

Introduction

Grinding mills or other similar equipment are very often equipped with an auxiliary power drive to turn the equipment at a slow speed for purposes of maintenance. The auxiliary drives are also called creep drives, inchers, pony drives, or barring drives. The drives normally include a power source such as an electric motor with a brake, a gear drive, and a connection such as a shiftable coupling. This manual explains the installation and operation of this equipment.

The auxiliary drive is supplied with a KIRK Interlock System. The purpose of the KIRK Interlock System is to require locking out of the main mill motor before the auxiliary drive can be engaged. The interlock system consists of two locks, applied to the main motor starter switch and the auxiliary drive shiftable coupling, that only allow the operation of those components in a prearranged sequence.

The KIRK Interlock is operated by a special key which can only be duplicated by the manufacturer. The key can be removed from the lock only when the particular equipment the lock is mounted on is either locked in the "OFF" position or locked out of the system entirely.

The electro mechanical incher must be used with an electrical reversing motor starter and control system similar to that described in Figure 1, Page 2. The starter/control system is not included in the scope of supply. This starter/control system allows the inching motor to be easily actuated in either direction of rotation. The brake must be connected such that it will automatically electrically release when the motor is started in either direction but will immediately spring set when the motor is stopped.

The KIRK Interlock System and various guards are provided to prevent personal injury and/or property damage. It is imperative that the interlocks and guards be installed and used as intended.

WARNING: Consult applicable local and national safety codes for proper guarding of rotating members. Lock out power source and remove external loads from drive before servicing drive or accessories.

Installation

The shiftable coupling of the auxiliary drive is equipped with an interlock that must be unlocked to enable engagement of the coupling. (This may be mounted on the shifting lever for a permanently installed incher or the coupling guard for a portable incher.) A mating interlock is provided loose and must be mounted on the main motor starter switch by the user for the appropriate mill. This loose interlock must be installed on the main motor starter switch such that the switch must be "OFF" before the interlock key can be removed. This mating interlock may be equipped with an electrical switch for connection to the plant control system(s) to provide an electrical interlock for the main mill motor in addition to the mechanical switch. The above mentioned pair of interlocks must be operated with one key only. Since each lock is shipped with a key, an extra key will be present. The extra key should be placed under a supervisor's responsibility for emergency use only. For multi-mill installations the coupling guards fitted with interlocks and "main motor" interlocks must be properly mounted by the user such that mating paired interlocks are on the same mill.

The auxiliary drive is mounted on a foundation supplied by the user. The motor, brake, shiftable coupling and guards are all mounted on the drive or on a common bed plate. The assembly must be installed in the proximity of the gear coupling hub mounted on the main pinion shaft, main drive high speed shaft opposite the main motor, or on the unused end of the main motor shaft. Adjust the position of the drive to achieve proper alignment of the shiftable coupling. Initial installation will require temporary removal of coupling guards. For portable incher installations, mark this location with corner blocks welded to the baseplate or with dowels so that the position can be repeated. Be sure all guards and interlocks are in proper position before operation commences.

WARNING: Under no circumstances should the shiftable coupling be engaged unless the main mill motor is locked out and inoperative. The auxiliary drive and motor will greatly over speed if back-driven by the main motor. Personal injury and/or property damage could result.

Connection

1. Turn the main motor operational switch to the "OFF" position and lock it there with the KIRK Interlock. Remove the key.
2. Ensure the mill is in a state of equilibrium and blocked so it cannot rotate.
3. Insert the key taken from the main motor interlock into the KIRK Interlock installed on the shifting lever or the guard for the shiftable coupling. Turn the key to draw back the bolt projection. This will allow the shiftable coupling to be engaged.
4. Engage the shiftable coupling using the shifting lever projecting from the guard. If the coupling does not engage readily, it may be necessary to jog the auxiliary motor forward or backward slightly until engagement is accomplished. It should not take excessive force to engage the coupling as long as it is clean, lubricated and properly aligned.
5. Pin the shifting lever in the engaged position with the pin provided.

Operation

1. Remove any blocking of the mill and be sure there is lubrication pressure to the mill trunnion bearings.
2. To position the mill in a specific location, drive the mill forward by holding the "forward" control button of the incher motor control until the desired position is reached. With a charged mill, it will be necessary to turn the mill beyond the desired position to allow the charge to cascade. The rate of rollback can be controlled by operating the inching motor in the reverse direction until the charge is approximately level.
3. The auxiliary drive is equipped with a brake that will hold the mill in any position — balanced or unbalanced. For safety reasons, it is important that no work be performed on the mill when it is in an unbalanced state. The mill and charge must be in a state of equilibrium and properly blocked before any work begins.

- To determine if a state of equilibrium exists, one may be able to observe if the internal charge is level through the end of the mill. If it is not level, power the auxiliary motor in the forward or reverse direction until level.

WARNING: Some drives have brakes that are equipped with brake release devices. Do not activate this brake release when the equipment is in an unbalanced state. If activated, the mill may free wheel and accelerate to an over speed condition trying to achieve equilibrium. This could result in personal injury and/or property damage.

- Proceed with any necessary maintenance.

Disconnection

- The mill must be in a state of equilibrium prior to disconnection of the auxiliary drive. The friction forces on the shiftable coupling will be too great to allow disengagement while under load. If there is a clutch connection on the main drive, one can easily remove the torque on the system by disengaging the clutch. If a clutch is not in the system, the charge must be rotated to bottom-dead-center.
- Remove the pin holding the shifting lever in the engaged position. Exert force on the shifting lever to disengage the coupling. If it does not move freely, there may still be torque on the system. If this occurs, try jogging the auxiliary motor "forward" or "backward" while exerting force on the shifting lever. Excessive force by mechanical advantage and/or mechanical means will cause equipment damage.

- Pin the shifting lever in the disengaged position using the pin or KIRK Interlock provided. Turn the key in the KIRK Interlock of the shiftable coupling to extend the bolt projection. This will disallow re-engagement of the shiftable coupling.
- Remove the interlock key.
- Insert the interlock key that was removed from the interlock on the shiftable coupling into the interlock on the main motor switch. Unlock the main motor switch.
- The mill can now be operated at normal conditions.

NOTE: Periodically, when the mill is not operating, the guard covering the shiftable coupling should be removed and the shiftable coupling cleaned and lightly coated with grease or a molydisulfide lubricant. This will aid shifting and help protect the coupling from corrosion.

Figure 1

