

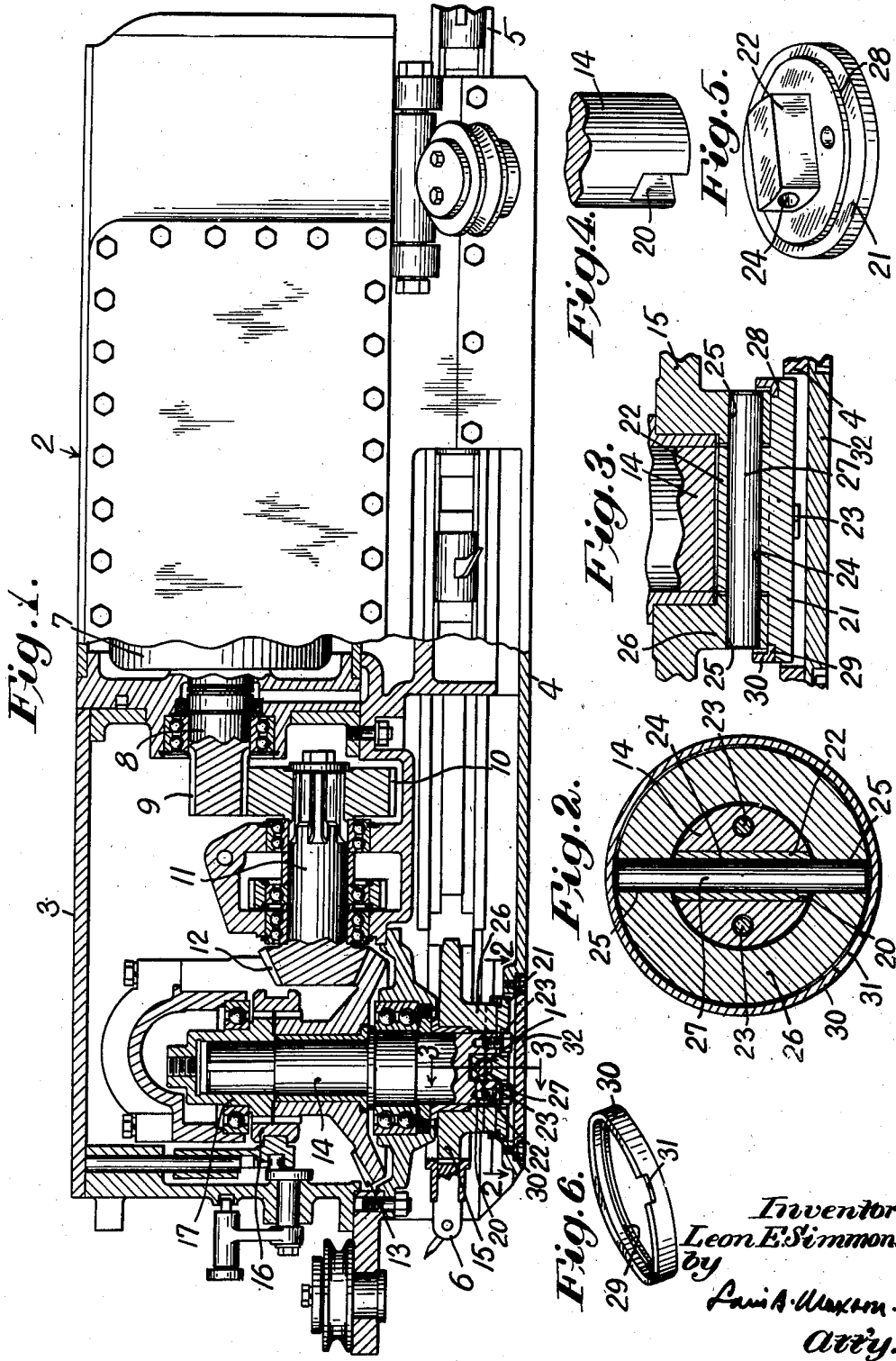
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OVERLOAD RELEASE DEVICE

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OVERLOAD RELEASE DEVICE

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This invention relates to overload release devices, and more particularly, but not exclusively, to a shear pin construction for the cutter chain sprocket of the cutting mechanism of a coal cutting machine.

An object of the present invention is to provide a novel overload release device. Another object is to provide an improved shear pin construction arranged in a novel manner between driving and driven elements whereby the possibility of breakage of the associated parts, due to overload, is substantially eliminated. A further object is to provide an improved shear pin construction for the cutter chain drive of a coal cutting machine whereby drive between the parts, due to the shearing of the safety pin, will be automatically interrupted in the event of overloading of the cutter chain. Yet another object is to provide an improved shear pin construction for the cutter chain sprocket of the cutting mechanism of a coal cutting machine.

With the above and other objects in view, this invention relates to certain novel features of construction and arrangement of parts, an example of which is given in the specification and illustrated in the accompanying drawing, wherein:

Fig. 1 is a view partially in side elevation and partially in longitudinal vertical section of a coal cutting machine with which the invention is associated.

Fig. 2 is an enlarged horizontal sectional view taken substantially on line 2—2 of Fig. 1.

Fig. 3 is an enlarged vertical sectional view taken substantially on line 3—3 of Fig. 1.

Fig. 4 is a perspective view of the lower portion of the cutter chain drive shaft.

Fig. 5 is a perspective view of the bottom cap plate.

Fig. 6 is a perspective view of the pin retaining sleeve.

In this illustrative embodiment of the invention the improved shear pin construction, generally designated 1, is embodied in a coal cutting machine, generally designated 2, herein of the flexibly fed, room and pillar type adapted to rest upon and slide over a mine floor during the cutting operation. It will be evident, however, that the invention may be embodied in coal cutting machines of various other types, and that features of the invention may be incorporated in other types of apparatus.

The coal cutting machine 2 shown may be similar to that disclosed in Patent No. 2,131,178, patented September 27, 1938, in which I am co-

inventor, and comprises a machine frame 3 having a bottom skid plate 4. Secured within the machine frame and projecting horizontally lengthwise thereof is an elongated plane cutter bar 5 having an endless cutter chain 6 guided for circulation about its margin. Also carried by the machine frame is a motor 7 having fixed to its power shaft 8 a spur pinion 9 meshing with a spur gear 10. The gear 10 is fixed to a longitudinal shaft 11 which has secured thereto and drives a bevel gear 12 meshing with a bevel gear 13. The hub of the bevel gear 13 is journaled on the bearing supported by a vertical shaft 14 in turn suitably journaled within the machine frame. Connected to the lower end of the shaft 14, through the improved shear pin construction, is a chain sprocket 15 which engages and drives the cutter chain. The bevel gear 13 is connectible to the shaft 14 by a conventional sliding clutch having a shiftable toothed clutch element 16 engageable with clutch teeth on the bevel gear hub and connectible to clutch teeth on a clutch member 17 keyed to the upper end of the shaft 14. Thus when the clutch is connected, the cutter chain may be driven by the motor through the spur gearing 9, 10, bevel gearing 12, 13, shaft 14 and the chain sprocket 15. The motor 7 also effects drive of the flexible feeding means of the machine, in the manner fully described in the patent above referred to, but since the feeding means does not enter into the present invention it is not described and illustrated herein.

Now referring to the improved shear pin construction 1, it will be noted that the lower end of the cutter chain drive shaft 14 is transversely slotted or recessed at 20, and a retaining cap plate or bottom cap 21 has a transverse projection 22 receivable in the shaft slot 20. This bottom cap or cap plate is secured, as by screws 23, to the lower end of the shaft 14 and serves to retain the chain sprocket in position on its bearing. The cap projection 22 is traversed by an opening 24 adapted to register with aligned openings 25 in the hub 26 of the chain sprocket, and a replaceable shear element such as a shear pin 27 is received in these openings 24, 25 for connecting the chain sprocket to the shaft. The cap 21 is annularly grooved or recessed at 28 around its outer edge for the reception of the bottom flange 29 of an annular sleeve 30 which encircles the lower portion of the chain sprocket hub and serves to retain the shear pin against axial displacement. The vertical flange of this sleeve is slotted at 31 (Fig. 6) to permit insertion of the shear pin within the sprocket hub

and cap plate openings. This sleeve is held in position within the cap groove between the bottom of the groove and the lower surface of the chain sprocket hub in the manner shown in Fig. 3. The bottom plate 4 of the machine has a detachable cover plate 32 to obtain access to the detachable cap 21. The cover plate 32 may be readily removed simply by turning the machine onto its side and detaching the screws.

The mode of operation of the improved shear pin construction will be clearly apparent from the description given. In the event the cutter chain of the cutting mechanism for any reason becomes overloaded, the shear pin 27 will shear off, thereby automatically to prevent breakage of the associated relatively costly parts of the cutter chain drive. Shearing of the pin takes place between the inner surface of the hub bore of the cutter chain sprocket and the outer end surfaces of the cap projection 22, and when sheared off the cap 21, and so the drive shaft 14 and its associated elements, are free to turn with respect to the cutter chain sprocket, and, of course, drive of the cutter chain sprocket is no longer possible. The shear pin can be readily replaced simply by removing the cover plate 32 and detaching the cap 21 upon removal of the screws 23 and driving the fragment of shear pin from the opening 24 in the cap projection and driving the shear pin fragments from the bores in the sprocket hub. The shear pin may be readily replaced by bringing the slot 31 in the sleeve 30 into registry with the openings in the sprocket hub and driving in a new pin. When the cap has been secured in position and the pin has been replaced and the cause of overload has been removed from the cutter chain, the latter may again be driven. Under certain conditions the fractured shear pin can be removed without detaching the cap, simply by aligning the slot 31 with the openings 24, 25 and driving out the fragments.

As a result of this invention an improved overload release device for the cutter chain drive of a coal mining machine is provided which automatically interrupts drive of the cutter chain in the event the latter is, for any reason, overloaded. It will further be evident that a novel shear pin construction is provided which is relatively simple in construction and rugged in design and may be readily applied to a conventional coal cutting machine with a minimum of change and expense. It will also be evident that an improved shear pin construction is provided which automatically prevents overload of the cutter chain sprocket and its associated parts and which may have its shear pin readily replaced at a relatively low cost. Other uses and advantages of the improved overload release device will be clearly apparent to those skilled in the art.

While I have in this application specifically described one form which the invention may assume in practice, it will be understood that this form of the same is shown for purposes of illustration and that the invention may be modified and embodied in various other forms without departing from its spirit or the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent is:

1. A shear pin construction comprising, in combination, a driving element having a transverse slot, a member detachably secured to said driving element and having an interlocking projection received in said slot, said projection hav-

ing an opening therethrough, a driven element having openings in registry with said projection-opening, and a replaceable shear pin received in said openings for securing said driven element to said driving element.

2. A shear pin construction comprising, in combination, a driving element having a transverse slot, a member having a projection received in said slot for interlocking said element and member together, said projection having an opening, a driven element having openings aligned with said projection-opening, and a replaceable shear pin received in said openings.

3. In a device of the character described, a drive shaft having a slot and a cap detachably secured to said shaft and having a lug received in said slot for interlocking the shaft and cap, said lug having an opening, a chain sprocket surrounding said shaft and having openings in registry with said lug opening, and a replaceable shear pin received in said openings for connecting said sprocket to said cap.

4. In a device of the character described, the combination comprising a driving element having a transverse slot, a driven element having aligned openings, a member detachably secured to said driving element and having a lug received in said slot, said lug having an opening in registry with said openings in said driven element, and a replaceable shear pin received in said openings.

5. In a device of the character described, the combination comprising a driving element having an opening, a driven element having an opening in registry with said opening, a replaceable shear pin received in said openings, and a flanged retaining sleeve carried by one of said elements and encircling said driven element for preventing endwise displacement of said pin from said openings, said sleeve having a slot in a flange thereof to permit insertion of said pin into said openings.

6. In a device of the character described, the combination comprising a drive shaft having a slot, a cap detachably secured to said shaft and having a lug received in the slot for interlocking said cap and shaft, said lug having an opening, a cutter drive sprocket having its hub surrounding said shaft, said hub having aligned openings in registry with said lug opening, and a replaceable shear pin received in said openings.

7. In a device of the character described, the combination comprising a drive shaft having a slot, a cap detachably secured to said shaft and having a lug received in the slot for interlocking said cap and shaft, said lug having an opening, a cutter drive sprocket having its hub surrounding said shaft, said hub having aligned openings in registry with said lug opening, a replaceable shear pin received in said openings, and an annular member carried by said cap and encircling said sprocket hub and the ends of said pin for retaining the latter against endwise displacement, said annular member being movable into a predetermined position to permit insertion of said shear pin into said openings.

8. In a device of the character described, the combination comprising a drive shaft having a slot, a cap detachably secured to said shaft and having a lug received in the slot for interlocking said cap and shaft, said lug having an opening, a cutter drive sprocket having its hub surrounding said shaft, said hub having aligned openings in registry with said lug opening, a replaceable shear pin received in said openings, and a sleeve

carried by said cap and encircling said sprocket hub and the ends of said pin for retaining the latter against endwise displacement, said sleeve having a slot movable into registry with said openings to permit insertion of said pin into said openings.

9. In a device of the character described, the combination comprising relatively rotatable parts one of which is slotted, a member rotatable with said slotted part and having a lug received in the slot for rigidly interlocking said slotted part and member, said other part and said member having openings in registry, and a replaceable shear pin received in said openings for locking said parts together and adapted to shear upon overload to permit relative rotation of said parts.

10. In a mining machine, the combination comprising a cutter chain drive shaft having a slotted end, a cap detachably secured to said shaft and having a projecting lug received in the shaft slot for interlocking said shaft and cap, said lug having an opening passing therethrough, a cutter chain drive sprocket having a hub surrounding said shaft and having openings in registry with said lug opening, and a replaceable shear pin received in said openings for securing said sprocket to said cap and adapted to fracture upon overload.

11. A shear element construction comprising, in combination, a driving element, an element detachably secured to said driving element, one of said elements having a transverse slot and the other element having a projection received in said slot for interlocking said elements together, said projection having an opening, a driven member having an opening in registry with said pro-

jection-opening, and a replaceable shear element received in said openings for securing said driven member to said driving element.

12. A shear element construction comprising, in combination, a driving element, an element interlocked with said driving element, one of said elements having a transverse slot and the other element having a projection received in said slot, said projection and slot connection serving to interlock said elements together, said projection having an opening, a driven member having an opening alined with said projection-opening, and a replaceable shear element received in said openings.

13. In a device of the character described, a drive shaft element, a cap element secured to said shaft element, one of said elements having a slot and the other element having a lug received in said slot, said lug having an opening, a driven member having an opening alined with said projection-opening, and a replaceable shear element received in said openings.

14. In a mining machine, the combination comprising a cutter chain drive shaft element, a cap element detachably secured to said shaft element, one of said elements having slotted portion and the other element having a lug received in the slot for interlocking said elements together, said lug having an opening, a cutter chain drive sprocket having a hub surrounding said shaft element and having an opening in registry with said lug opening, and a replaceable shear element received in said openings for securing said sprocket to said cap element and adapted to fracture upon overload.

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