Dec. 19, 1967 R. E. LINDEMANN 3,358,595

ROTARY PRINTING PRESS REGISTER CLUTCH

Filed Jan. 18, 1965 4 Sheets-Sheet 1

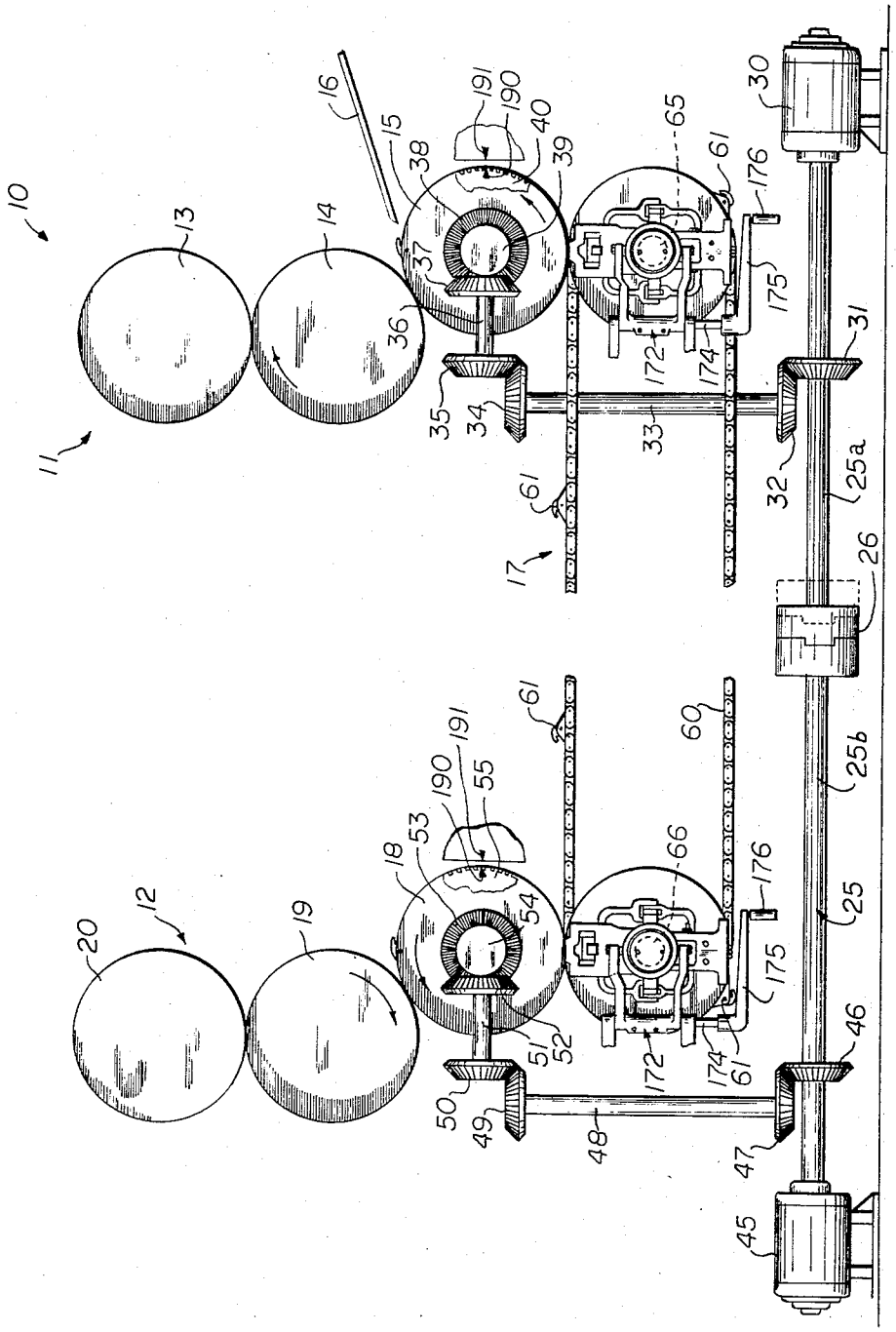

FIG. 1

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ROTARY PRINTING PRESS REGISTER CLUTCH

Filed Jan. 18, 1965 4 Sheets-Sheet 2

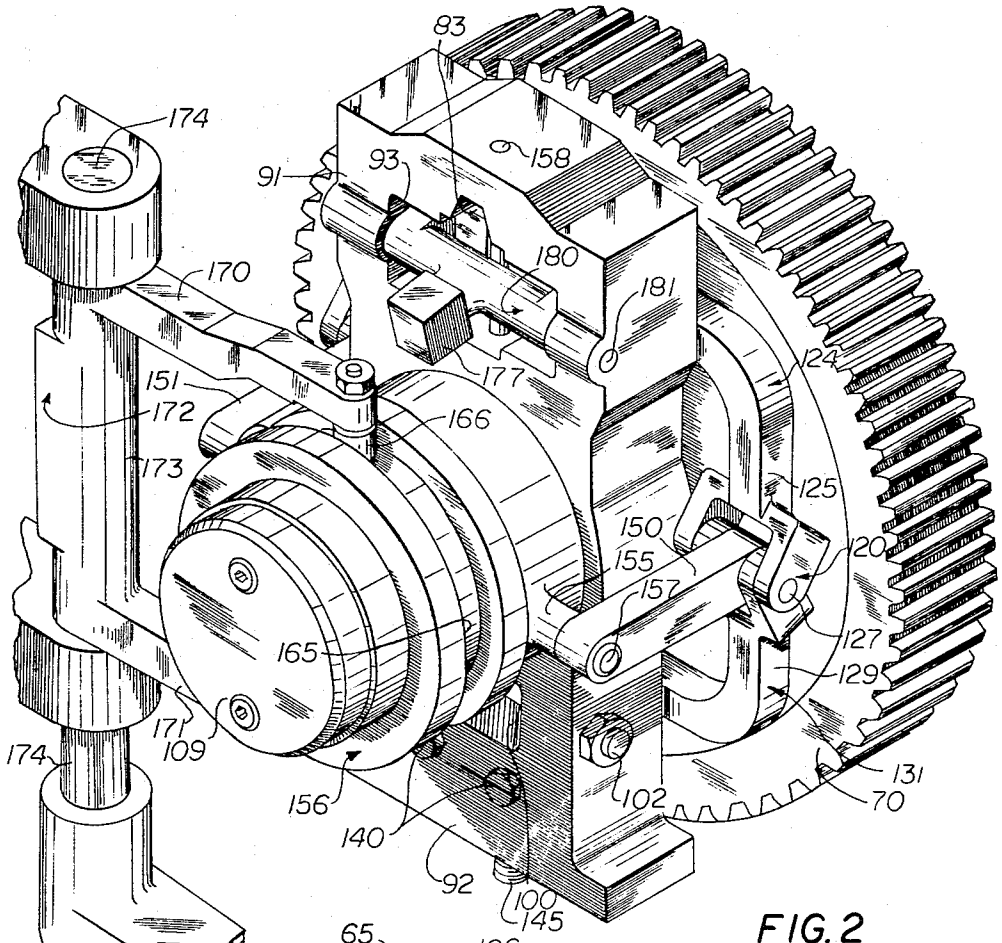

FIG. 2

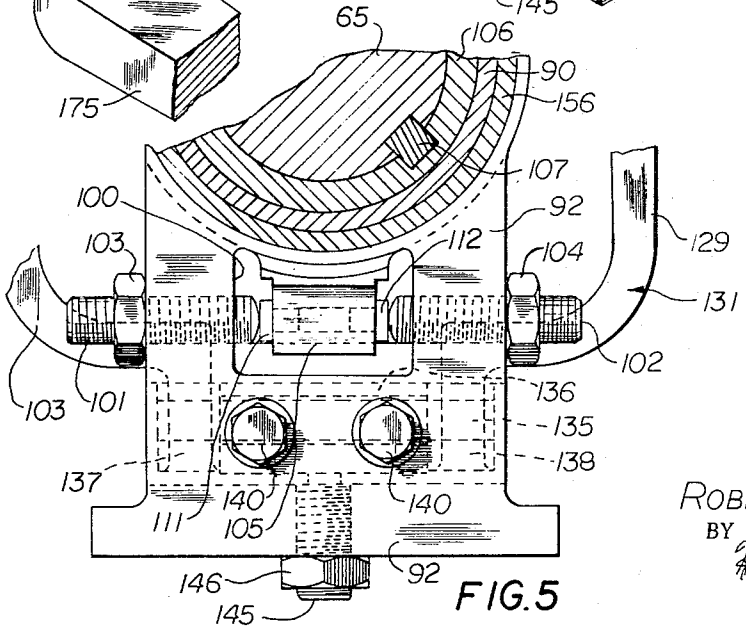

FIG. 5

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ROTARY PRINTING PRESS REGISTER CLUTCH

Filed Jan. 18, 1965 4 Sheets-Sheet 3

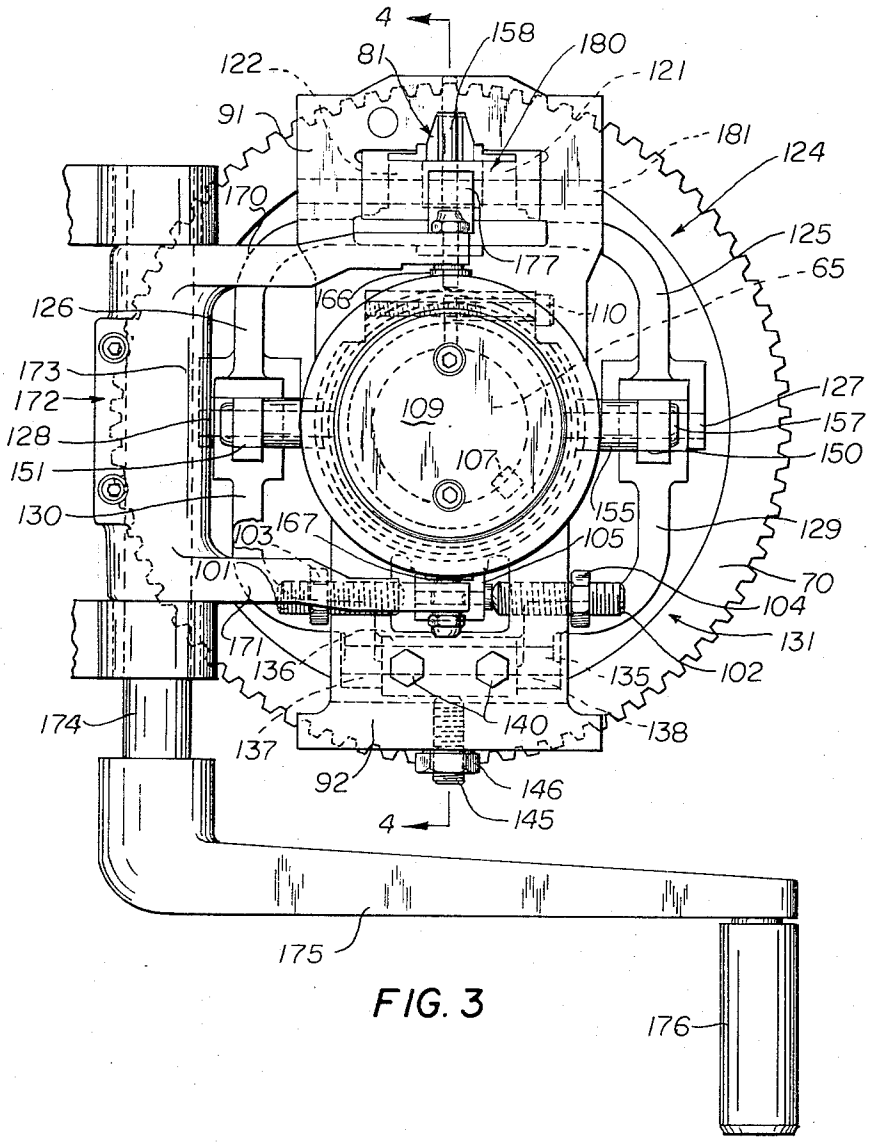

FIG. 3

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ROTARY PRINTING PRESS REGISTER CLUTCH

Filed Jan. 18, 1965 4 Sheets-Sheet 4

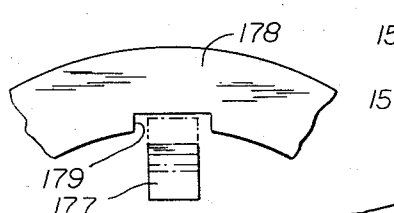

FIG. 6

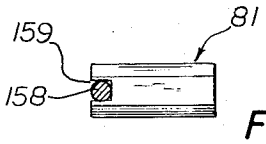

FIG. 7

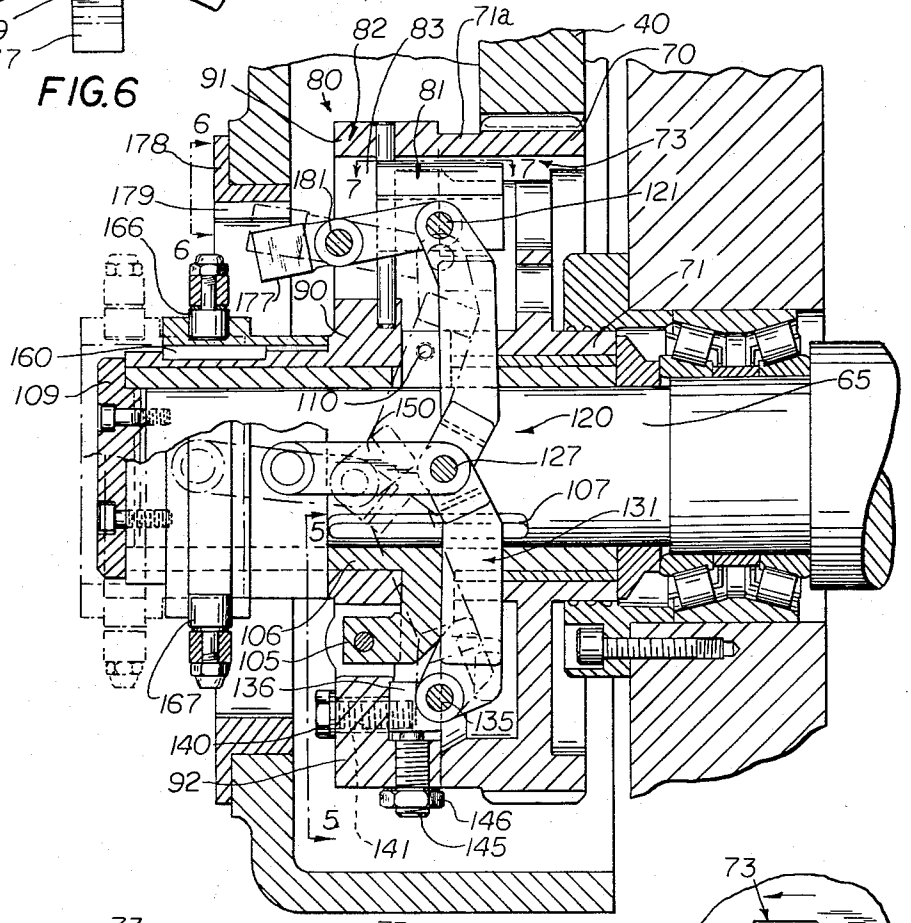

FIG. 4

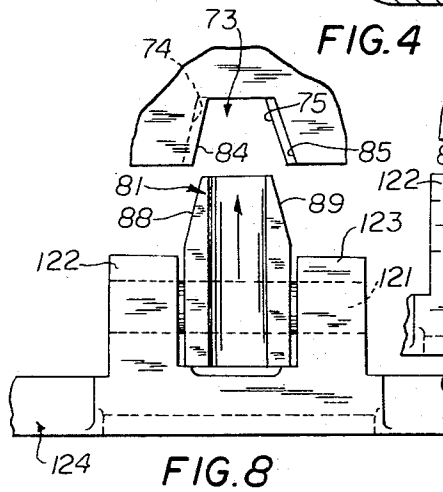

FIG. 8

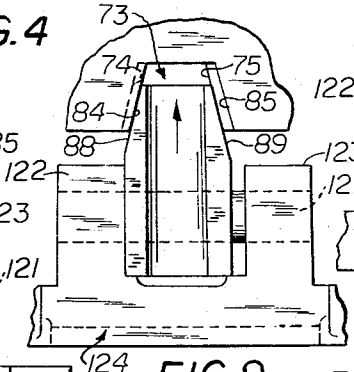

FIG 9

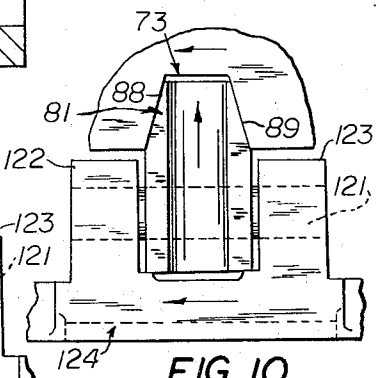

FIG. 10

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3,358,595

ROTARY PRINTING PRESS REGISTER CLUTCH

Robert E. Lindemann, Medina, Ohio, assignor to Harris-Intertype Corporation, Cleveland, Ohio, a corporation of Delaware

Filed Jan. 18, 1965, Ser. No. 426,142
18 Claims. (Cl. 101—183)

The present invention relates to an improved printing press structure and, particularly, to a multiple unit printing press having a chain transfer mechanism for conveying the material being printed between the printing units of the press.

Known printing presses having a plurality of printing units and a chain transfer between the printing units have a common drive for the printing units in which a clutch mechanism is located for breaking or disconnecting the common drive so that each of the units may be operated independently of the other unit. The common drive is drivingly connected to drive a gear for each unit and from which the units are driven. The drive for the chain transfer is from the drive gear for the respective units to chain transfer drive gears and from the chain transfer drive gears through a clutch mechanism to the chain transfer drive shaft. This clutch mechanism is operable to disconnect or break the drive from the chain transfer drive gear to the chain transfer drive shaft. By breaking this drive, the impression cylinder and other cylinders of the printing unit may be driven without driving the chain transfer drive shaft. If at the same time, the clutch in the main drive shaft is broken, each unit may be driven independently of the other by separate drive motors without driving the chain transfer mechanism. This enables make-ready of the printing units simultaneously and independently and without destroying the registry of the grippers on the chain transfer with the grippers on the impression cylinders.

The principal object of the present invention is the provision of a new and improved printing press having cooperating parts which should register accurately and are driven together and a clutch structure in the drive between the parts and which clutch structure is highly reliable in operation, readily manufactured, and constructed so that problems of backlash, part alignment and wear are minimized.

A further object of the present invention is the provision of a new and improved printing press having cooperating parts which should register accurately and are driven together and a clutch structure in the drive between the parts and which is operable to connect and disconnect the drive therebetween and includes a register key member movable into slots in drive elements connected with the cooperating parts and which is self-registering in that when moved to its engaged position, it restores the registry which the cooperating parts had when it was disengaged.

A still further object of the present invention is the provision of a new and improved multiple unit printing press having a chain transfer between printing units and having a clutch structure in a drive to a chain transfer drive shaft associated with each unit and each of which includes a key member movable into a slot in a chain transfer drive gear and a corresponding slot in a drive member drivingly connected with the associated chain transfer drive shaft to effect a driving connection between the gear and shaft and wherein a linkage mechanism is utilized for moving the key into and out of the slots, and which linkage mechanism functions to move the key only and does not function to transmit driving forces from the gear to the chain transfer drive shaft.

A still further object of the present invention is the provision of a new and improved multiple unit printing press having a chain transfer between printing units of the press and having a clutch structure in the drive to the chain transfer drive shaft and which includes a driving member drivingly connected to the drive shaft and having a slot therein and a key member movable into the slot and into a corresponding slot in a chain transfer drive gear, and wherein the key member "floats" and is operable to effect registry of the slots in the gear and drive member if these slots are not exactly aligned.

Yet a further object of the present invention is the provision of a new and improved printing press, as noted in the next preceding object, wherein if the slots in the drive gear and drive member are misaligned, the key is moved by a camming action due to engagement of a surface of the key with a surface defining the slot in the gear member and, when moved by this camming action, tends to rotate the drive member so that the slot therein aligns with the slot in the driving gear and the key properly seats in the slots therein.

Another object of the present invention is the provision of a new and an improved multiple unit printing press having a chain transfer between the units of the press and having a clutch structure in the drive to the chain transfer of each unit and which includes a key member movable into slots in a driving gear and a drive member in order to establish the drive to the drive shaft of the chain transfer and movable out of the slots in order to break the drive to the drive shaft of the chain transfer, and wherein a linkage mechanism is provided for moving the key into and out of the slots only and which is adjustable to compensate for wear of the key and for any manufacturing inaccuracies in the key and slot.

Further objects and advantages of the present invention will be apparent to those skilled in the art to which it relates from the following detailed description of the preferred embodiment thereof made with reference to the accompanying drawings forming a part of this specification and in which:

FIG. 1 is a schematic side elevational view, with parts omitted, of a multiple unit printing press embodying the present invention;

FIG. 2 is an enlarged perspective view of a part of the printing press shown in FIG. 1;

FIG. 3 is an enlarged side elevational view of a part of the printing press shown in FIG. 1;

FIG. 4 is an axial sectional view of the portion of the printing press shown in FIG. 3, taken approximately along the section line 4—4 of FIG. 3;

FIG. 5 is a fragmentary sectional view of the mechanism shown in FIG. 4, taken approximately along the section line 5—5 of FIG. 4;

FIG. 6 is a fragmentary view of the mechanism shown in FIG. 4, looking at the mechanism of FIG. 4 as indicated by the line 6—6;

FIG. 7 is a fragmentary sectional view of the mechanism shown in FIG. 4, taken approximately along the section line 7—7 of FIG. 4; and

FIGS. 8, 9, and 10 are schematic views illustrating different operative positions of parts of the mechanism shown in FIG. 4.

As representing a preferred embodiment of the present invention, FIG. 1 illustrates a mulitple unit printing press **10**. The multiple unit printing press **10** includes two printing units **11** and **12** of substantially identical construction. The printing unit **11** includes a plate cylinder **13**, a blanket cylinder **14**, and an impression cylinder **15**. Sheetlike material, such as paper sheets, to be printed in the printing press **10** are fed down a feedboard **16** and are engaged by a suitable gripper mechanism on the impression cylinder **15** and carried into the nip between the blanket cylinder **14** and the impression cylinder **15**. The sheets are then transferred to a chain transfer mecha-

nism, generally designated **17**, which transfers the sheets from the printing unit **11** to the printing unit **12**. The sheets are picked up by the gripper mechanism on an impression cylinder **18** of the printing unit **12** and carried by the impression cylinder **18** into the nip defined by the impression cylinder **18** and a blanket cylinder **19** of the printing unit **12**. The printing unit **12** also includes a plate cylinder **20** which runs in engagement with the blanket cylinder **19**. The sheets, after being printed in the printing unit **12**, may be transferred to a further printing unit or to a pile support, in a well-known manner.

The printing units **11**, **12** are driven by a common drive means **25** which includes a clutch **26**. The clutch **26** is operable to break the drive between the shafts **25***a* and **25***b* of the common drive and when the clutch **26** is disengaged, it should be apparent that the units **12** and **11** may be driven independently of each other.

The printing unit **11** is driven from the shaft **25***a* which is drivingly connected to the printing unit **11** and is driven by a motor **30**. The shaft **25***a* carries a bevel pinion gear **31**, as shown in FIG. 1. The bevel pinion gear **31** meshes with a bevel pinion gear **32** carried on a shaft **33** having a bevel pinion gear **34** on the end thereof opposite the end on which the bevel pinion gear **32** is located. The bevel pinion gear **34** meshes with a bevel pinion gear **35** carried on a stub shaft **36** having a bevel pinion gear **37** mounted on the end thereof opposite the end on which the bevel pinion gear **35** is mounted. The bevel pinion gear **37** meshes with a bevel pinion gear **38** carried on a shaft **39** which carries the impression cylinder **15**. Also mounted on the shaft **39** is a printing unit drive gear **40** which is drivingly connected with drive gears, not shown, for the blanket and plate cylinders **14** and **13**, respectively, in order to drivingly connect all of the cylinders of the unit **11**.

The drive, as illustrated in FIG. 1, for the printing unit **12** includes a drive motor **45** which drives the shaft **25***b*. The shaft **25***b* carries a bevel pinion gear **46** which meshes with a bevel pinion gear **47** carried on a shaft **48**. The shaft **48** on the end thereof opposite the end on which the bevel pinion gear **47** is mounted carries a bevel pinion gear **49** which meshes with a bevel pinion gear **50** carried on a stub shaft **51** which has a bevel pinion gear **52** mounted on the end thereof opposite the end on which the gear **50** is mounted. The bevel pinion gear **52** meshes with a bevel pinion gear **53** carried on the shaft **54** on which the impression cylinder **18** is mounted. A printing unit drive gear **55** is drivingly connected to the shaft **54** and meshes with gearing, not shown, for rotating the cylinders **19** and **20** of the printing press in timed relation with the impression cylinder.

The chain transfer mechanism **17** which transfers the sheets from the printing unit **11** to the printing unit **12** includes spaced chain members **60** having a plurality of gripper assemblies **61** supported thereon and which take the sheets from the impression cylinder **15** of the printing unit **11** and deliver the sheets to the impression cylinder **18** of the printing unit **12**. The gripper assemblies **61**, of course, must be spaced on the chain **60** in order to properly cooperate with the grippers on the impression cylinder **15** and the grippers on the impression cylinder **18**. Moreover, the gripper assemblies must register and cooperate accurately with the gripper assemblies on the impression cylinder **15** and the impression cylinder **18** in order to properly effect the transfer of the sheet from one gripper assembly to the other.

The chains **60** of the chain transfer mechanism **17** are trained around transfer cylinders including spaced drive sprockets, not shown, adjacent to the impression cylinders **15**, **18** and which drive sprockets are mounted on chain transfer drive shafts **65**, **66** which are adjacent to the impression cylinders **15**, **18**, respectively, of the printing units. The drive shafts **65**, **66** are driven from the drive gears **40**, **55**, respectively, and the drive from the drive

gear **40** to the shaft **65** is identical in construction to the drive from the drive gear **55** to the shaft **66** and in view of the similarity in these drives, only the drive between the gear **40** of the printing unit **11** and the drive shaft **65** will be described in detail, and similar reference numerals will be used to designate corresponding parts of these drive mechanisms on the drawings.

The drive from the drive gear **40** to the shaft **65** includes a chain transfer drive gear **70**, see FIG. 4, which meshes with the drive gear **40** and rotates therewith. The gear **70** has a hub portion **71** which is rotatably supported by the chain transfer drive shaft **65**. The gear **70** also has an outer hollow sleeve portion **71***a* in the internal diameter of which is a drive slot **73**. The drive slot **73**, as best shown in FIG. 8, is of a converging cross-sectional dimension as it extends radially outwardly of the gear **70** and is defined by a pair of converging surfaces **74** and **75**.

The gear **70** may be drivingly connected to the shaft **65** to drive the shaft **65** by means of an antibacklash clutch mechanism **80**. The clutch mechanism **80** includes a driving register key **81** which is movable into the slot **73** in the drive gear **70** and into a corresponding slot **83** in a drive spider member **82** which is drivingly connected to the shaft **65** to effect rotation thereof upon rotation of the member **82**, as will be described in detail hereinbelow. The slot **83** in the drive member **82** into which the key member is movable is of the same configuration as the slot **73** in the gear **70** and is defined by a pair of surfaces **84** and **85** which converge as they extend outwardly from the shaft **65**, as best shown in FIG. 8. In manufacturing the slots **73**, **83** may be machined while the gear **70** and drive spider member **82** are secured together to insure uniformity thereof. The key member **81** has an outer portion of a trapezoidal cross-sectional shape and is defined by converging surface portions **88** and **89** which converge at approximately the same angle as the surfaces **84** and **85** and **74** and **75**, respectively, so that the key when moved into the slots **73** and **83**, when aligned, will have a wedging engagement therein and effect a drive between the gear **70** and the drive spider member **82** without lost motion therebetween.

The drive spider member **82** which is driven from the gear **70** by the key **81** includes a hub portion **90** and opposite projecting portions **91** and **92**. The portion **91** projects upwardly, as shown in the drawings, and has an opening **93** therein into which the key member **81** extends and the slot **83** is provided in the uppermost part of the portion **91** of the spider member. The lower projecting portion of the spider member **92** has an opening **100** therein and carries a pair of adjustable screw members **101** and **102** which extend into the opening and which have cooperating nuts **103** and **104**, respectively, for securing the screws **101** and **102** in a particular position relative to the spider portion **92**.

The ends of the screw members **101** and **102** which extend into the opening **100** cooperate with a lug portion **105** of a sleeve member **106** and which projects therefrom. The sleeve member **106** encircles the drive shaft **65** and is keyed thereto by means of a key **107**, and extends axially of the shaft **65** between the hub portion **90** of the spider member **82** and the shaft **65** and, likewise, has a portion which extends between a bearing for the gear **70** and the shaft **65**. A suitable stop member **109** is securely fastened on the end of the shaft **65** and engages the ends of the sleeve member **106** and hub portion **90** of the drive spider **82** and holds them on the shaft **65**. The sleeve **106** is tightly clamped onto the shaft **65** by means of a clamping arrangement including a fastening means **110**, shown in FIG. 4. The lug portion **105** of the sleeve **106** carries suitable wear buttons **111** and **112** which are engaged by the screw members **101** and **102**.

From the above description, it should be apparent that the gear 70 may be connected to drive the shaft 65 upon engagement of the clutch mechanism 80. Engagement of the clutch mechanism is effected by moving the key member 81 into the aligned slots 73 and 83 in the gear member 70 and the spider drive member 82, respectively. The spider drive member then rotates with the gear 70 and the rotation thereof is transmitted through the screw members 101 or 102 to the lug portion 105 of the sleeve member 106 and from the sleeve member 106 through key 107 to the shaft 65. Of course, when the key member 81 is moved out of the slots 73, 83 in the gear 70 and spider drive member 82, respectively, the gear 70 is free to rotate relative to its bearing without effecting any rotation of the drive shaft 65. Moreover, it should be apparent that the screws 101, 102 may be moved relative to the spider member 92 and when moved, effect movement of the lug portion 105 and, in turn, rotation of the shaft 65 of the chain transfer. In this manner, the gripper assemblies on the chain 60 may be adjusted relative to the gripper assemblies on the impression cylinder 15, as should be readily apparent.

The key member 81 is moved into its driving position, shown in FIG. 4, and from its driving position by means of a manually actuated linkage mechanism 120. The key 81 may be said to be a "floating" key and is supported on a pin member 121 and is slidable axially along the pin member 121. The pin member 121 extends between lug portions 122, 123 of a link member 124 and which are pivotal relative thereto. The link member 124 straddles the shaft 65 and forms a part of the linkage 120. The lug portions 122, 123 are spaced a distance apart, as best shown in FIG. 8, which is greater than the dimension of the key member 81 which is located on the pin member 121 and between the lug members 122, 123. This permits the key member 81 to slide on the pin member 121 relative to the lug members 122, 123, for a purpose to be described hereinbelow.

The link member 124 straddles, as noted hereinabove, the shaft 65 and has portions 125 and 126 extending downwardly from the lug members, as shown in FIG. 3, and which terminate on diametrically opposite sides of the shaft member 65. The ends of the portions 125, 126 of the link member 124 are pivotally connected by means of pins 127, 128, respectively, to arm portions 129, 130 of a link member 131 which is similar to the link member 124 and straddles the shaft 65. As best shown in FIG. 4, the lower portion of the link member 131 is pivotally connected to a pin member 135 which is carried by a block member 136. Specifically, the lower portion of the link member 131 has a pair of spaced projecting lug portions 137, 138, see FIG. 3, which support the pin member 135 and between which the block member 136 is located.

The block member 136 is clamped to the portion 92 of the drive spider member 82 by means of a pair of fastening screws 140 which extend through openings 141, respectively, into the block 136. There is a substantial clearance between the walls of the openings and the stems of the screws 140 and the screws thus may be moved vertically in the openings for adjustment purposes. Of course, when the screws 140 are moved vertically in the openings 141, the block 136 is moved vertically and for this purpose, an adjusting screw 145 and nut 146 is provided. The screw 145 extends so as to engage the lower surface of the block 136, as viewed in FIG. 4. When the screws 140 are loosened, the nut 146 may be turned to effect upward movement of the block 136. The upward movement thereof is guided by the lug members 137, 138. This upward movement, of course, moves the pivot pin 135 upwardly and, in turn, causes an upward movement of the pin 121 on which the key 81 is mounted. This causes the key 81 to move upwardly relative to the slots 73, 83, and by this adjustment the position of the key 81 after actuation of the linkage may be varied so that wear of the key 81 and slots 73, 83 and inaccuracies in manufacturing thereof can be compensated for.

The pins 127, 128 which provide a pivot connection between the arms 125, 129 of the links 124, 131 and the arms 126, 130 of the links 124, 131, respectively, also extend through one end of links 150, 151, respectively, which links also form a portion of the linkage 120. The links 150, 151 extend axially of the shaft 65 on diametrically opposite portions thereof and on the outside of the spider drive member 82. The links 150, 151 are of identical lengths and are pivotally connected at their ends opposite the ends pivotally connected to the links 131, 124 to a boss portion 155 of a sleeve member 156 which encircles the hub portion 90 of the drive spider member 82. The ends of the links 150, 151 are connected to the boss portions 155 by pivot pin members 157, best shown in FIG. 2.

The sleeve member 156 which encircles the hub portion 90 of the drive spider 82 is splined to the hub portion 90 by a suitable key 160, see FIG. 4, which causes rotation of the sleeve member 156 with the spider drive member 82, but yet permits axial sliding movement of the sleeve 156 relative to the spider member 82. The sleeve member 156 is slidable axially on the hub portion 90 of the drive spider 82 from the full-line position shown in FIG. 4 to the dot-dash position shown in FIG. 4. It should be apparent, of course, that upon movement between these positions, the links 150, 151 will likewise be moved and, when so moved, the links will cause lowering and raising movements of the key member 81. The lowering and raising movements of the key member 81 are guided by means of a pin 158 which is supported in the opening 93 of the spider drive member and which is engaged in a recess 159 in the one vertical face of the key member 81. The pin member 158 not only guides the vertical movement of the key 81 upon actuation of the linkage 120, as described hereinabove, but also blocks the key 81 from tilting or tipping and thereby provides for a solid wedging engagement of the key member in the slots 73, 83.

The linkage mechanism 120 when in its position shown in full lines in FIG. 4 with the key 81 in the slots 73, 83, is in such a position that the links of the linkage act as a spring and hold the key member 81 in its raised position. In the position shown in full lines in FIG. 4, the pivot pins 127, 128 are located beyond a line connecting the center of the pivot pins 121, 135. The pins 127, 128 thus move beyond the center of the toggle mechanism upon actuation thereof to effect movement of the key 81 into the slots 73, 83, as noted hereinabove, and the toggle linkage is, in a sense, self-locked so that the key member 81 is maintained in driving engagement in the slots in the gear 70 and driving member 82.

As noted hereinabove, the sleeve 156 when moved between the position shown in dot-dash and full lines in FIG. 4 effects engagement and disengagement of the key 81 in the slots to engage and disengage the drive from the gear 40 to the chain transfer drive shaft 65. The sleeve 156 includes a portion defining an outer circumferentially extending groove 165 which extends completely around the sleeve 156. A pair of rollers 166 and 167 are supported in the groove and are rotatably supported on the ends of arm portions 170, 171 of a lever 172, the base portion 173 of which is fixed on a shaft member 174 which is rotatably supported in spaced portions of the frame of the press. The shaft member 174 carries on one end thereof a handle member 175 which includes a manually grippable handle portion 176 which may be gripped by the operator. Upon turning of the handle 175, the shaft 174 is rotated and the arm portions 170, 171 are moved so that the rollers 166 and 167 move axially of the shaft 65 causing axial movement of the sleeve member 156 which, in turn, causes axial movement of the links 150, 151 and causes movement of the key member 81, as described hereinabove.

From the above description, it should be readily apparent that upon disengagement of the clutch **26** in the main drive shaft and disengagement of the keys **81** in the drive from the drive gears **40**, **55**, respectively, to the shafts **65**, **66**, the units **11** and **12** may be operated independently of each other by means of the motors **30**, **45** and without any drive connection to the chain transfer mechanism **17**. This facilitates make-ready of the units **11**, **12** due to the fact that each unit can be operated independently of the other and at the same time. Moreover, it should be clear that all the rotational force for driving the drive shaft **65** is transmitted through the key **81** and drive member **82** and not through the linkage **120** for moving the key into and out of driving position.

When the chain transfer shafts **65**, **66** are disconnected from the gears **40**, **55**, respectively, it is desirable to hold the gripper assemblies thereof in the position they have when the keys **81** are moved from slots **73**, **83**. Each clutch mechanism **80** thus is provided with a lug member **177** which moves into locking cooperative engagement with the frame of the printing press when the key member **81** is moved out of driving engagement with its associated gear **70** and driving spider member **82** and functions to lock the chains **60** to the frame of the press and prevent movement thereof. The frame of the press includes a ring portion **178** which encircles each of the sleeve members **156**. The ring portions **178** each have a slot **179** located therein which receives a lug member **177**, if properly aligned therewith when the key member **81** is disengaged. The lug member **177** of each clutch mechanism is carried by a link member **180** which is pivotally connected by a pin **181** to the spider drive member **82**. The link member **180** includes arm portions which extend toward the key **81** and on opposite sides of the key and through which the pin member **121** extends. The link **180** acts to determine the path of movement of the pin **121**. When the pin member **121** is moved vertically downwardly, as viewed in FIG. 4, the lug member **177** pivots upwardly, as shown in dot-dash lines in FIG. 4, about the pivot pin **181**, and if the lug member **177** is aligned with the slot **179**, it moves into the slot **179**. Thus, when the key member **81** is disengaged, the lug member **177** is located in the slot **179** and thus locks the spider drive member **82** from rotary movement relative to the frame and since the spider drive member **82** is drivingly connected to the shaft **65**, the shaft **65** is locked against movement relative to the frame and thus rotation thereof cannot occur. This will maintain the gripper assemblies on the chains **60** in their registered positions in which they are located when the clutch is disengaged, and in which position they are located in FIG. 1.

From the above description, it should be apparent that the slot **179** must be aligned with the lug **177** and that the slots **83** and **73** must be aligned when the clutch is to be engaged. In order to effect this alignment, the gear **40** has an arrow marker **190**, see FIG. 1, and the frame adjacent thereto has an arrow marker **191** thereon, which when aligned indicate that the lug **177** is aligned with the slot **179** and that the slots **73**, **83** are also aligned. Similar markers are utilized in connection with the gear **55**. The markers **190**, **191**, of course, are difficult to align with great accuracy and suitable clearance is provided between the slot **179** and the lug **177** in order to facilitate movement of the lug **177** into the slot **179**, even though they are not exactly aligned.

Moreover, even though the slots **83**, **73** in the driving spider member **82** and gear member **70** are not exactly aligned, the floating register key member **81** effects alignment thereof upon movement into its driving position in the slots and, of course, restores the registry between the grippers on the chain transfer and impression cylinders. This operation will be clear when viewing FIGS. 8–10 and from the description hereinbelow. As shown in FIG. 8, the slots **73** and **83** are not aligned and the groove or slot **73** in the gear member **70** is offset to the left from the slot **83** in the spider drive member **82**. The key member **81** when moved vertically engages one surface defining the slots and, as viewed in FIG. 8, will engage the surface **75** defining the slot **73** in the gear member **70**. This causes the key member to be slid axially along the pin **121** and causes the key **81** to engage the surface **75** on the gear member and the surface **84** on the driving spider member **82**, as shown in FIG. 9. Further vertical movement causes the spider member **82** to be moved or cammed due to the vertical movement of the key **81** into exact alignment with the slot in the gear member **70**, as shown in FIG. 10. The construction of these parts is such that the lug member **177** has sufficient clearance with the walls defining the slot **179** so that the spider member **82** is able to move relative to the gear member due to movement of the key **81**, and is not held therefrom by the lug **177**. Of course, movement of the spider member by this camming action, causes the spider member and the pin **121** carried thereby to be moved relative to the key **81** and thus when the key in the slots is in driving engagement with the slots **73**, **83**, the parts will be in the position shown in FIG. 10.

The preferred embodiment of the present invention has been described in considerable detail hereinabove and it should be apparent that certain modifications, changes, and adaptations may be made therein by those skilled in the art to which it relates from the detailed description thereinabove, and it is intended to cover all such modifications, changes, and adaptations therein which fall within the scope of the appended claims.

Having described my invention, I claim:

1. A printing press comprising a pair of printing units; each of said printing units including an impression cylinder having gripper means thereon for advancing sheetlike material through its printing unit; a chain transfer mechanism having gripper means for receiving the material from the gripper means on the impression cylinder of one unit and for transferring the material to the gripper means on the impression cylinder of the other printing unit; common drive means for said printing units including a clutch means for disconnecting the printing units from each other so that each of said printing units may be driven independently of the other; a drive for said chain transfer mechanism from at least one of said printing units and including a printing unit drive gear driven from said common drive means, a chain transfer drive gear driven from said printing unit drive gear, a drive shaft for driving said chain transfer mechanism, a drive member drivingly connected with said drive shaft to effect rotation thereof upon rotation of said drive member, said drive member and said chain transfer drive gear each having a driving slot therein which slots have an aligned position, a driving key member movable into said slots and providing a drive connection between said drive member and said chain transfer drive gear and movable from said slots to break the drive connection therebetween; and means separate from said drive member for moving said key into and from said slots whereby all the rotational force for driving said chain transfer drive shaft is transmitted through said driving key member and said drive member.

2. A printing press comprising a frame; a pair of printing units supported in the frame; each of said printing units including an impression cylinder having gripper means thereon for advancing sheetlike material through its printing unit; a chain transfer mechanism having gripper means for receving the material from the gripper means on the impression cylinder of one unit and for transferring the material to the gripper means on the impression cylinder of the other printing unit; common drive means for said printing units including a clutch means for disconnecting the printing units from each other so that each of said printing units may be driven independently of the other; a separate drive for said chain transfer mechanism from each of said printing units; each of said

separate chain transfer drives including a printing unit drive gear for a different one of the printing unts and driven from said common drive means, a chain transfer drive gear driven from said printing unit drive gear, a drive shaft for driving said chain transfer mechanism and supported adjacent a different one of said printing units, a drive member drivingly connected with said drive shaft to effect rotation thereof upon rotation of said drive member, said drive member and said chain transfer drive gear each having a driving slot therein which slots have an aligned position, a driving key member movable into said slots and providing a drive connection between said drive member and said chain transfer drive gear and movable from said slots to break the drive connection therebetween; and means connected with the driving key member in each of said drives and separate from the drive member associated with the driving key member for moving said key into and from said slots whereby all the rotational force for driving the chain transfer drive shafts is transmitted through the driving key members and the drive members.

3. A printing press comprising a frame; a pair of printing units supported in the frame; each of said printing units including an impression cylinder having gripper means thereon for advancing sheetlike material through its printing unit; a chain transfer mechanism having gripper means for receiving the material from the gripper means on the impression cylinder of one unit and for transferring the material to the gripper means on the impression cylinder of the other printing unit; common drive means for said printing units including a clutch means for disconnecting the printing units from each other so that each of said printing units may be driven independently of the other; a separate drive for said chain transfer mechanism from each of said printing units; each of said separate chain transfer drives including a printing unit drive gear for a different one of the printing units and driven from said common drive means, a chain transfer drive gear driven from said printing unit drive gear, a drive shaft for driving said chain transfer mechanism and supported adjacent a different one of said printing units, a drive member drivingly connected with said drive shaft to effect rotation thereof upon rotation of said drive member, said drive member and said chain transfer drive gear each having a driving slot therein which slots have an aligned position, a driving key member movable into said slots and providing a drive connection between said drive member and said chain transfer drive gear and movable from said slots to break the drive connection therebetween; means connected with the driving key member in each of said drives and separate from the drive member associated with the driving key member for moving said key into and from said slots whereby all the rotational force for driving the chain transfer drive shafts is transmitted through the driving key members and the drive members; and means for locking each drive member from rotation relative to said frame and thereby locking said chain transfer mechanism from movement when said driving key member is located out of said slots.

4. A printing press as defined in claim 3 wherein the key members located in said drives are supported for movement relative to the chain transfer drive gear and drive member transverse to the axis of rotation of said drive shafts and cooperate with the drive member and chain transfer drive gear to effect alignment of the slots therein in response to movement of the key member toward its driving position.

5. A printing press as defined in claim 3 wherein the key members located in said drives are supported for movement relative to the chain transfer drive gear and drive member transverse to the axis of rotation of said drive shafts and have surfaces engageable with surfaces defining said slots in said chain transfer drive gear and drive member and which surfaces have a camming cooperation and effect axial shifting of said key member due to the camming cooperation of said surfaces when the slots are not exactly aligned and cause engagement of the surfaces of the key member with the surface defining a slot in the drive gear and a surface defining a slot in the drive member when nonaligned and provide as a result of further movement of the key member into the slots axial rotation of the associated drive member to align the slot in the drive member with the slot in the associated chain transfer drive gear.

6. A printing press as defined in claim 3 wherein the means for moving the key member into the slots includes a toggle linkage mechanism having a first link pivotally connected to the key member and a second link pivotally connected to the drive member, means pivotally connecting the ends of the first and second links opposite the ends connected to the key and drive members, respectively, and an actuating link connected to the first and second links at the pivotal connection therebetween and movable to effect actuation of the linkage to effect movement of the key member into and out of the slots.

7. A printing press as defined in claim 3 wherein the means for moving the key into the slots includes a linkage mechanism having a link thereof pivotally connected to the key member and a second link thereof pivotally connected with the drive member and wherein the point of the pivotal connection between the second link and the drive member is adjustable to vary the position of the key member after actuation of the linkage mechanism.

8. A printing press comprising a pair of printing units; each of said printing units including an impression cylinder having a gripper means thereon for advancing sheetlike material through its printing unit; a chain transfer mechanism having gripper means for receiving the material from the gripper means on the impression cylinder of one unit and for transferring the material to the gripper means on the impression cylinder of the other printing unit; common drive means for said printing units including a clutch means for disconnecting the printing units from each other so that each of said printing units may be driven independently of the other; a drive for said chain transfer mechanism from at least one of said printing units and including a printing unit drive gear driven from said common drive means, a chain transfer drive gear driven from said printing unit drive gear, a drive shaft for driving said chain transfer mechanism, a drive member drivingly connected with said drive shaft to effect rotation thereof upon rotation of said drive member, said drive member and said chain transfer drive gear each having a driving slot therein which slots have an aligned position, a driving key member movable into said slots and providing a drive connection between said drive member and said chain transfer drive gear and movable from said slots to break the drive connection therebetween; said driving key member having means cooperable with means on said chain transfer drive gear and drive member to effect alignment of the slots in said drive member and chain transfer gear as said key member moves into the slots when they are slightly misaligned.

9. A printing press as defined in claim 8 wherein said key member is supported on said driving member for shifting movement relative thereto transverse to the axis of rotation of said drive member and said key member has means cooperating with the driving member and chain transfer gear to effect shifting of said key member in response to movement into said slots when said slots are misaligned and is operable to effect rotation of said drive member when shifted to effect alignment of said slots.

10. A printing press as defined in claim 9 wherein said driving key member has opposite driving surfaces engageable with opposite surfaces defining said slots in said drive member and said chain transfer drive gear and through which the drive is transmitted, said surfaces having a camming cooperative engagement and effect

axial shifting movement of said key upon insertion thereof into said slots when said slots are misaligned.

11. A printing press comprising a frame; a pair of printing units supported in the frame; each of said printing units including an impression cylinder having gripper means thereon for advancing sheetlike material through its printing unit; a chain transfer mechanism having gripper means for receiving the material from the gripper means on the impression cylinder of one unit and for transferring the material to the gripper means on the impression cylinder of the other printing unit; common drive means for said printing units including a clutch means for disconnecting the printing units from each other so that each of said printing units may be driven independently of the other; a separate drive for said chain transfer mechanism from each of said printing units; each of said separate chain transfer drives including a printing unit drive gear for a different one of the printing units and driven from said common drive means, a chain transfer drive gear driven from said printing unit drive gear, a drive shaft for driving said chain transfer mechanism and supported adjacent a different one of said printing units, a drive member drivingly connected with said drive shaft to effect rotation thereof upon rotation of said drive member, said drive member and said chain transfer drive gear each having a driving slot therein which slots have an aligned position; a driving key member movable into said slots and providing a drive connection between said drive member and said chain transfer drive gear and movable from said slots to break the drive connection therebetween; said driving key member being cooperable with said chain transfer drive gear and drive member to effect exact alignment of the slots in said drive member and chain transfer gear as said key member moves into the slots when they are slightly misaligned.

12. In a printing press having first and second rotary cylinders with a driving gear mounted at the end of the first cylinder and rotatable therewith and a driven gear meshing with said driving gear and coaxial with the second cylinder and adapted to be drivingly connected to and disconnected from the second cylinder, the improvement comprising a clutch for drivingly connecting and disconnecting said driven gear and said second cylinder and for aligning said cylinders in predetermined angular position relative to each other and including a drive member fixed to said second cylinder, said drive member and the driven gear having alignable key slots, a driving register key member movable from a first position spaced from said slots wherein said driven gear and said second cylinder are not drivingly connected to a second position wherein said key member extends into said slots to drivingly connect said driven gear and second cylinder, an dmeans mounted on and rotatable with said second cylinder and operable to selectively effect movement of said driving register key member between said positions.

13. A printing press as defined in claim 12 wherein said key member includes a surface portion engageable with a surface portion of one of said slots during movement thereof toward said second position to align said slots by effecting relative rotation between said driven gear and said second cylinder to align said cylinders in said predetermined angular positions.

14. A printing press as defined in claim 12 wherein said slots in said driven gear and said drive member extend generally parallel to the axis of said second cylinder.

15. A register clutch as defined in claim 14 wherein said surface portion of said key member is angularly disposed relative to the direction of movement of said key member and said surface portions of said slots are angularly disposed relative to said direction of travel of said key member and with said surface portions of said key member and said slots slidingly engaged to effect said alignment of said slots.

16. A register clutch for drivingly connecting rotatable driving and driven members in a predetermined angular relationship with each other and comprising a register key member carried by one of said driving and driven members for rotation therewith, alignable slots formed in said driving and driven members, and actuating means connected to said one of said driving and driven members for moving said key members from a first position spaced from said slots to a second position wherein said key member extends into said slots to drivingly connect said driving and driven members, said key member including a surface portion engageable with surface portions of said slots during movement thereof toward said second position by said actuating means and operable to exert a force on said surface portions of said slots to effect relative rotation between said driving and driven members to align said slots and move said members into said predetermined angular relationship.

17. A register clutch as defined in claim 16 wherein said slots and said driving and driven members extend generally parallel to the axis of rotation thereof.

18. A printing press comprising a pair of printing units; each of said printing units including an impression cylinder having gripper means thereon for advancing sheetlike material through its printing unit; a chain transfer mechanism having gripper means for receiving the material from the gripper means on the impression cylinder of one unit and for transferring the material to the gripper means on the impression cylinder of the other printing unit, common drive means for said printing units including a clutch means for disconnecting the printing units from each other so that each of said printing units may be driven independently of the other; a drive for said chain transfer mechanism from at least one of said printing units and including a printing unit drive gear driven from said common drive means, a chain transfer drive gear driven from said printing unit drive gear, a drive shaft for driving said chain transfer mechanism, a drive member drivingly connected with said drive shaft to effect rotation thereof upon rotation of said drive member, and means for drivingly connecting said drive member and said chain transfer drive gear in a predetermined angular relationship with each other and comprising surfaces formed on said drive member and said chain transfer drive gear, a member movable from a first position spaced from said surfaces wherein said drive member and said chain transfer drive gear are disconnected and to a second position wherein said member engages said surfaces to drivingly connect said drive member and said chain transfer drive gear, and actuating means for selectively moving said member between said positions.

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