July 31, 1956 W. KOCH 2,756,995

SHEET TRANSFERRING DEVICE FOR MULTI-UNIT PRINTING MACHINES

Filed March 22, 1951 10 Sheets-Sheet 1

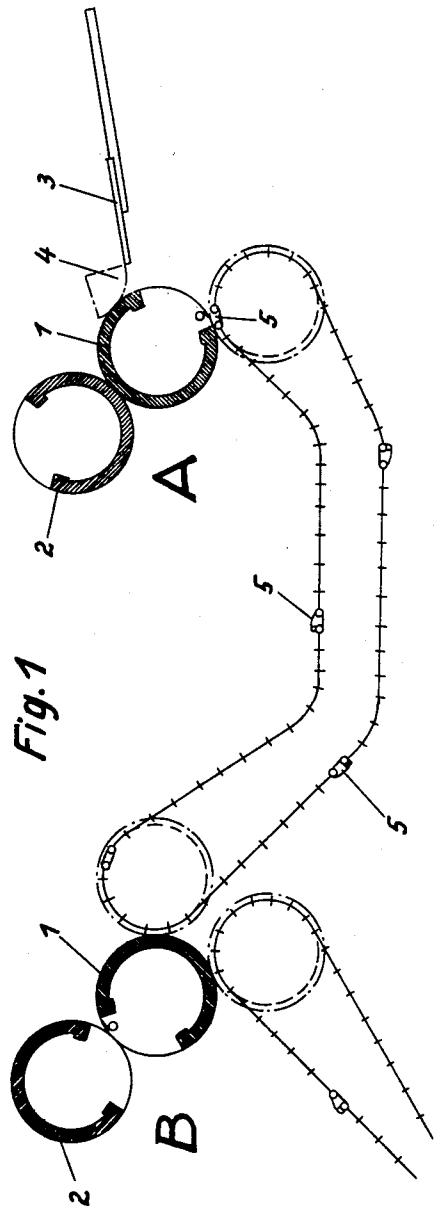


Fig. 1

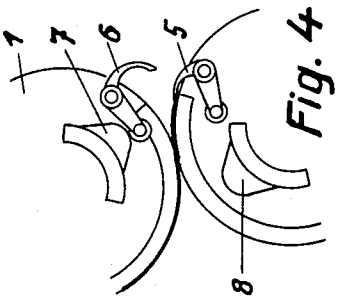


Fig. 4

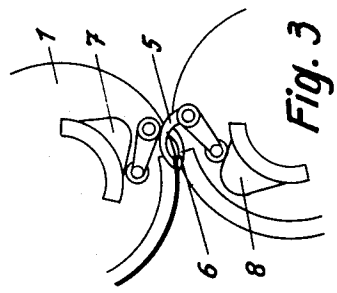


Fig. 3

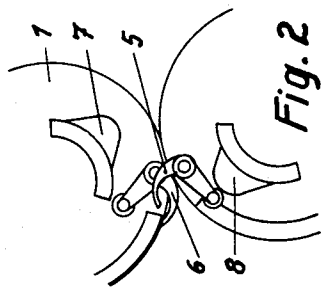


Fig. 2

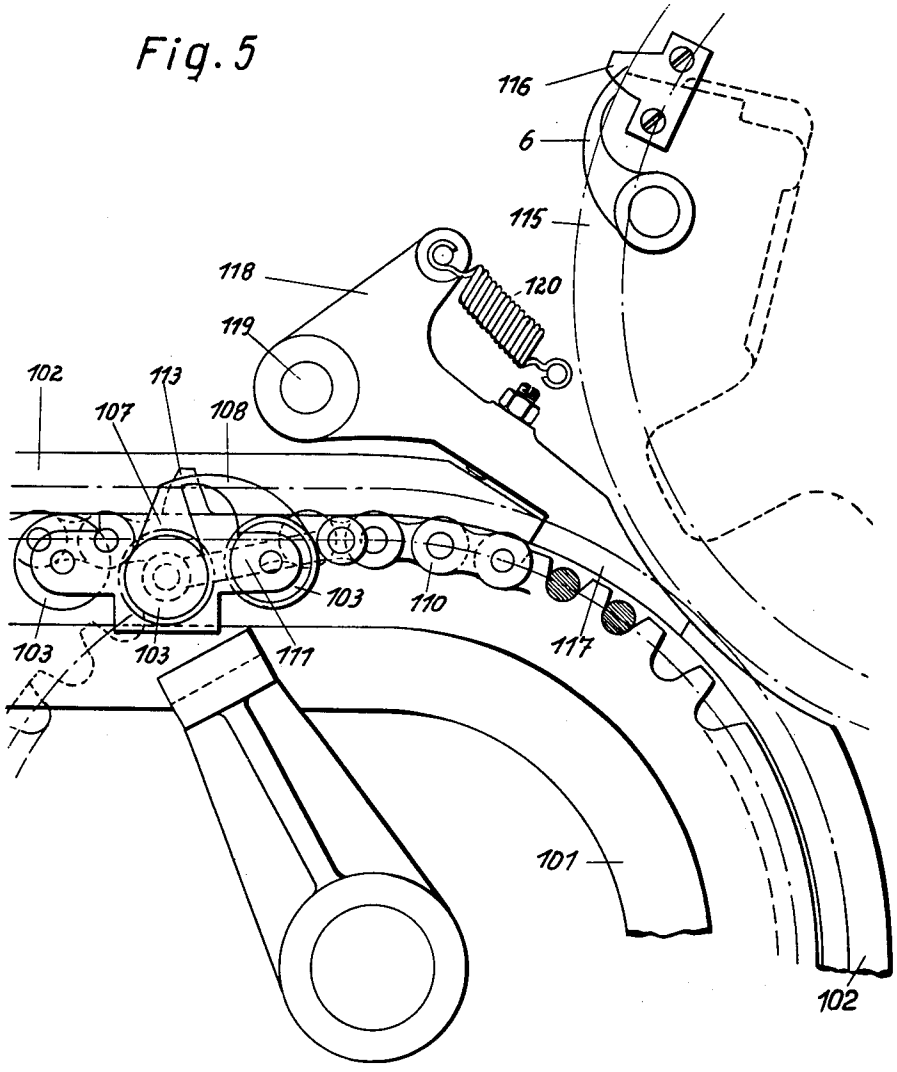
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July 31, 1956 W. KOCH 2,756,995

SHEET TRANSFERRING DEVICE FOR MULTI-UNIT PRINTING MACHINES

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Fig. 5



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SHEET TRANSFERRING DEVICE FOR MULTI-UNIT PRINTING MACHINES

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Fig. 7

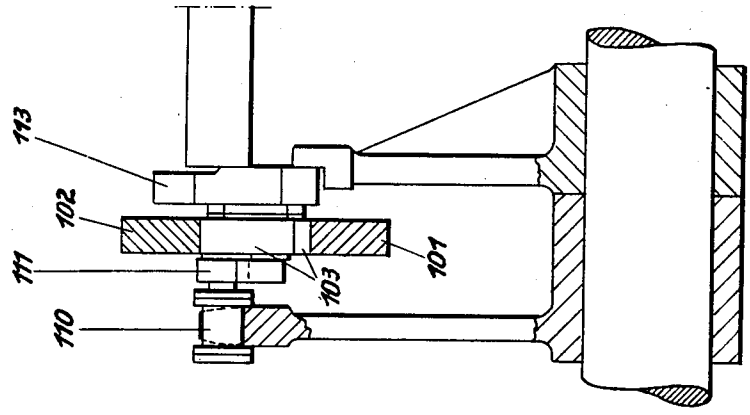
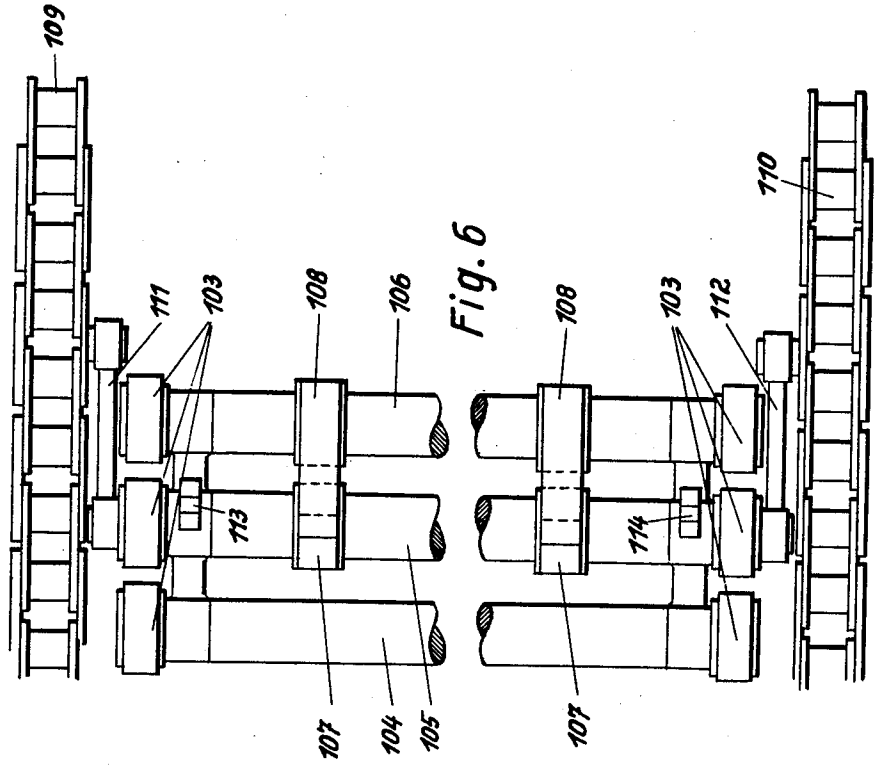


Fig. 6



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SHEET TRANSFERRING DEVICE FOR MULTI-UNIT PRINTING MACHINES

Filed March 22, 1951 10 Sheets-Sheet 4

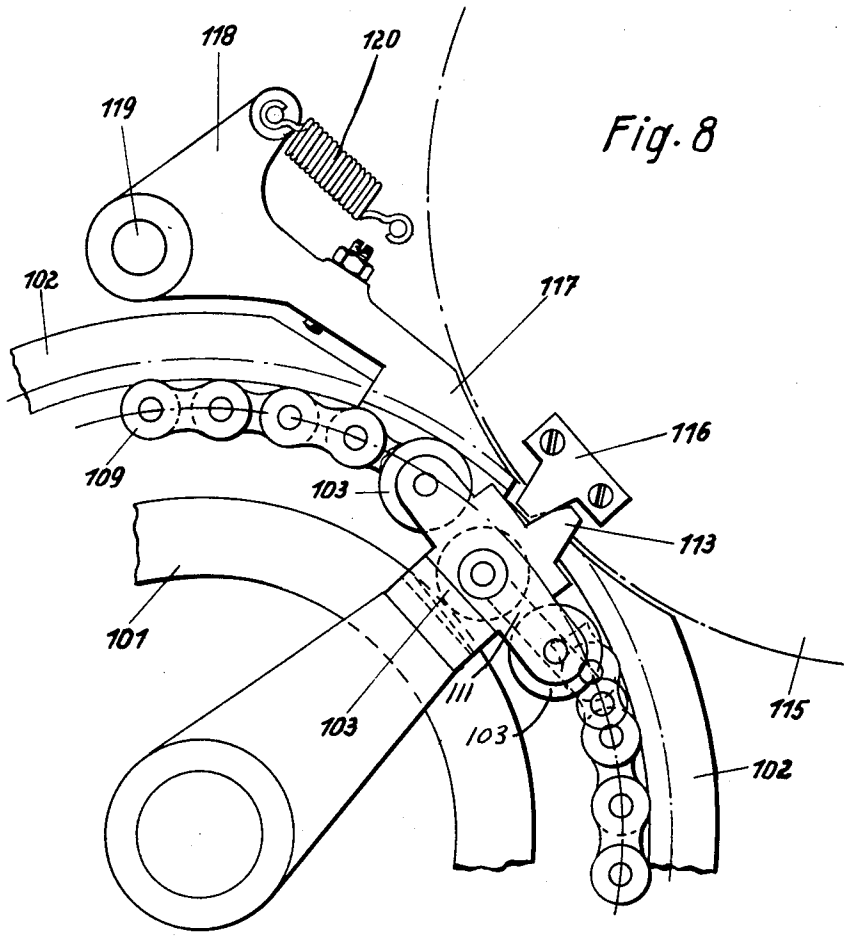


Fig. 8

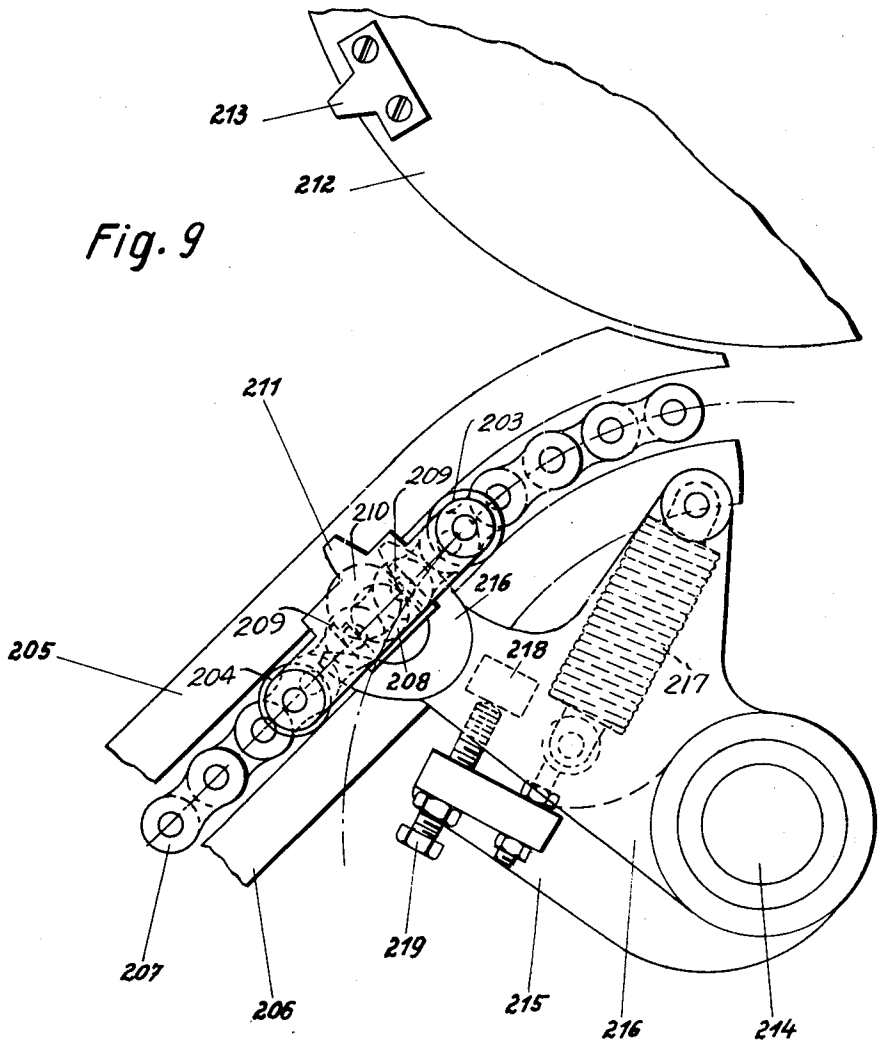
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SHEET TRANSFERRING DEVICE FOR MULTI-UNIT PRINTING MACHINES

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Fig. 9



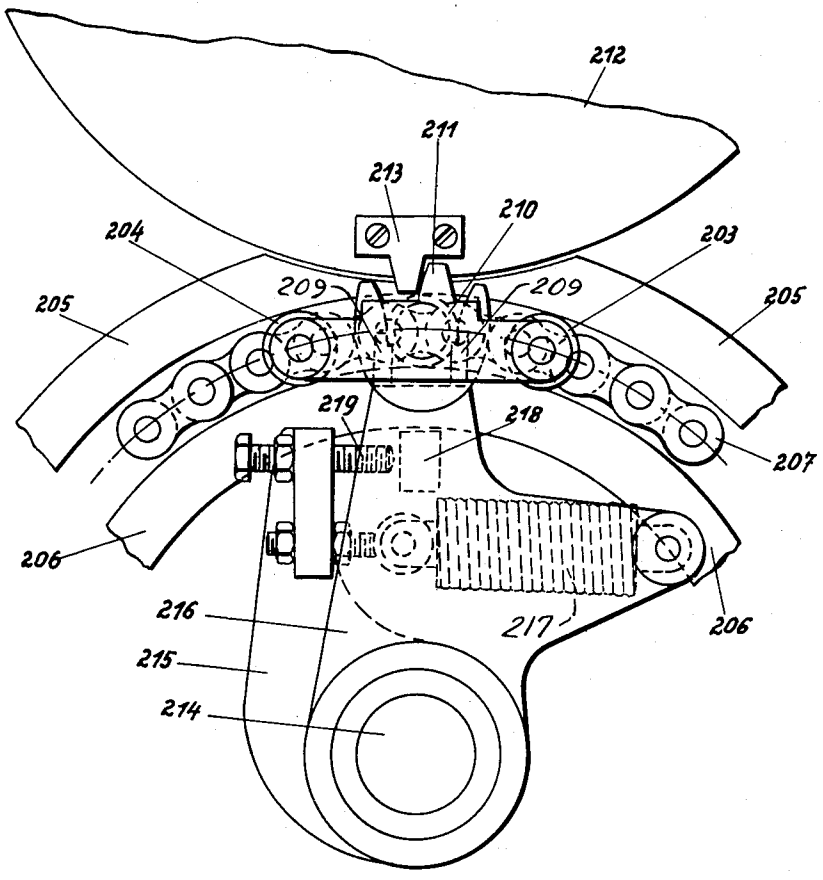
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July 31, 1956 W. KOCH 2,756,995

SHEET TRANSFERRING DEVICE FOR MULTI-UNIT PRINTING MACHINES

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Fig. 10



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SHEET TRANSFERRING DEVICE FOR MULTI-UNIT PRINTING MACHINES

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Fig. 11

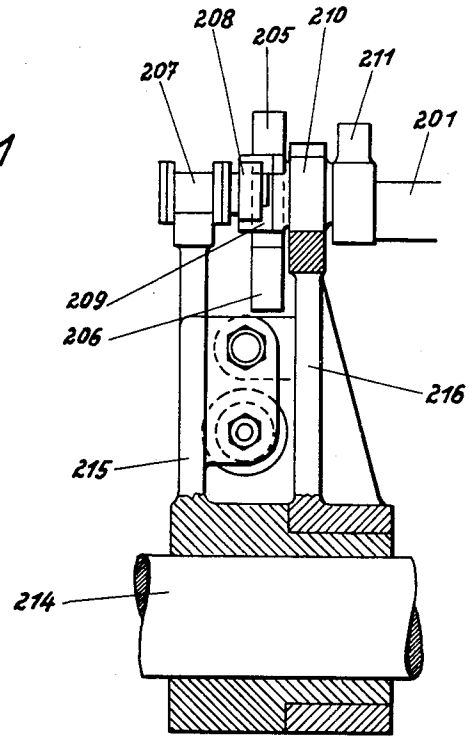
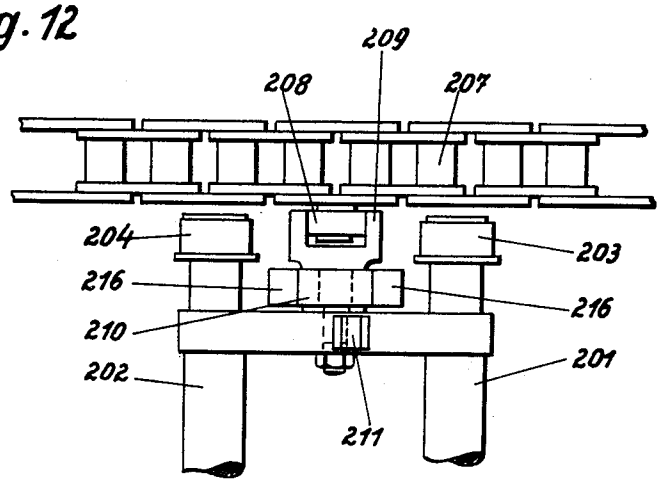


Fig. 12



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SHEET TRANSFERRING DEVICE FOR MULTI-UNIT PRINTING MACHINES

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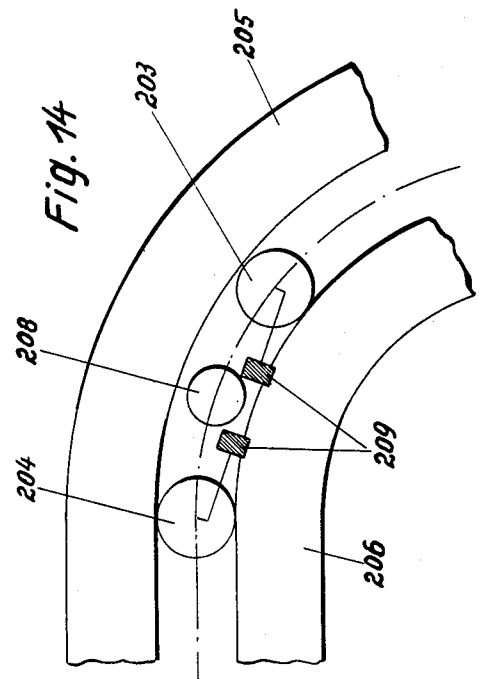


Fig. 14

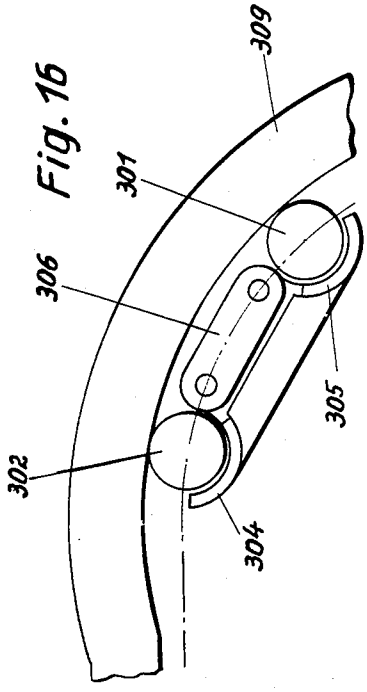


Fig. 16

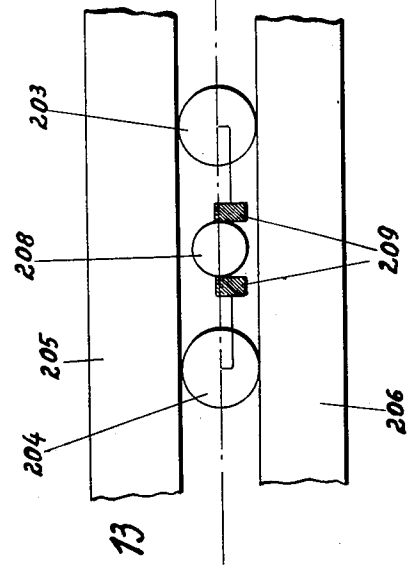


Fig. 13

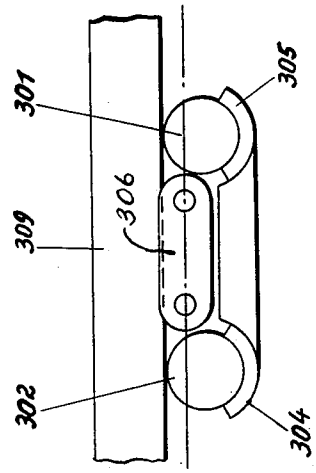


Fig. 15

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SHEET TRANSFERRING DEVICE FOR MULTI-UNIT PRINTING MACHINES

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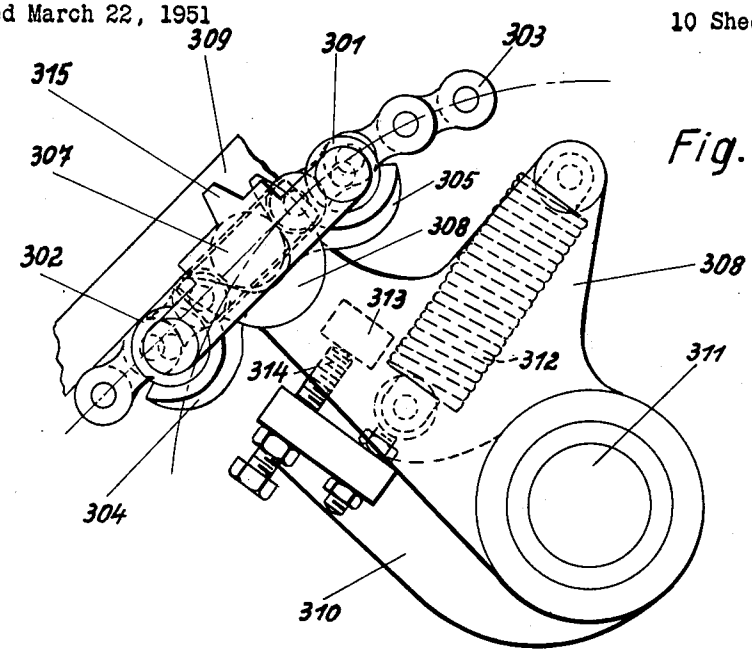


Fig. 17

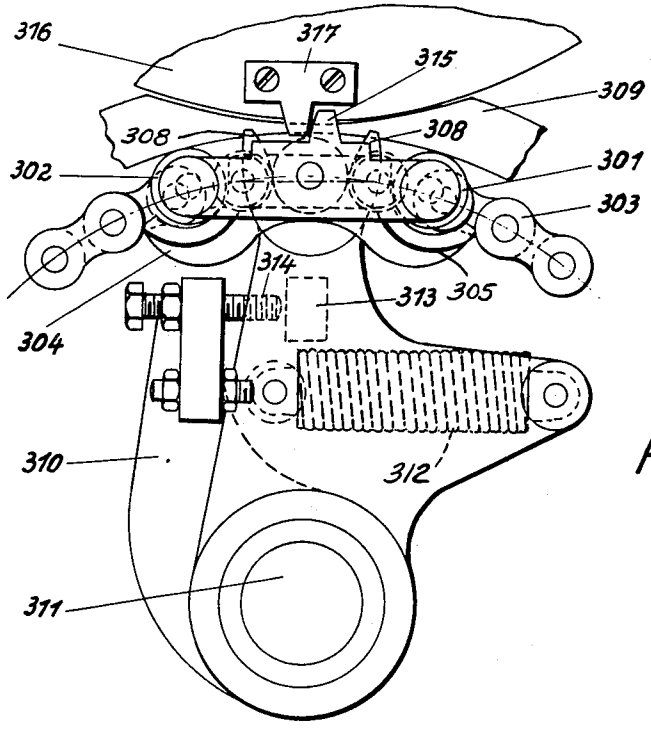


Fig. 18

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SHEET TRANSFERRING DEVICE FOR MULTI-UNIT PRINTING MACHINES

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Fig. 19

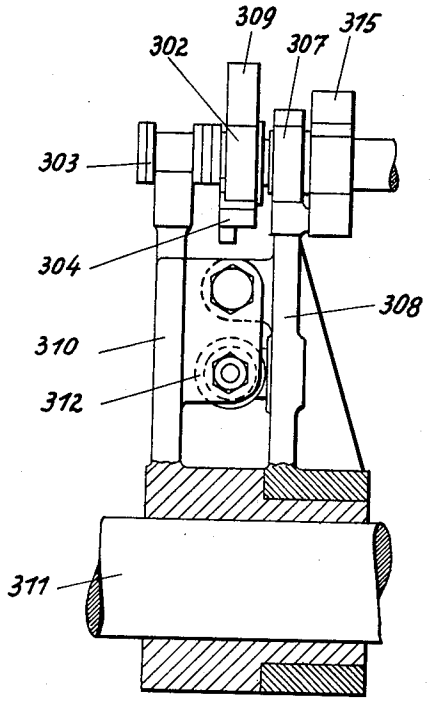
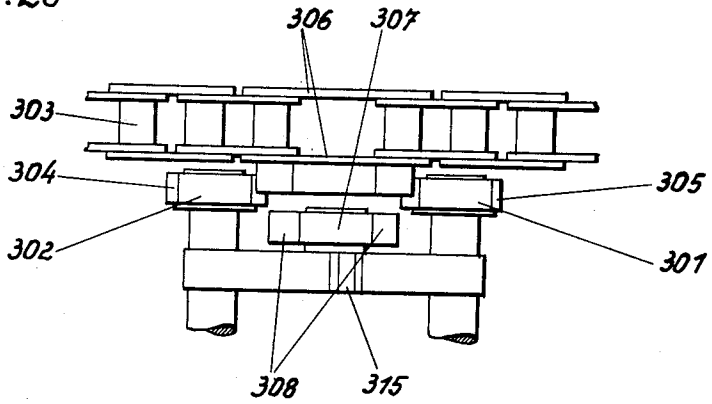


Fig. 20



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United States Patent Office 2,756,995 Patented July 31, 1956

2,756,995

SHEET TRANSFERRING DEVICE FOR MULTI-UNIT PRINTING MACHINES

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Application March 22, 1951, Serial No. 216,886

Claims priority, application Germany March 30, 1950

3 Claims. (Cl. 271—50)

The invention relates to an apparatus for the conveying, with correct spacing of sheets of paper between two printing machines, by means of chains with gripper systems comprising grippers and gripper pads mounted on chain carriages which take over the sheets of paper from the impression cylinders.

With apparatus of this kind, the point is that the sheets of paper should not be displaced on the transfer from the printing machine to the chain, because otherwise the printing in the subsequent printing machine does not coincide with the printing of the preceding printing machine.

For achieving this object, it has already been proposed to lock the chain gripper system automatically with the chain wheels during the transfer of the sheet of paper, in order to prevent any relative displacement of the chain gripper system to the printing machine during the transfer of the sheet of paper due to differences in the chain lengths. This locking was effected on the one hand through a recess in the chain wheel for the reception of the frame of the gripper system and further by rotatable cheeks which held the frame fast in the recess in the chain wheel.

The effectiveness of this apparatus depends on the chain wheel having exactly the right position in regard to the pressure cylinder on the transfer of the sheet of paper, and further on the locking of the chain gripper system concerned in the chain wheel taking place in a completely satisfactory manner. In the practical execution of the known proposal, these assumptions are frequently not guaranteed satisfactorily or with the requisite accuracy.

The invention aims at providing an apparatus in which the transfer, with correct spacing of the sheets of paper from the printing system to the chain system is ensured in a completely satisfactory manner, and is based on the fact that during the transfer the chain gripper systems are driven directly by the impression cylinder and the chain conveyor is put out of action for this interval of time.

The purpose of the invention is realised by connecting the chain gripper systems relatively movably with the chains and by equipping the impression cylinders with a device, e. g. a stop, which brings the chain gripper system into an exact position relative to the impression cylinder during the transfer of the sheet of paper independently of their drive.

The relatively movable connection of the chain gripper system with the chains can be effected in accordance with the invention in various ways.

In one construction, each gripper system is displaced on a chain carriage which is connected with the chains by link rods, whilst there is interposed in the outer chain guide a resilient part which permits the tipping of the chain carriage on its adjustment by the impression cylinder.

In a second construction the chain carriage is detachably connected with the chains and is released on its revolution about the chain drum, while drivers are disposed on the drum which drive the chain carriage on its revolution about the chain drum.

The drawings show some embodiments of the invention as examples.

Fig. 1 is a diagrammatic representation of two printing machines connected with each other by chain systems.

Figs. 2–4 show the gripper systems of the printing machines before, during and after the transfer of the sheet of paper.

Figs. 5–8 show an embodiment in side elevation before and during the transfer (Figs. 5 and 8), elevation (Fig. 6) and side view (Fig. 7).

Figs. 9–12 show a second embodiment in side elevation before and during the transfer (Figs. 9 and 10) in side view (Fig. 11) and elevation (Fig. 12).

Figs. 13 and 14 are a diagrammatic representation according to Figs. 9–12.

Figs. 15 and 16 are a diagrammatic representation of a third construction.

Figs. 17–20 show the third construction in side view before and during the transfer (Figs. 17, 18), in side elevation (Fig. 19) and elevation (Fig. 20).

According to Fig. 1, two printing machines A and B are disposed one behind the other. Each printing machine consists of an impression cylinder **1** and a blanket cylinder **2**. The sheet of paper lying on the supporting table **3** is made to bear on the impression cylinder **1** by the preliminary gripper **4** and is seized by the gripper system of this impression cylinder. From this gripper system the sheet of paper is transferred to the chain gripper system **5** and conveyed to the printing machine B, where the operation is repeated.

According to Figs. 2–4, the sheet of paper is held fast on the impression cylinder **1** by a gripper system **6** which is controlled in the usual way by a fixed cam **7**. The chain gripper system **5**, which is shown purely diagrammatically, is controlled by the fixed cam **8**. On transfer of the sheet of paper (Fig. 3) both gripper systems are closed. In order that this may take place at the right moment and that thus conveying of the sheet of paper with correct spacing, from the printing machine A to the printing machine B may be ensured, according to the invention the chain gripper system **5** independently of its chain drive is brought by the impression cylinder **1** into an exact position relative to the said cylinder **1**. After termination of the transfer of the sheet of paper, the gripper system **6** of the impression cylinder **1** can then open without the sheet of paper being able to become displaced, because it is already held fast by the chain gripper system **5** before the opening of the gripper system **6**.

In the form of construction of the invention according to Figs. 5–8, the chain gripper system consists of a gripper carriage which is guided between guides **101** and **102**. The rollers **103** of the gripper carriage run in these guides. The side parts of the carriage are connected with each other by bars **104**, **105** and **106**. The bar **105** is constructed as a fixed central cross-bar and carries the gripper pads or supports **107**. The bar **106** is disposed so that it can be rocked relative to the cross-bar **105** and carries the grippers **108**. The latter are controlled in the usual manner by a roller lever, not shown for the sake of simplicity, and by a cam belonging thereto, as is shown diagrammatically in Figs. 2–4.

Each gripper carriage is loosely connected to the two lateral chains **109**, **110**, by means of a drawbar **111**, **112**. The gripper carriages are thus carried along by the chains **109** and **110** and drawn through the guides **101** and **102**. The gripper carriages and thus the chain gripper systems are relatively movably connected with the chains **109**, **110** by drawbars **111** and **112**.

On each of the two side parts of the gripper carriage

is fitted a guide finger 113 or 114 respectively. On each side of the impression cylinder 115 is disposed a guide finger 116 which comes into engagement with the guide finger concerned, 113 or 114 of the gripper carriage, shortly before the transfer of the sheet of paper.

The arrangement of the guide finger 116 on the impression cylinder 115 is so selected that each guide finger 116 carries out a light pushing movement upon the fingers 113 or 114 respectively on the gripper carriage. Since the gripper carriage is connected with the chain by the drawbars 111, 112, it can only follow this pushing movement by the fingers 116 when it can swing out about the securing point of the bars 111, 112 to the gripper carriage. This securing point or the securing axis of the guide rods 111, 112 is preferably located in the centre of the middle carriage roller 103.

In order to make possible this tipping movement of the gripper carriage about the axis of the middle roller 103, a section of the outer guide 102 is constructed as a resilient part 117. This resilient part forms the head of a bell crank 118 which can be rocked about a stud 119 and is loaded by a draw spring 120.

If the gripper carriage is displaced by the guide finger 116 of the pressure cylinder 115, then it can tip when its rear rollers 103 are in the range of the resilient part 117 (Fig. 8). The lever 118 then rocks about its pivot 119 against the action of the spring 120.

Through the arrangement described, it is brought about that the gripper carriage and thus the chain gripper system is brought into the correct position for the taking over of the sheet of paper for the transfer of the sheet of paper from the impression cylinder 115 and is kept in this position until the transfer of the sheet of paper is completed and, in fact, independently of the chain drive of the gripper carriages and of any differences in length of the chains 109 and 110.

A second form of construction of the invention is shown constructionally in Figs. 9–12 and purely diagrammatically in Figs. 13 and 14. The grippers have been omitted for the sake of general clarity. The gripper carriage consists of two bars 201, 202 with rollers 203, 204 on which it runs between the rails 205, 206. The gripper carriage is detachably connected with the chain 207 by a roller 208 which engages in a slide 209 on the gripper carriage. On the carriage side, the slide 209 carries a roller 210. Further, a guide finger 211 is disposed on the side part of the gripper carriage and a guide finger 213 is disposed on the impression cylinder 212.

As long as the chain runs in a straight line (Fig. 13), the gripper carriage is coupled with the chain 207 by the roller 208 and the slide 209. When the chain runs up onto the chain drum and its path is curved thereby, the slide 209 (Fig. 14) drops, because it is located on the chord of the two rollers 203 and 204. The connection between the gripper carriage and the chain 207 is thereby released.

In order to convey the gripper carriage during the revolving of the chain 217 about the chain drum, a special revolving device is provided. A lever 215 is firmly keyed to the drum shaft 214 and on the hub of this lever is loosely mounted a forked lever 216. The forked lever 216 is connected with the lever 215 by a draw spring 217. The spring 217 pulls a nose 218 of the lever 216 against a stop, e. g. a setting screw 219 on the lever 215.

On leaving the straight track between the rails 105 and 206, the roller 210 of the gripper carriage becomes placed in the fork of the lever 216, which drives the gripper carriage while the chain 207 is revolving about the chain drum.

As soon as the guide finger 213 of the impression cylinder 212 bears against the guide finger 211 of the chain carriage and thereby advances the chain carriage, the forked lever 216 detaches itself from the stop 219 and the spring 217 pulls the gripper carriage with its guide

finger 211 against the guide finger 213 of the impression cylinder 212. Through the co-operation of these two guide fingers, the chain gripper system is thus brought during the transfer of the sheet of paper into an exact position relative to the impression cylinder 212.

The third form of construction according to Figs. 15–20 corresponds in its fundamental method of operation to the second form of construction according to Figs. 9–14. It differs only by the means in which the gripper carriage is detachably connected with its guide chains.

According to Figs. 15–16 on the rectilinear course of the chain 303 the rollers 301 and 302 of the gripper carriage rest in cups 304, 305 of a long chain link 306. On the gripper carriage there is a third roller 307 which corresponds to the roller 210 in the second form of construction. The roller 307 lies in the pitch circle of the chain 303 and is guided in this pitch circle line by the forked lever 308 about the chain drum.

On the revolving of the gripper carriage about the chain drum it is thus suspended in the forked lever 308 by the roller 307 and the rollers 301 and 302 are guided by an outer guide rail 309. The roller cups 304 and 305, which are connected with the chain by the long chain link 306 and which on the running up of the chain 303 onto the chain drum come into a chordal position, hereby become released from the rollers 301 and 302, so that the gripper chain system is detached from the chains.

The forked lever 308 is disposed, in the same manner as the forked lever 216 in the second form of construction, so as to be loosely rotatable on a lever 310, which is firmly keyed to the chain drum roller 311. The spring 312, the nose 313, and the stop 314 corresponds to the spring 217, the nose 218 and the stop 219 in the second form of construction.

On the gripper carriage a guide finger 315 is disposed at each side and on the printing cylinder 316 is disposed a guide finger 317.

The method of operation on the transfer of the sheet of paper is the same as in the second form of construction so that it is superfluous to repeat the description.

The invention is not limited to the three forms of construction illustrated, but in its consrtuctional details can be extensively modified and adapted to the particular needs of the individual case, without deviating from the basic idea of the invention.

I claim:

1. In a sheet transferring device wherein a sheet is transferred between first grippers mounted on a first cylinder and second grippers transported by chains around a second cylinder: three substantially coplanar bars rigidly interconnected, the central of said bars being pivotally connected to the chains, the outer of said bars constituting a support for the second grippers, a first abutment on the first cylinder, a second abutment on the support, and resilient means adjacent the chains and the first cylinder for contacting one of the outer of said bars to cause the support to pivot about said central bar and urge said abutments into close contact when the grippers are substantially on a line joining the centers of cross-sections of the two cylinders to locate the grippers with relation to each other for the transferring of the sheet.

2. In a sheet transferring device wherein a sheet of paper is transferred between first grippers mounted on a first cylinder and second grippers transported by chains around a second cylinder: three rigidly interconnected bars, two of said bars being mounted in substantially opposite sides of the third of said bars and constituting a support for the second grippers, connecting means for pivotally connecting said third bar to the chains, an abutment on the first cylinder, another abutment on the support for contacting the first said abutment, and a resilient member adjacent the chain and said first and second cylinders for contacting one of said two bars to pivot the support about said connecting means so that said abut-

ments are forced into close contact when the grippers are substantially on a line joining the centers of the cross-sections of the cylinders to locate the grippers with relation to each other for transferring of the sheet.

3. A sheet transferring device comprising an impression cylinder, grippers mounted on said impression cylinder, a first abutment mounted on said impression cylinder, a drum, chains around said drum, a central bar pivotally connected to said chains, outer bars rigidly affixed on opposite sides of said central bar and constiting a carriage pivotable about said central bar, second grippers mounted on the carriage, a second abutment mounted on the carriage, and resilient means adjacent said chains, said drum and said cylinder to contact one of said outer

bars and urge the carriage to pivot about said central bar whereby said abutments are forced into close contact when the grippers are substantially on a line joining the centers of cross-sections of the two cylinders to locate the grippers with relation to each other for the transferring of the sheet.

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