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S. J. BOND

SAFETY DEVICE FOR HOISTING MACHINES AND THE LIKE

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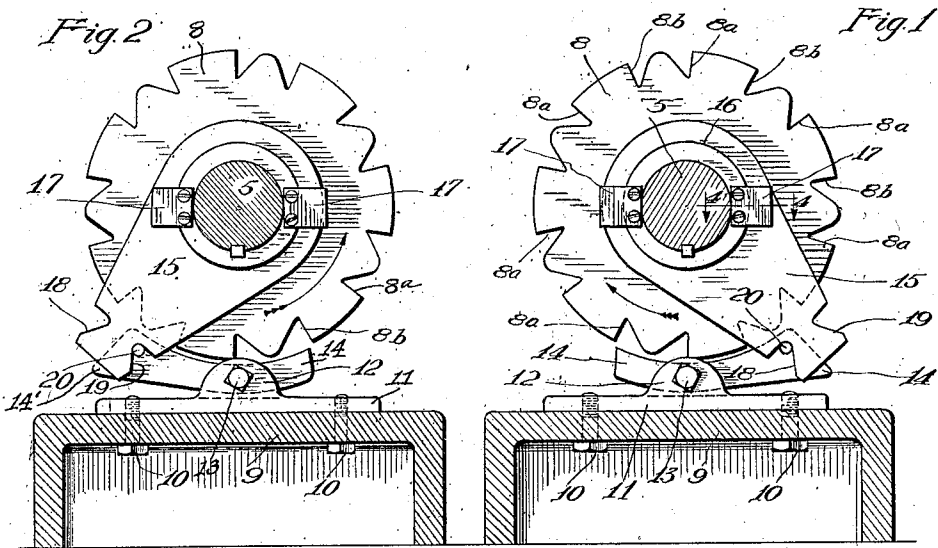


Fig. 3

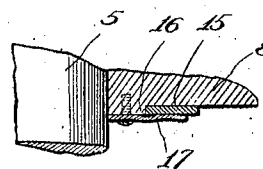
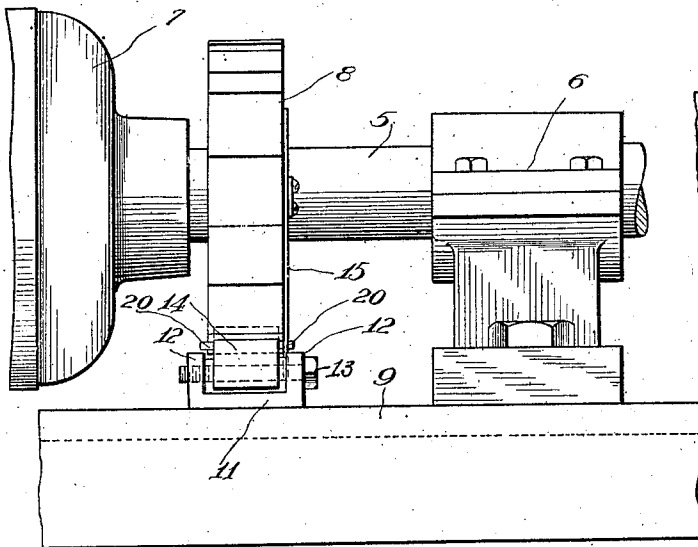


Fig. 4

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SAFETY DEVICE FOR HOISTING MACHINES AND THE LIKE.

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To all whom it may concern:

Be it known that I, STANLEY J. BOND, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Safety Devices for Hoisting Machines and the like, of which the following is a specification.

This invention relates to safety devices for rotating shafts designed to prevent the shaft from turning in a backward direction in the event of an interruption in the driving power applied thereto or a break in the transmission from the motor to the shaft. The chief intended use of the device is as a safety appliance for the drum or winch-head shafts of hoisting machines where, in the event of a break-down in the power, the load being raised may suddenly drop with possible disastrous consequences; but it is to be understood that the device is applicable to any situation wherein it is desired to prevent a driven shaft from turning backwardly when the drive thereof is intermitted.

One object of the invention is to provide a simple and automatic safety device of the pawl and ratchet type for the general uses and purposes above mentioned which will be reliable in action and noiseless in operation and will obviate the friction and wear accompanying the use of the ordinary ratchet and spring pressed dogging pawl. A further object of the invention is to provide a device of the character above mentioned which, by a mere reversal of the position of the dogging pawl, can be made to function for either direction of rotation of the shaft.

Other objects and attendant advantages of the invention will be apparent to persons skilled in the art from the following description taken in connection with the accompanying drawing in which I have illustrated one simple and practical embodiment of the invention and wherein—

Fig. 1 is a side elevation of my improved safety device applied to the rotating shaft, the latter being shown in cross section and assumed to be turning clockwise as indicated by the arrow;

Fig. 2 is a view similar to Fig. 1, showing the reversed position of the dogging pawl and the pawl releasing arm, when the

shaft is rotating in the reverse or counter-clockwise direction;

Fig. 3 is an edge elevation as viewed from the left of Fig. 1; and

Fig. 4 is an enlarged section on the line 4—4 of Fig. 1, showing the spring means for maintaining the pawl controlling arm in frictional engagement with the side of the ratchet wheel.

Referring to the drawing, 5 designates a rotary shaft such, for instance as the shaft of a winding drum or winch-head of a hoisting machine, the same being journaled in a bearing 6 and directly driven by an electric motor indicated at 7. Fast on the shaft 5 is a ratchet wheel 8, the periphery of which is formed with two groups of alternately arranged oppositely facing ratchet teeth 8^a and 8^b, respectively. Secured to a base or platform 9 as by screws 10 is a plate or strip 11 formed with a pair of upstanding parallel lugs 12, between which is mounted on a pivot pin 13 a detent dog 14 formed with a counterweighted or heavy tail piece 14', whereby, under the weight of said tail piece, the nose of the dog is normally moved into engaging relation to the teeth of the ratchet wheel. With the detent dog mounted as shown in Figs. 1 and 3, the dog tends to engage with the teeth 8^a of the ratchet wheel, thereby permitting the latter to turn in the clockwise direction indicated by the arrow. When, however, the position of the detent dog is reversed, as shown in Fig. 2, the nose of the dog tends to engage with the teeth 8^b of the ratchet wheel, thus allowing the latter to travel in the counter-clockwise direction indicated in this figure.

The dog is held disengaged from the teeth of the ratchet wheel during the normal rotation of the shaft by means of a flat arm 15 that is loosely mounted on a narrow hub or boss 16 formed on one side of the ratchet wheel 8, and is pressed into frictional engagement with the side of the latter by a pair of springs 17 (Fig. 4). In the opposite edges of the arm 15 at its free end are cut a pair of cam notches 18 and 19, that are adapted to liftingly engage with a pin 20 projecting laterally from the tail piece 14' of the detent dog.

When the shaft is turning clockwise as indicated in Fig. 1, the arm 15 is swung around in the same direction until the notch

18 engages with the pin 20, whereby the nose of the dog is withdrawn from engagement with the teeth of the ratchet and held clear of the latter, as indicated in Fig. 1, so that the rotation of the shaft is unaccompanied by noise or wear of the dog on the ratchet. Should the drive of the shaft, however, be suddenly interrupted and the load start to turn the shaft in the reverse direction, the arm 15 and its cam 18 are instantly withdrawn from the pin 20 and the nose of the dog instantly falls into engagement with the next tooth 8^a of the ratchet; thus arresting the back turning of the shaft.

Precisely the same action occurs when the normal direction of travel of the shaft is counter-clockwise as indicated in Fig. 2. In this case the pivot pin 13 of the pawl has been withdrawn, the pawl reversed endwise, and the pivot pin replaced. To enable the counter-weighted tail of the dog to function with the other cam notch 19 of the arm 15, said pin is provided on both sides of the tail-piece, as clearly shown in Fig. 3. In this case, if the direction of rotation of the shaft and ratchet wheel is reversed, the arm 15, through its frictional engagement with the side of the ratchet wheel, instantly releases the dog and allows the latter to co-operate with the teeth 8^b of the ratchet, instantly arresting the turning movement of the ratchet and shaft.

From the foregoing it will be apparent that the device is entirely automatic in its action; eliminates the noise and wear accompanying the ordinary spring pressed pawl; and can be readily set to function when the shaft is driven in either direction. Manifestly the specific details of structure may be considerably varied from those herein shown and described without involving any departure from the principle of the invention or sacrificing any of the advantages inherent therein. Hence I reserve all such variations and modifications as fall within the spirit and purview of the appended claims.

I claim—

1. The combination with a driven shaft, of a ratchet wheel fast thereon, a detent pawl pivotally mounted opposite the periphery of said ratchet wheel and provided with means normally urging it into engagement with said ratchet wheel, and a member frictionally driven from said shaft operating, when said shaft is turning in one direction, to disengage said pawl from said ratchet wheel, and, when said shaft turns in the reverse direction, to release said pawl and permit it to engage with said ratchet wheel.

2. The combination with a driven shaft, of a ratchet wheel fast thereon, a detent pawl pivotally mounted opposite the periphery of said ratchet wheel and provided

with means normally urging it into engagement with said ratchet wheel, and an arm having a friction drive connection to said shaft and operating, when said shaft is turning in one direction, to disengage said pawl from said ratchet wheel and hold it out of contact with said ratchet wheel, when said shaft turns in the reverse direction, to release said pawl and permit it to engage with said ratchet wheel.

3. The combination with a driven shaft, of a ratchet wheel fast thereon, a detent pawl pivotally mounted opposite the periphery of said ratchet wheel and provided with means normally urging it into engagement with said ratchet wheel, a radially extending arm mounted coaxially with said shaft, means pressing said arm into frictional engagement with a side of said ratchet wheel, and co-operating means on said arm and pawl operating, when said ratchet wheel is turning in one direction, to disengage said pawl from, and hold it out of contact with, said ratchet wheel, and when said shaft turns in the reverse direction, to release said pawl and permit it to engage with said ratchet wheel.

4. The combination with a driven shaft, of a ratchet wheel fast thereon, a detent pawl pivotally mounted opposite the periphery of said ratchet wheel and having a counterweighted tail piece normally urging said pawl into engagement with said ratchet wheel, and a member frictionally driven from said shaft operating, when said shaft is turning in one direction, to lift the tail piece of said pawl and thereby disengage said pawl from said ratchet wheel, and, when said shaft turns in the reverse direction, to release the tail piece of said pawl and permit said pawl to engage with said ratchet wheel.

5. The combination with a driven shaft, of a ratchet wheel fast thereon, a detent pawl pivotally mounted opposite the periphery of said ratchet wheel and having a counterweighted tail piece normally urging said pawl into engagement with said ratchet wheel, a laterally projecting pin on said tail piece, a radially extending arm mounted coaxially with said shaft and formed with a cam on its outer end adapted to liftingly engage with said pin, and means pressing said arm into frictional engagement with a side of said ratchet wheel.

6. The combination with a driven shaft, of a ratchet wheel fast thereon and formed with reversely disposed teeth, a detent pawl pivotally mounted opposite the periphery of said ratchet wheel with capacity of endwise reversal as to position, and an arm having a friction drive connection to said shaft and provided on its free end with means to disengage said pawl from said ratchet wheel and hold it out of contact

with said ratchet wheel in either position of said pawl when said shaft is turning in one direction, and to release said pawl when said shaft is turning in the opposite direction.

5 7. The combination with a driven shaft, of a ratchet wheel fast thereon and formed with reversely disposed teeth, a detent pawl pivotally mounted beneath and opposite the periphery of said ratchet wheel with capacity for endwise reversal as to position and
10 having a counterweighted tail piece, a laterally projecting pin on each side of said tail

piece, and a radial arm having a friction drive connection to said shaft and formed on its free end with oppositely disposed cams 15 adapted to liftingly engage with said pin and thereby disengage said pawl from said ratchet wheel and hold it out of contact with said ratchet wheel in the two positions of said pawl, respectively, when said shaft 20 is turning in one direction, and to release said pawl when said shaft is turning in the opposite direction.

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