screw such as D; the one being suitably mounted against translation relative to the element A, and the other suitably mounted against translation relative to the element B. Thus the lower end of the nut C is provided with a shoulder 10 interfitting with a counter-part shoulder on the element A and this nut C is secured against rotation by means of a screw 11 in the manner usual in radial drills. The screw D, being used as a lifting-screw is rotatable and is accordingly journaled at its ends in a stationary part of the machine in any conventional manner, as for example in the manner shown by my U. S. Patent No. 1,374,581 of April 12, 1881.

In the form illustrated in the drawings, the screw is shown journaled in the member B which is here assumed to be the base or stationary element, and the nut C is non-rotatably secured to the element A which is here illustrated as the movable member. As will be understood, some sort of operating means will be utilized and such means will also be under manual control. For example the base B may support the shaft E connected in driving relation with the screw D by means of suitable gears F and this shaft E may be driven either clockwise or counter-clockwise by means of either one or the other of gears G and H which rotate in opposite direction by reason of their connection to the prime-mover J. The connection between the gears G and H with the shaft E may be effected through a suitable clutch, such as the member K, splined to the shaft E and shifted to the right or left by means of an arm L projecting from a member M, here shown in the nature of an elongated vertical bar, adapted to be manually oscillated. For the purpose of facilitating
the oscillation of this rod, a hand lever (not shown) may be employed, as will be understood.

Referring to Fig. 1 it will be seen that, in addition to the regular nut C, an auxiliary nut N is threaded to the screw D and that it occupies a position between a shoulder P provided by the frame-element A and the upper end of the regular nut C; there being a clearance space O for the purpose of permitting a predetermined separation between the auxiliary nut N and the regular nut C in the event of undue thread-wear or of thread-failure. It will be perceived that this will happen because the auxiliary nut N normally carries no load; the load being assumed by the regular nut C. Therefore, even though the threads of the regular nut should wear, those of the auxiliary nut N will not be subject to wear since the latter is virtually an idle element. It is essential, however, that these parts shall separate only as a result of thread-wear or failure and not by reason of any relative rotation between them and, accordingly, the auxiliary floating nut N is restrained against rotation by some suitable means such as, for example, as the clutch-like engagement Q shown best by Fig. 2. This permits separation without permitting rotation.

A power throw-out operative when an undue separation has taken place is preferably carried in part by the frame-element A. In the form here shown one element of this means assumes the form of a plunger R which is normally restrained against moving under the influence of a spring S by means of an engagement which depends upon the distance between the auxiliary and main nuts N and C. Thus, the plunger R may terminate in an engagement with the auxiliary nut N; said engagement consisting of a shoulder 1 of limited height and normally abutting a side of the slot 2 in the auxiliary nut. If the slide of the shoulder 1 be, say, one-third of the thickness of a thread, the plunger R will be released as soon as one-third of the thread has been worn away. So also, if the thread should strip entirely, the auxiliary nut will immediately be brought to bear against the shoulder P and also the plunger R will be released.

By referring to Figs. 1 to 4 inclusive, there will be seen an adaptation of this invention whereby the power control is thrown off automatically if it be on, and is locked against manipulation if it be off. This arrangement is of a special utility where the auxiliary nut is resorted to since it brings the rotating screw to a standstill and prevents any wearing away of the threads of the auxiliary nut by the chips or debris given off by the main nut when the threads become stripped or torn. In general, the mechanism of this embodiment may follow the constructions hereinbefore described but in order to impart to the plunger R the capacity of throwing off the power, its extremity may be provided with a shoe W having two contact surfaces 6 and 7 which may consist with the fingers 8 and 9 radiating from a dog X, adapted to slide along but not rotate relative to the rod M and maintained, by suitable means, such as lugs 12 and 13 projecting from the element A in the same plane as the shoe W throughout the rise and fall of the frame-element A. When the plunger R is released, it will be advanced by the spring and the appropriate contact surface will impact the appropriate finger to turn the rod M until both of the contact surfaces are in contact with both of the fingers, as shown by Fig. 4, and thereby the power will be disengaged.

To prevent the operator from again starting the machine after the nut C has failed, and the machine has been brought to rest, a suitable locking mechanism is provided for the plunger R. This mechanism comprises a shoulder 3 on the plunger which in the abnormal or outward position of the plunger is engaged by a detent 4 (pressed by a spring 5). This lock prevents any rearward movement of the plunger and thereby precludes the starting of the machine. To guard against the temptation of manually releasing the detent it is preferably arranged in accessible, as shown by the drawings so that the operator can restore the parts to their normal position only by going to the trouble of taking the machine apart to an extent sufficient to effect a replacement of the main nut.

It will thus be seen that this invention provides a safety arrangement whereby the power will be automatically disconnected from an elevating mechanism of the nut-and-screw type as soon as the threads become so far worn as to be unsafe.

Without further analysis, the foregoing will so fully reveal the gist of this invention that others can, by applying current knowledge, readily adapt it for various utilizations by retaining one or more of the essential characteristics of either the generic or specific aspects of this invention, and, therefore, such adaptations should be, and are intended to be, comprehended within the meaning and range of equivalency of the following claims.

Having thus revealed this invention, I claim as new and desire to secure the following combinations of steps and elements, or equivalent thereof, by Letters Patent of the United States:

1. A device of the nature disclosed comprising a screw; a load-free member meshing with said screw; a load-carrying member also meshing with said screw and adapted by thread-wear or failure to become varied in
distance from said load-free member; power-driven means for effecting a relative rotation between said screw and said members simultaneously; and means made operative through a variation in said distance for throwing out of action said power-driven rotation-effecting means.

2. A device of the nature disclosed combining a screw; a load-free member meshing with said screw; a load-carrying member also meshing with said screw and adapted by thread-wear or failure to become varied in distance from said load-free member; power-driven mechanism for effecting a relative rotation between said screw and said members simultaneously; a manual control means therefor; and an instrumentality for automatically shifting said manual control into a position rendering inoperative said power-driven mechanism, said instrumentality being adapted to become effective through a variation in the distance between said members.

3. A device of the nature disclosed combining a screw; a load-free member meshing with said screw; a load-carrying member also meshing with said screw and adapted by thread-wear or failure to become varied in distance from said load-free member; means for effecting a relative rotation between said screw and said members simultaneously; and a mechanism put into operation through a variation in said distance for automatically throwing said rotation-effecting means out of operation.

4. In a machine, in combination, a screw, an element cooperating therewith, power driving means for effecting relative movement between said screw and element and a safety device adapted to be brought into action by an abnormal relation between said screw and element to automatically and instantaneously render ineffective said driving mechanism, said safety device comprising a spring pressed member, means normally retaining said member in retracted position and adapted under abnormal conditions to release it, means actuated by the movement of the spring-pressed member for throwing off the power and an inaccessible detent adapted automatically to engage said member after it has been advanced by said spring to prevent it from being restored to its initial position.

5. A device of the nature disclosed combining a screw; a member having a thread-connection with said screw; power driving means for effecting relative movement between said screw and member; a manual control for said driving means; and an instrumentality, rendered effective by movement resulting from undue wear or damage in said thread-connection, for shifting said manual control to render said driving means ineffective.

6. A device of the nature disclosed combining a power-driven screw; a member operated by said screw; a manually operable means for controlling the movement of said screw; an interposition between said screw-operated member and said manually operable means said interposition having a neutral and an obstructing position with respect to the manually operable means, the position of said interposition being controlled by the relative position of said screw and screw-operated member; means actuated by the interposition in its movement from neutral to obstructing positions for shifting the manually operable means to instantaneously stop the power driven screw, and a detent adapted to automatically retain said interposition when moved to its obstructing position.

7. A device of the nature disclosed combining a screw; two members simultaneously engaging said screw; a part retained in its normal position by connection with one of said members; said part being arranged to occupy an abnormal position upon a pre-determined variation in the relation between said members due to thread-wear or thread-yield; a power-driven means; and a manual-control therefor, said part and said control being so related that when said part moves into its abnormal position it will shift said manual control so as to render said power-driven means inoperative.

8. A device of the nature disclosed combining a rotatable element; two members simultaneously in thread-engagement therewith and simultaneously movable thereby at the same rate, one of said members carrying a load and the other being normally free of load; a part retained in its normal position by connection with one of said members, said part being adapted to occupy an abnormal position in consequence of any undue relative movement between said members caused by excess wear or yield of said thread-engagement; a power-driven mechanism; and a means intervening between said part and said mechanism to enable said part when being shifted from its normal position to automatically and instantaneously render inoperative said mechanism.

9. A device of the nature disclosed combining a screw; two members in thread-engagement therewith; a spring-pressed element normally latched to one of said members; a part bodily movable with the other member and carrying said element, whereby a displacement of the one member relatively to the other will effect a release of said element; and a power-driven mechanism adapted to be automatically and instantaneously rendered inoperative by said element when it is released from its normal position.

10. A device of the nature disclosed com-
bining a screw; two members in thread-
engagement therewith; an element coacting
with one of said members; a part movable
bodily with the other member and carrying
said element, whereby a relative movement
between said members may effect a displace-
ment of said element; a power-driven mecha-
nism adapted to be automatically and in-
stantaneously rendered inoperative when
said element moves from its normal position;
and a latch for obstructing a return of said
element to its normal position.

11. A device of the nature disclosed com-
bining a screw; a prime-mover therefor;
means for establishing a connection between
said screw and said prime-mover; a manu-
ally controlled part for actuating said means;
two members engaging said screw and
simultaneously moved thereby, the one
carrying a load and the other being load-
free; and means effective upon a relative
movement between said members for auto-
matically shifting said part into its in-
operative position and for thereafter
obstructing the manual manipulation of said
part.

12. A device of the nature disclosed com-
bining a screw; a screw-operated member;
power-means for rotating said screw; an
element for controlling said power-means,
said element having two effective positions
and a neutral position; manually actuated
means for shifting said element; an inter-
ponent between said screw operated mem-
ber and said manually actuated means; and
means for shifting said interponent from a
normal position to an abnormal position,
said interponent being so constructed and
arranged with respect to the manually
actuated means that in its movement it acts
automatically through said manually ac-
tuated means to shift said power-means
controlling-element to its neutral position.

13. A device of the nature disclosed com-
bining a screw; a prime-mover therefor;
means for establishing a connection between
said screw and said prime-mover; a manu-
ally-controlled part for actuating said means;
two members engaging said screw and
simultaneously moved thereby, the one
carrying a load and the other being load-
free; the load-free member being adapted to
assume a load upon moving relative to said
other member; and means effective upon a
relative movement between said members for
moving said part into its inoperative position
and for thereafter obstructing the manual
manipulation of said part.

In witness whereof, I hereunto subscribe
my name, as attested by the two subscribing
witnesses.

DAVID C. KLAUSMEYER.

Witnesses:
C. C. SLETE,
META NORDMAN.