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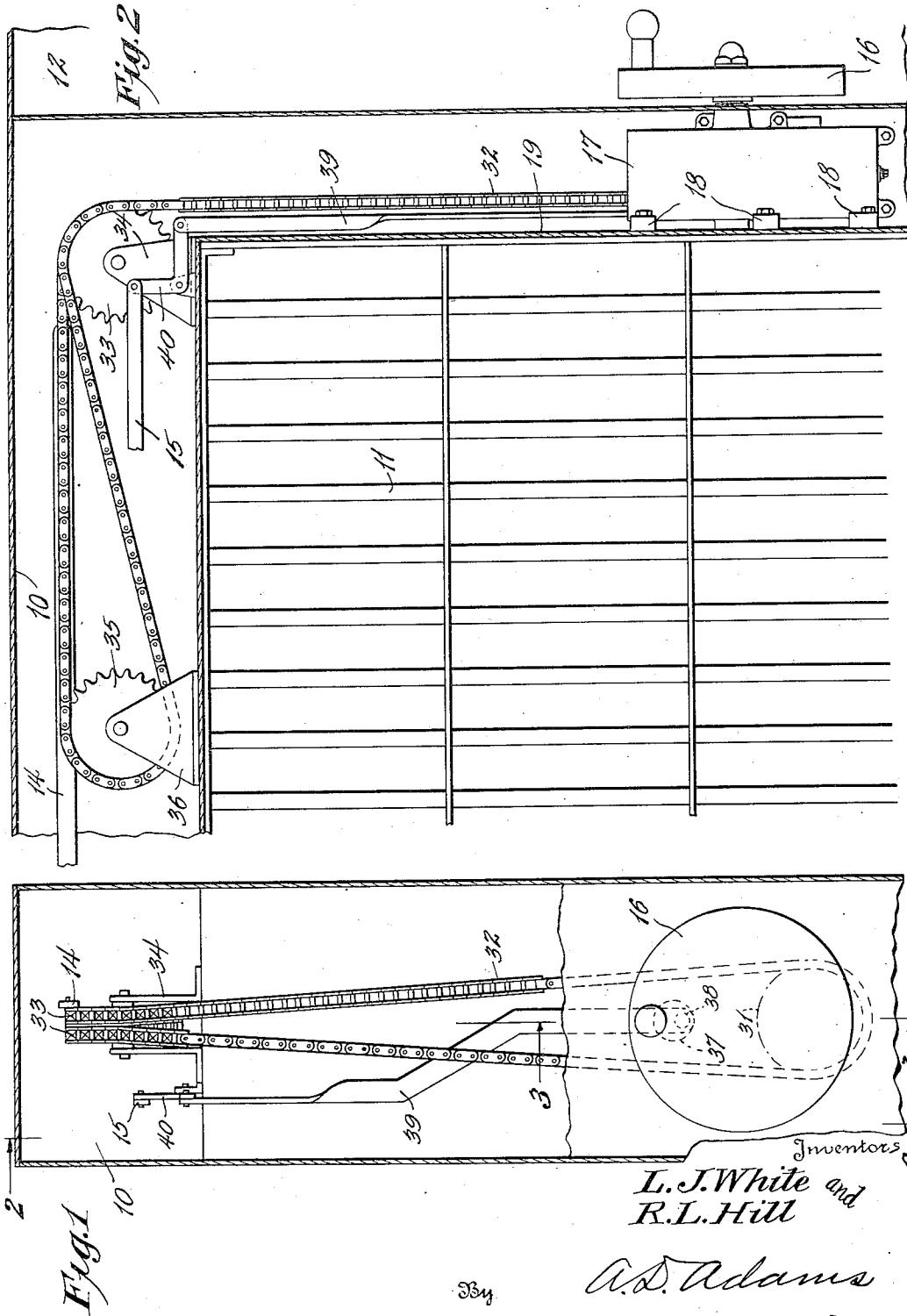
L. J. WHITE ET AL

2,012,556

ACTUATING MECHANISM FOR CELL DOORS AND LOCKS

Filed July 23, 1934

3 Sheets-Sheet 1



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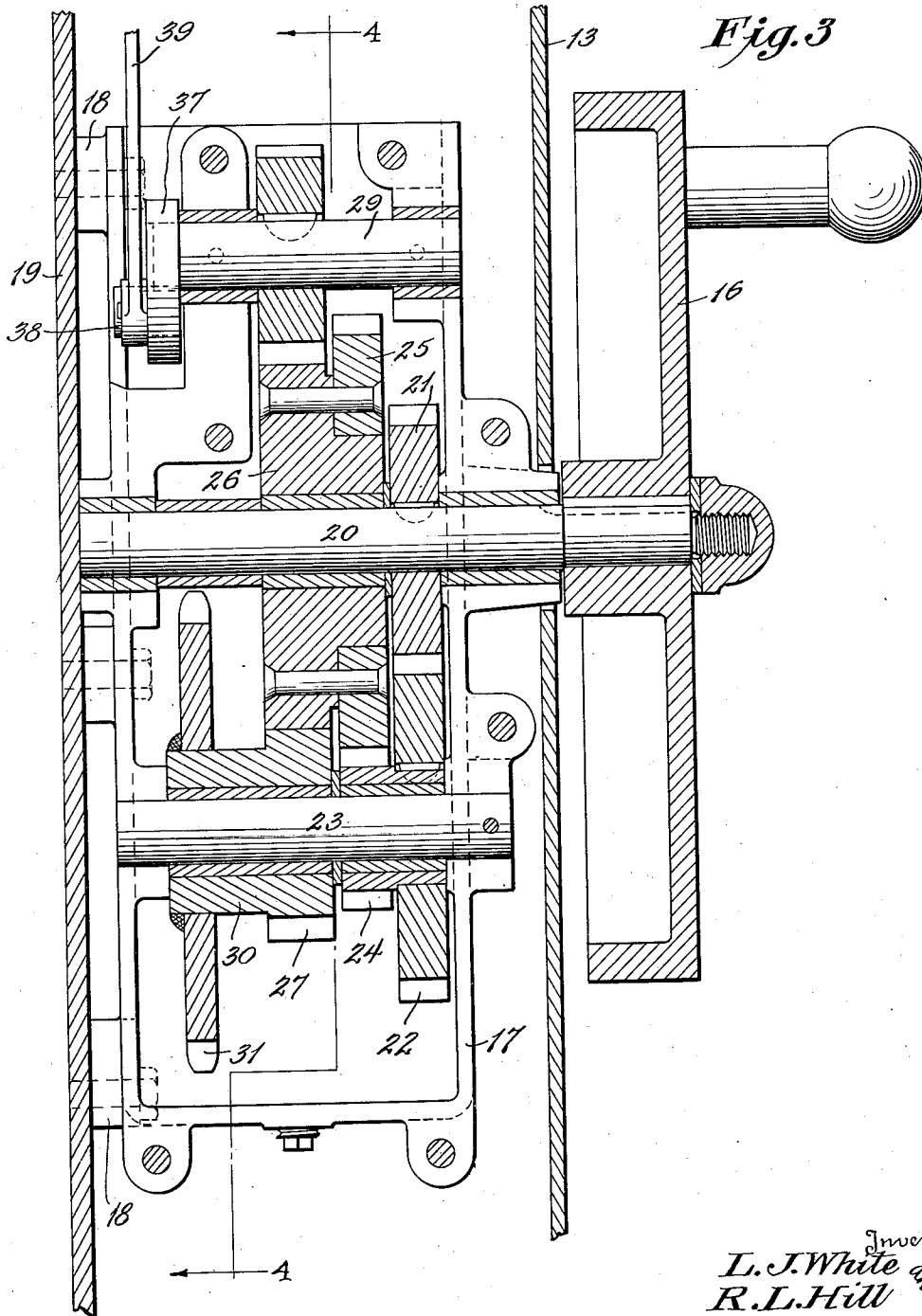
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3 Sheets-Sheet 3

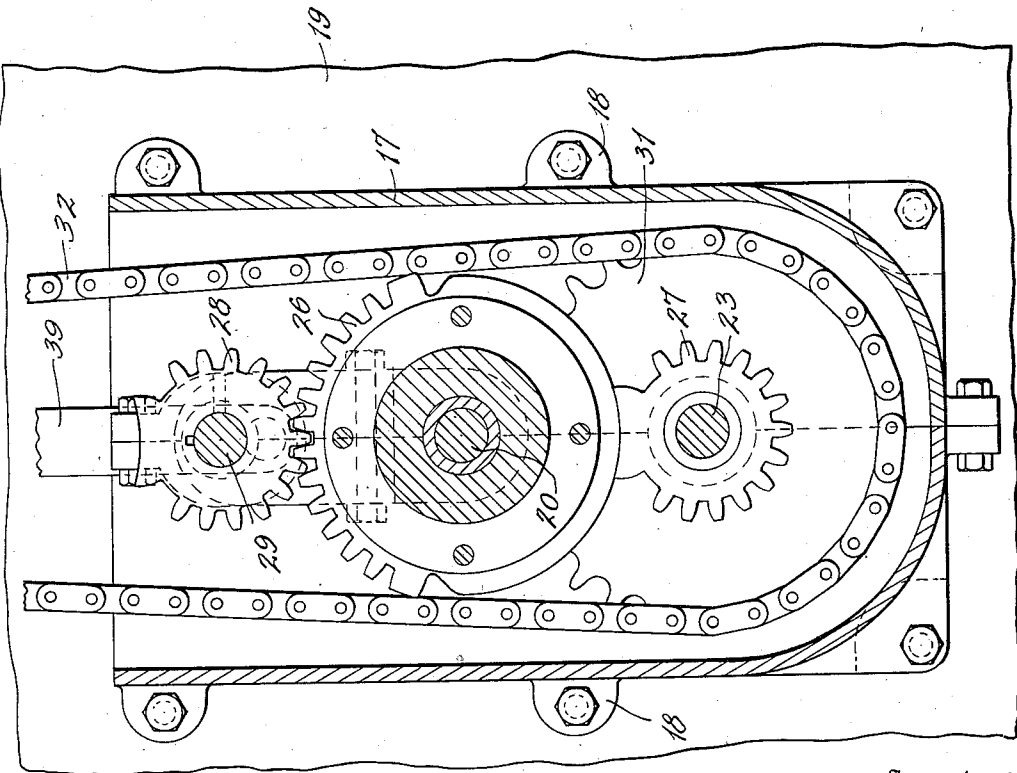
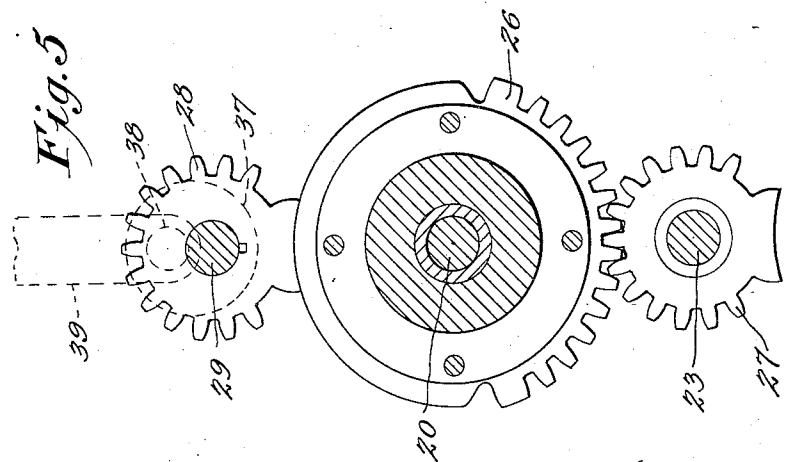


Fig. 4

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2,012,556

ACTUATING MECHANISM FOR CELL DOORS
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Application July 23, 1934, Serial No. 736,604

8 Claims. (Cl. 189-7)

This invention relates to master actuating mechanism for a plurality of cell doors and locks such as are used in prison installations and involves certain important improvements on the general type of mechanism shown in U. S. Patent No. 1,836,661 to Hart et al. Among other objects, the invention aims to provide a greatly simplified intermittent gear unit adapted to be used in either old or new prison installations having a plurality of cell doors. The main idea is to provide an intermittent gear unit of the type that can be standardized and made at the factory so that it can be applied to practically all types of installations by more or less unskilled workmen. A further aim is to locate such a unit so that it is easily accessible and can be installed in a master control cabinet without requiring any changes in the design of the cell work or in the usual horizontal cover box or casing above the cell doors.

Other aims and advantages of the invention will appear in the specification, when considered in connection with the accompanying drawings, wherein:

Fig. 1 is a fragmentary sectional view, partly in elevation, showing one form of the operating mechanism;

Fig. 2 is a fragmentary side elevation of the mechanism showing how it is applied to operate master bars which are in line with the control cabinet;

Fig. 3 is a sectional view taken on the line 3-3 of Fig. 1;

Fig. 4 is a sectional view taken on the line 4-4 of Fig. 3; and

Fig. 5 is a fragmentary sectional view showing the gearing of Fig. 4 in another position.

Referring to the aforesaid Hart et al. patent, it has been found that the intermittent gearing shown therein works very satisfactorily, but the horizontal units are more or less difficult to install in the cover boxes. Oftentimes, the space is quite limited in the cover boxes and there is not sufficient room for the installation of such units. Moreover, it has been found that units of this type are more or less costly because of the great number of machine operations necessary. Furthermore, it is practically impossible to standardize such units to be used in the great variety of installations where they are required. In some cases the master bars have to be on the right hand side of the unit and, in others, on the left hand side. Furthermore, provision has to be made for what is known as the straight line drive, where the master bars are in line with the control cabinet

and for right angle drives both to the right and to the left where the control cabinet is mounted directly on the cell wall, for example. Also, expensive changes have to be made to provide for different lengths of travel of doors in different installations. In making such installations the intermittent gear unit has to be adjusted and synchronized by an erection crew on the job, to operate properly. The adjustments must be made correctly and it is often difficult and expensive to have the work done properly away from the factory by erection men who are not thoroughly experienced. This invention therefore aims to provide a greatly simplified mechanism which eliminates such objections and enables the units to be made on a quantity production basis ready for assembly at the plant rather than on the job and which can be applied to almost any type of modern prison installation.

Referring particularly to the drawings, the intermittent gear unit is illustrated as being applied to a master lock and door operating system employing the usual master bars which are adapted to be selectively connected to the respective locks and doors by mechanism such as those disclosed in the patents of D. F. Youngblood Nos. 1,269,244; 1,611,260 and 1,785,471. Also, the mechanism might be considered as being substituted for the intermittent gearing shown in the aforesaid Hart et al. patent. Inasmuch as the present invention relates solely to the operating means for imparting lock and door operating movements in proper sequence to the master bars, illustration of the complete system is unnecessary. For the sake of simplicity, the selector mechanism and other attachments are omitted, reference being made to the patent to Youngblood No. 1,785,471 for illustration of suitable selector mechanism. Furthermore, reference is made to the Youngblood Patent 1,785,469 and to the Mardick et al. Patent No. 1,857,924 showing master control cabinets of the general character employed. Likewise, reference is here made to the patent to White No. 1,951,315 showing a locking attachment for an operating hand wheel adapted for use in such systems, since this system embodies a hand wheel which is adapted to be turned through a predetermined number of revolutions to impart a series of sequential movements to the master bars.

In Figs. 1 and 2 there is shown an example of the operating mechanism applied to a prison cell installation having the usual type of cover box above the corridor or cell wall. The wall is shown conventionally as comprising a series of bars. In some modern installations, this corridor

wall is made of tool-resisting steel plate. The operating mechanism is here shown as being mounted at the end of a block of cells in a control cabinet 12 having an operating panel 13 and this control cabinet is usually located in a keeper's corridor (not shown).

Referring to Fig. 2, there is shown the usual type of travel bar or door propelling bar 14 and the lock operating bar 15, which are adapted to be selectively connected to the respective doors and locks. Assuming that the doors are all closed and locked with the parts in the positions shown in Figs. 1 and 2, it is necessary to impart unlocking movement to the locking bar 15 while the travel bar 14 remains stationary. Then, the locking bar must remain stationary while door opening movement is imparted to the door propelling bar 14. After the doors are opened, the door propelling bar must then remain stationary while relocking movement is imparted to the locking bar 15 to lock the doors open. The arrangement is such that all of these sequential movements may be imparted to the master bars by turning the hand wheel 16 through several revolutions. Likewise, the selected doors may be unlocked, closed and locked closed by turning the hand wheel in the reverse direction, so that the handle again is at the initial or starting position, as shown.

Instead of employing the horizontal intermittent gear unit in the cover box 10, as shown in the aforesaid Hart et al. Patent No. 1,836,661, where it is not easily accessible, the unit has been redesigned and greatly improved so that it can be mounted in the back of the control cabinet and connected by suitable gearing to impart the movements to the master bars. In this example, the intermittent gearing is mounted in a split gear case 17 which is open at the top and closed at the bottom as best shown in Fig. 4. This gear case is shown as having a series of ears or lugs 18 adapted to be bolted or otherwise secured to the partition 19 at the end of the block of cells adjacent to the control cabinet. As shown in Fig. 3, the hand wheel 16 is connected to a main shaft or drive shaft 20 which is journaled in and extends through the gear casing. A driving gear 21 is keyed on the shaft 20 adjacent to the front wall of the gear case and meshes with a pinion 22 which is rotatably mounted on a stationary shaft 23 below the main shaft. The pinion 22 is shown as being keyed on the hub of a small driving pinion 24 which, in turn, meshes with a ring gear 25 secured on a large intermittent gear 26 rotatably mounted on the main shaft 20. The intermittent gear 26, best shown in Figs. 4 and 5, meshes with intermittent gears on pinions 27 and 28, the pinion 27 being rotatably mounted on the shaft 23 and the pinion 28 being keyed on an upper shaft 29. The arrangement is such that the intermittent pinion 27 is connected to impart movements to the door propelling or travel bar and the pinion 28 imparts movements to the locking bar.

Referring to Fig. 3, intermittent pinion 27 is shown as having a hub 30 on which is secured a sprocket 31 in case a chain drive is employed. The size of this sprocket determines the amount of movement that can be imparted to the travel bar and will be selected to suit any particular installation, depending upon the extent of opening movement of the doors. Of course, it is understood that a bevel gear drive may be substituted for the sprocket and chain drive, such gearing being shown in the Hart et al. Patent No. 1,836,661 and others. However, the sprocket and

chain drive has been found to be quite satisfactory.

In this example, a sprocket chain 32, driven by the sprocket 31, is shown as having its vertical runs passing over two adjacent sprockets 33 mounted on brackets 34 at the forward end of the cover box 10. In case of a straight line drive, as shown, the sprocket links are twisted at 90° in the runs where they are trained over the sprockets 33. From the sprockets 33 the chain is trained over a sprocket 35 supported on brackets 35 in the cover box, the distance between the sprocket 35 and the sprockets 33 being determined by the amount of travel to be imparted to the door propelling bar. In this instance, the chain is connected to move the travel bar to the left as viewed in Fig. 2 to impart opening movement to the doors. If the travel bar had to be moved to the right to open the doors, the runs of the chain over the sprocket 35 would be reversed, so that the bottom run would be on top or horizontal.

Referring now to the mechanism for imparting movement to the locking bar 15, the shaft 29 which is driven by the intermittent gear 28, carries a crank arm or eccentric disk 37 on which is mounted a crank pin 38 and a link 39 connects the crank pin to a bell crank 40 which, in turn, is connected to the locking bar 15, as best shown in Fig. 2. When the parts are in this position, or in the position shown in Figs. 3 and 4, the crank pin 28 is at its lower dead center, while intermittent gear 26 has its teeth meshing with the teeth on the intermittent pinion 28. The gear 26 is rotated clockwise by the hand wheel. The intermittent gear 28 is turned through a half revolution to the position shown in Fig. 5, so that the crank pin 38 moves to its upper dead center and the intermittent gear is held in this position while movement is being imparted to the other intermittent gear 27, it being noted that the intermittent gear 27 has been held stationary while the gear 28 was being rotated. After the intermittent gear 28 assumes the position shown in Fig. 5, the teeth on the intermittent gear 26 engage the teeth on the intermittent gear or pinion 27 and impart movement to it in the direction indicated until it has been turned through one complete revolution and its smooth part engages the smooth part of the gear 26. In Fig. 5, only half of the door operating movement has been imparted through the intermittent pinion 27 and the connected sprocket and chain. After a complete revolution is imparted to this gear, the driving gear 26 completes its revolution and again assumes the position shown in Fig. 4, so that intermittent gear or pinion 28 is again turned through a half revolution to impart locking movement to the locking bar 15 through the crank pin 28. In that position, one complete cycle of operations has taken place. That is to say, the doors have been unlocked, opened and locked open and the hand wheel is back in its original position ready to be turned backward through several revolutions to unlock the selected doors which were opened and locked open, close the doors and again lock them closed. If desired, the handwheel itself may have provision for locking it in any one of several positions, especially to prevent it from being turned too far. In the aforesaid White Patent No. 1,951,315, the hand wheel is shown as having means to lock it in any one of a number of positions and it is contemplated that such an arrangement may be used in this case. Moreover, any suitable automatic stop means may be employed to prevent the

hand wheel from being turned too far in either direction.

While the mechanism is illustrated as being applied to what is called a straight line drive, the same unit may be used in installations where the row of cell doors is at right angles or in case the master control cabinet is located on the side wall of a prisoner's corridor as shown in the patent to Youngblood No. 1,611,260. It is a simple matter to select the proper gearing to be connected to the master bars in any system. Obviously, the unit may also be employed to drive pinions which mesh with racks on the bars as shown in the aforesaid White et al. Patent No. 1,836,696, and bevel gearing may be substituted for the sprocket and chain drive in that case, as disclosed in the aforesaid Hart et al. Patent No. 1,836,661.

From the foregoing description, it will be seen that the vertical intermittent gear unit may be standardized and carried in stock at the factory. In fact, the unit may be secured to a panel ready to be installed on any particular job, it being only necessary to determine in advance the particular size of the driving sprocket required to open the doors. This greatly simplifies the installation. Furthermore, the unit is very compact and does not take up any unnecessary space. It includes only a few parts and can be made at very much less cost than the horizontal unit mounted in the cover box. Thus, the machine operations are reduced to a minimum. Moreover, the gear case mounted in the back part of the control cabinet also serves as a supporting bracket for the operating hand wheel. Also, the unit lends itself very readily to proper lubrication because gear grease or oil may be put in the bottom of the case. The case may be removed as a unit and the parts are easily accessible for any necessary repairs. Any ordinary mechanic without special factory training can apply the mechanism to an old or to a new installation. It is not necessary to make any special adjustments of the parts to insure proper sequential operation.

Obviously, the present invention is not restricted to the particular embodiment thereof herein shown and described. Moreover, it is not indispensable that all the features of the invention be used conjointly, since they may be employed advantageously in various combinations and sub-combinations.

What is claimed is:

1. In a jail cell installation having separate bars to actuate the doors and locks and a master control cabinet, master actuating mechanism for the bars comprising a gear unit having a vertical casing mounted in the back of the control cabinet and having an open upper end; intermittent gears in said casing including a driving gear and a pair of pinions meshing therewith; a sprocket connected to one of said pinions; a driving chain on said sprocket having one run connected to the door actuating bar; a crank connected to be driven by the other pinion having link and lever connections to the lock actuating bar; and a manual operating member for the gearing located in the control cabinet.

2. In a jail cell installation having separate bars to actuate the doors and locks and a master control cabinet, master actuating mechanism for the bars comprising a gear unit having a vertical casing mounted in the back of the control cabinet and having an open upper end; intermittent gears in said casing including a driving gear and a pair

of pinions meshing therewith; a sprocket connected to one of said pinions; a driving chain on said sprocket projecting through the open upper end of said casing; a pair of adjacent guide sprockets beyond the front end of the door actuating bar over which both runs of the chain are trained and another sprocket adjacent to one side of the door actuating bar and spaced from said guide sprockets over which the chain is trained so that one run is substantially parallel with said bar; means connecting said parallel run of the chain to said bar; means connecting the other of said intermittent pinions to actuate the locking bar; and an operating hand wheel in the control cabinet connected to said gear unit.

3. In a jail cell installation having separate bars to actuate the doors and locks and a master control cabinet, master actuating mechanism for the bars comprising a gear unit having a vertical casing mounted in the back of the control cabinet and having an open upper end; intermittent gears in said casing including a driving gear and a pair of pinions meshing therewith; a sprocket connected to one of said pinions; a driving chain connecting said sprocket to the door actuating bar; a crank connected to the other of said intermittent pinions; a link and lever connecting the crank to the locking bar; a hand wheel in the control cabinet; and spur gearing connecting the hand wheel to operate said intermittent gears so that the hand wheel turns through a predetermined number of revolutions to perform one cycle of operations on the master bars and the selected doors and locks.

4. As an article of manufacture, a gear unit for operating the master bars of a cell door and lock operating system comprising a gear casing having provision to be secured vertically in the back of a control cabinet; trains of intermittent gears enclosed within said casing; separate actuating members projecting from the upper end of the casing and adapted to be connected to the bars, the gearing being timed to impart the proper sequential movements thereto; and a manual operating member projecting from and supported by said casing.

5. As an article of manufacture, a standardized gear unit for actuating the master bars of a door operating and locking system comprising a gear casing adapted to be mounted vertically in the back of a master control cabinet having a closed lower end to hold a lubricant and an open upper end; intermittent gears in said casing including a driving gear and a pair of pinions adapted to be connected to the respective bars; a drive shaft projecting at one end through the casing; means connecting the drive shaft to actuate the intermittent gears; an operating member on the drive shaft; and actuating members for the bars projecting through the open upper end of said casing, whereby continuous movement of said operating members will impart proper sequential movements to the bars.

6. In a jail cell installation having a horizontal cover box housing master members for actuating the doors and locks and a vertical control cabinet outside the cells, master operating mechanism for the lock and door actuating members including an intermittent gear unit secured in the rear portion of said cabinet below the level of the tops of the doors; actuating devices connecting the gearing in said unit to said master actuating members for the doors and locks extending vertically above said unit and horizontally into said cover box; and manual operating means associ-

ated with said gear unit and connected to be moved continuously in one direction to impart sequential movements to said master actuating members.

- 5 7. In a jail cell installation having a horizontal cover box housing master members for actuating the doors and locks and a vertical control cabinet outside the cells, master operating mechanism for the lock and door actuating members including an intermittent gear unit having a casing mount-
10 ed in the rear of said control cabinet; actuating means connecting the intermittent gearing to said master members and having parts arranged in the cover box; and a hand wheel connected to op-
15 erate said gearing and impart sequential movement to said master members as it is turned continuously in one direction.

8. In a jail cell installation having a cover box housing separate bars to actuate the doors and locks and a vertical master control cabinet at one end of the cell block, master actuating mechanism for the bars comprising an intermittent gear unit having a casing mounted vertically in the back of the control cabinet below the cover box; a sprocket and chain drive connecting the gear unit to the door operating bar; means also connecting the gear unit to the locking bar; and a hand wheel connected to operate the gearing arranged in the control cabinet and adapted to impart sequential movement to the bars as it is turned in one direction.

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