Aug. 27, 1968 MINORU HIROSE 3,398,681

MECHANISM FOR DRIVING THE PLATE AND IMPRESSION CYLINDERS OF A PRINTING PRESS

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Fig. 1

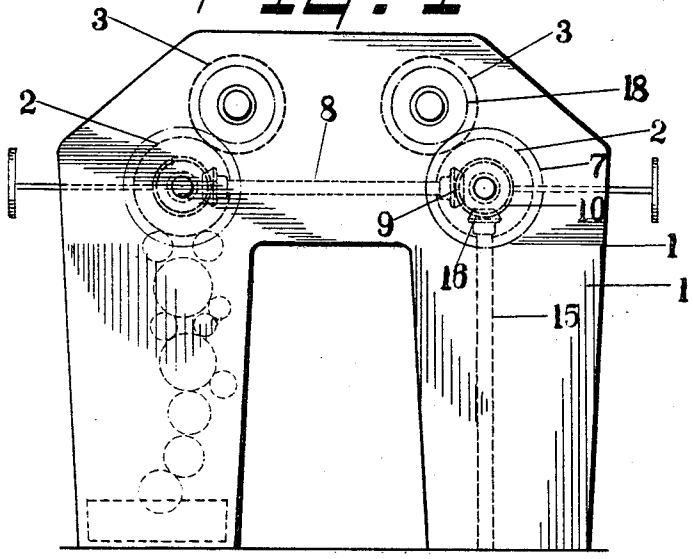
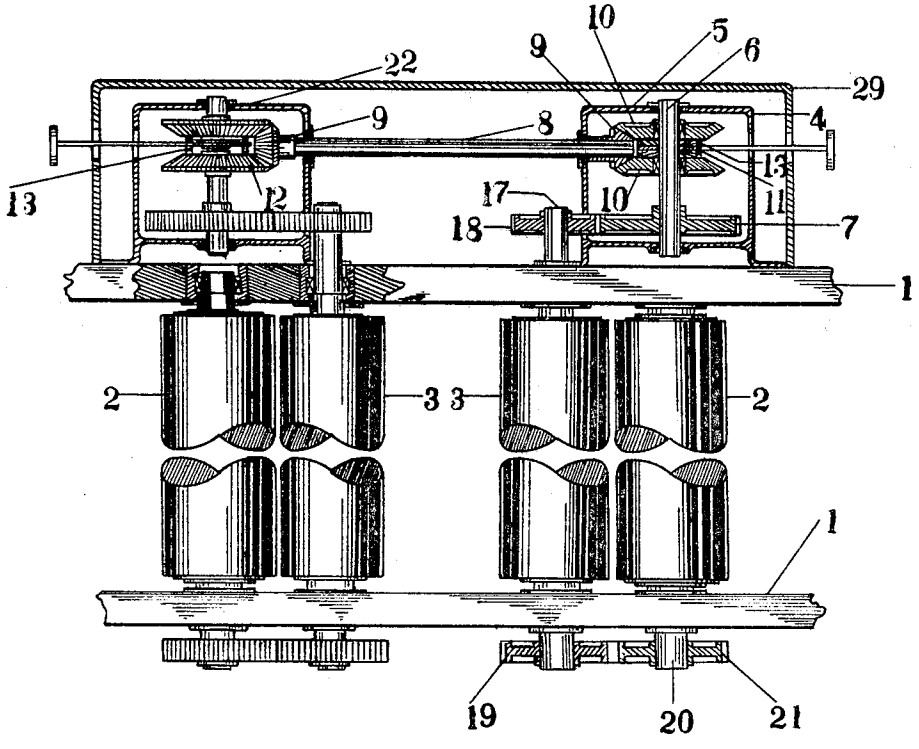


Fig. 2



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Fig. 3.

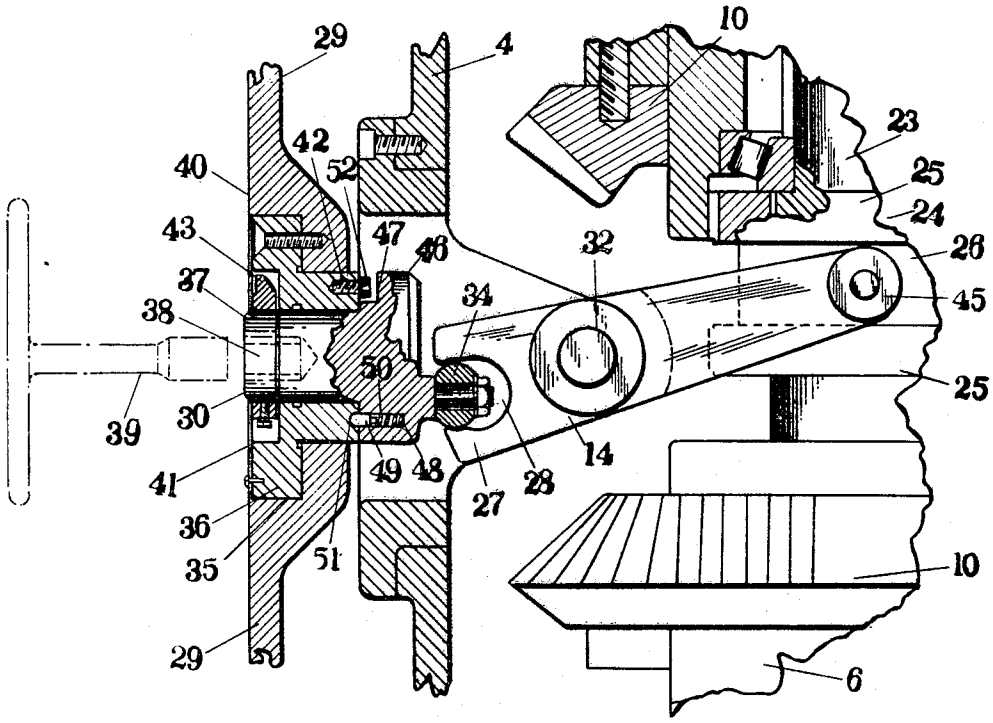


Fig. 5.

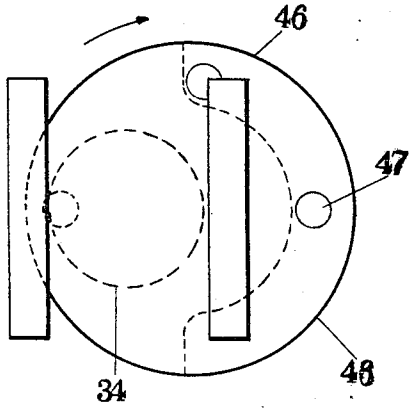
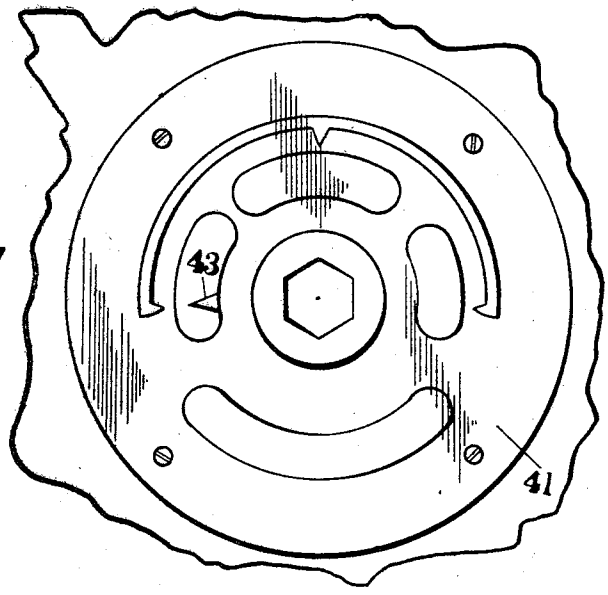


Fig. 4.



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3,398,681

MECHANISM FOR DRIVING THE PLATE AND IMPRESSION CYLINDERS OF A PRINTING PRESS

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2 Claims. (Cl. 101—216)

ABSTRACT OF THE DISCLOSURE

A drive mechanism for driving the plate and impression cylinders of a printing press. A vertical drive shaft extends upwardly from the base of the printing press along the front side of one leg of the front frame and has a bevel gear on the upper end thereof meshing with a first pair of bevel gears mounted on a short splined auxiliary shaft contained in a drive housing projecting forwardly from the front frame. The auxiliary shaft has a helical gear on the end thereof geared to a corresponding gear on the first impression cylinder shaft, and a clutch is positioned between the bevel gears. A horizontal connecting shaft extends between the first pair of bevel gears and a second pair of bevel gears and has gears thereon meshing with said pairs of gears. The clutch slides back and forth on the splined shaft under the action of a lever coupled thereto and operated from outside of the housing.

The present invention relates to a mechanism for driving the plate and impression cylinders of a printing press. More particularly, the invention relates to a drive mechanism for driving the plate and impression cylinders of a printing press, comprising a drive shaft installed on one side of the front frame of said press, two bevel gears mounted in face to face relation on said drive shaft, said bevel gears being in mesh with a lower bevel gear positioned on top of said drive shaft, a clutch positioned between the two bevel gears, a first bevel gear rigidly mounted on one end of a horizontal connecting shaft, said first bevel gear being in mesh with the two bevel gears mentioned above so as to constitute one of the drive systems for driving the plate and impression cylinders, with the other end of said horizontal connecting shaft being connected with the bevel gears of another system for driving the plate and impression cylinders positioned forwardly and on the other side of said front frame.

The present invention will now be described in detail with reference to the accompanying drawings, in which:

FIG. 1 is a front view of the printing press provided with the driving mechanism of this invention;

FIG. 2 is a transverse section, in part, showing the driving mechanism of the invention;

FIG. 3 is a partially exploded view, in section, of the clutching portion of the present driving mechanism;

FIG. 4 is a close-up view of the front of the portion shown in FIG. 3; and

FIG. 5 is a schematic diagram showing the reversing action of the clutch mechanism of the invention.

Referring to FIGS. 1 and 2, between the arches constituted by front and rear frames **1** and **1** are pivotally installed two sets of impression cylinders **3** and plate cylinders **2** in such a manner that the peripheral surface of each of said plate cylinders **2** comes in intimate contact with the corresponding one of said impression cylinders **3**. A plurality of inking rollers is installed under said plate cylinders **2** in such a manner that said inking rollers may come in contact with the lower peripheral surface of said plate cylinders **2**. Within a drive housing **4** provided on the front of and on one side of said front frame **1** is a drive mechanism **5**, which consists of a drive shaft **6** mounted centrally through said drive housing **4**, a helical gear **7** fixed to on one end of said drive shaft **6**, a horizontal connecting shaft **8**, a first bevel gear **9** fixed on said horizontal drive shaft **8**, bevel gears in mesh with bevel drive gears **10**, **10** which are bearing mounted in face-to-face relation on the other end of said shaft **6**. A clutch **11** is located between said bevel gears **10** and **10**.

Referring, now, to FIG. 3, said clutch **11** is freely slidable as its boss **24** is loosely fitted onto a spline **23** formed on said drive shaft **6**. Teeth **12**, **12** are formed, in required numbers, along the peripheral edges **25**, **25** of the two projections of said clutch, and a roller **45** on the forward end of a lever **14** is loosely fitted into a central groove **26** of the clutch, said roller **45** on the forward end of lever **14** remaining within said groove **26**, irrespective of the rotation of the clutch. The teeth **12**, **12** of the clutch **11** are brought into engagement with the internal gears **13**, **13** of the corresponding bevel gears **10**, **10** when the lever **14** is operated.

Other features of the present invention will now be described with reference to FIGS. 3, 4, and 5.

The lever **14** has a rear end **27** which is forked as indicated by numeral **28**, within which is loosely fitted an eccentric projection **34** of a crank shaft **30** mounted pivotally on a housing **29**. The central portion of said lever **14** is pivotally mounted on a pin **32** on the forward end of a receiving block extending from the desired position on the drive housing **4**. An outer housing **29**, located outside the drive housing **4** enclosing said drive mechanism **5**, has an opening **35**, in which a journal **36** is rigidly installed. Mounted in said journal **36** is a projection **37** of said actuating shaft **30**, said projection being provided with a hexagonal hole **38**, into which one end of a hexagonal operating bar **39** is fitted. A recess **42** is formed on one side of said journal **36** and a plate **41** is rigidly affixed to the side of said journal **36** on the same plane as the external side **40** of said housing **29**. Within said cavity **42** and in close contact with the internal side of said plate **41** is a pointer **43** which is rigidly mounted on said crank shaft **30**. An enlarged portion **46** formed integrally with said crank shaft **30**, on one of its lateral sides, is positioned in intimate contact with the other side of said journal **36**. The enlarged portion **46** has a recess **47**, and a stopper pin **52** screwed onto the journal **36** extends into said recess **47**. A stepping pin **49** supported by a spring **50** is installed in a hole **48** bored in said enlarged portion **46** in such a manner that the end of the stepping pin **49** may fit any one of a plurality of stepping holes **51** in said journal **36**.

To operate the above-mentioned clutch, the hexagonal operating bar **39** is inserted into the hexagonal hole **38** formed in the projection **37** of the crank shaft **30** mounted on the housing **29**, and the crank shaft **30** is turned until it is set in a required position, thereby moving the projection **34** extending from the rear portion of said crank shaft **30**. As the projection **34** is thus moved, the lever **14** connected thereto is actuated. When engaging the clutch, the stopper pin **52** is brought into contact with the lateral wall of the recess **47** and the stepping pin **49** is forced into the locking hole **51**, thereby locking the crank shaft **30** in the journal **36**. The internal gears **13**, **13** formed on the internal side of bevel gears **10**, **10** are in mesh with the above-mentioned teeth **12**, **12**. The hexagonal operating bar **39** of the clutch **11** extends through the housings **4** and **29**. The lower sides of the two bevel gears **10**, **10** are in mesh with a lower bevel gear **16** fixed on top of the vertical drive shaft **15** installed along the front columnar portion of the front frame **1**, and said helical gear **7** is in engagement with an impression cylinder gear **18** mounted

on one of the projections of an impression cylinder shaft **17** arranged in parallel with a drive shaft **6**. Mounted on the other projection of said impression cylinder shaft **17** is an impression cylinder gear **19** which is in mesh with a plate cylinder gear **21** mounted on a plate cylinder shaft **20**.

The above arrangement ensures that the plate and impression cylinders run at the same speed.

The other drive mechanism indicated by reference numeral **22** in the drawings, is the same as the drive mechanism **5** described hereinbefore, and serves the purpose of driving a plate cylinder **2** and an impression cylinder **3**, which are provided on the opposite side from the side of the frames **1**, **1** on which the first-mentioned drive mechanism is located. By means of a lower bevel gear **16** mounted on a drive shaft **15** which in turn is mounted within a drive housing **4**, bevel gears **10**, **10** which are loosely mounted through bearings on a drive shaft **6** turn in opposite directions, thereby engaging the clutch **11** located between said two bevel gears **10**, **10** with one of the bevel gears **10** so that the driving power is transmitted from said bevel gear to the drive shaft **6** and, thence, to the impression cylinder shaft **17** through the impression cylinder gear **18** in mesh with the helical gear **7**, thereby driving the plate and impression cylinders.

It will, thus, be apparent that the direction of revolution of the plate and impression cylinders may be altered as desired by engaging or disengaging the clutch **11**. The drive mechanisms **5** and **22** within the housings **4**, **4** located outside of the front frame **1** of the printing press are connected with each other through a horizontal connecting shaft **8**, and the plate and impression cylinders **2**, **2** and **3**, **3** connected with the driving mechanisms **5** and **22**, respectively, are driven through the drive shaft **15** which is connected with only one of said mechanisms.

These arrangements permit the concentration of the controls on one side of the front frame and, accordingly, facilitates the operation. It also makes it easier to ascertain the running condition of the press and remedy the troubles.

In addition, when a number of printing presses is installed in line, the running conditions of all the presses may be easily supervised.

As described hereinbefore, the bevel gears **10**, **10** that are in mesh with the bevel gear **9** mounted on the horizontal connecting shaft **8** are located in face-to-face relation, with the clutch **11** interposed therebetween, and one of the operating bars **39** attached to the clutch **11** extends outside the housings so that the direction of revolution may be easily and positively altered.

It will be apparent from the foregoing description that the present invention represents a great contribution toward substantial reductions in size and further compactness of the printing press.

I claim as my invention:

1. In a drive mechanism for driving the first and second plate and impression cylinders mounted between the front and rear frames of a printing press having a vertical drive shaft, a first pair of bevel gears mounted in face-to-face relation on a shorter splined auxiliary shaft which also has a helical gear on the end thereof geared to a corresponding gear on the first impression cylinder shaft, a lower bevel gear fixed on the upper end of said vertical drive shaft and in mesh with one of said first pair of bevel gears,

a first clutch positioned between said first pair of bevel gears, a horizontal connecting shaft having a first bevel gear thereon in mesh with said first pair of bevel gears and having a second bevel gear at the other end in mesh with a second pair of bevel gears and a second clutch between said second bevel gears, that improvement comprising two housings, a drive housing and an outer housing, projecting forwardly from the front frame of the printing press, the drive housing enclosing the shorter auxiliary shaft, and said first pair of bevel gears, said first bevel gear fixed on the end of said horizontal connecting shaft and said helical gear on said shorter auxiliary shaft, the vertical drive shaft extending upwardly from the base of the printing press along the front side of one leg of the front frame of the printing press, said clutch having a boss loosely fitted on the splined shorter auxiliary shaft, a mounting block extending inwardly from the wall of said one drive housing, a lever having the central portion pivotally mounted on the inner end of said block and a fork on the rear end thereof, a roller rotatably mounted on the forward end of said lever, said clutch boss having a groove therein in which said roller is movable, a crank shaft having an eccentric projection loosely fitted within the fork at the rear end of said lever, the outer housing on said front frame located outside said drive housing, said outer housing having an opening thereing with a journal in said opening, said crank shaft having an outer projection mounted in said journal, said outer projection having a hexagonal hole therein, a hexagonal operating bar having one end fitted into said hole, whereby when the hexagonal operating bar is turned the crank shaft is turned until said projection is moved and the lever connected thereto is actuated so that the teeth of the clutch are brought into engagement with the internal gears of one or the other of the pair of bevel gears.

2. The improvement as claimed in claim **1**, wherein said journal has a recess in the outer face thereof, a plate rigidly affixed to the side of the journal in the same plane as the external side of said outer housing, a pointer rigidly mounted on said crank shaft within said cavity and in close contact with the internal side of said plate, said crank shaft having an enlarged portion formed integrally therewith positioned in intimate contact with the other side of said journal, said enlarged portion having a recess, a stopper pin on the journal and extending into said recess, and a spring loaded stepping pin in a hole bored in said enlarged portion, the end of the stepping pin cooperating with any one of a plurality of stepping holes in said journal.

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