Oct. 17, 1967 J. BIRMANS 3,347,285

SUCTION DEVICE FOR DROP BOX LOOM HAVING WEFT REPLENISHMENT MEANS

Filed April 8, 1966 3 Sheets-Sheet 1

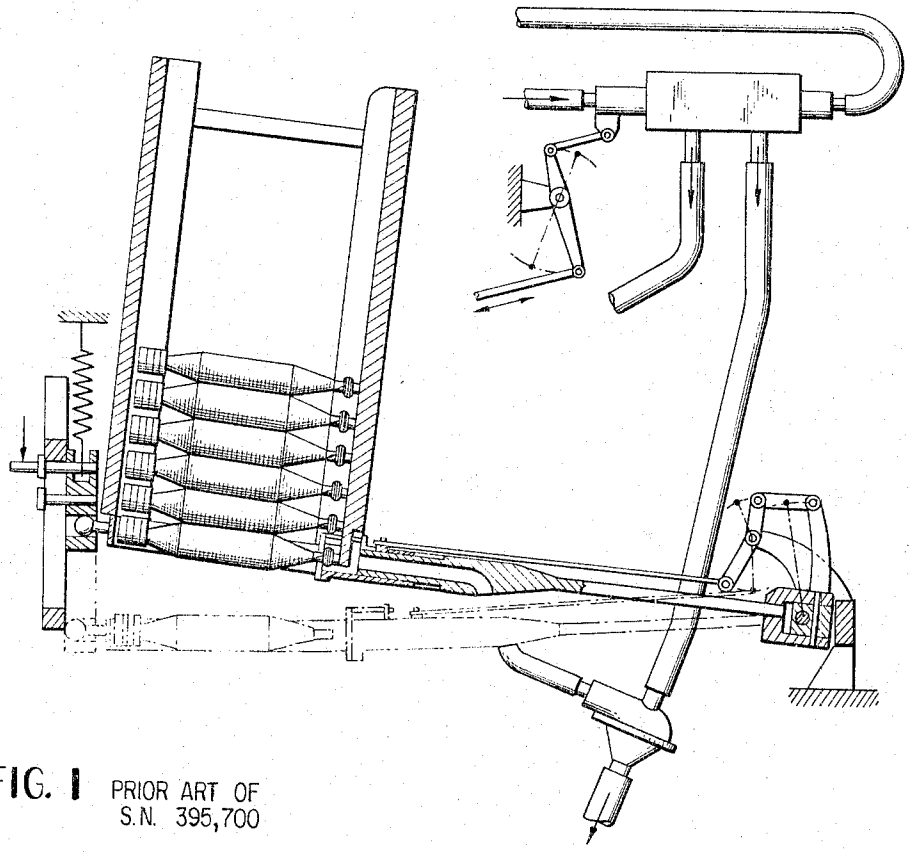

FIG. 1 PRIOR ART OF S.N. 395,700

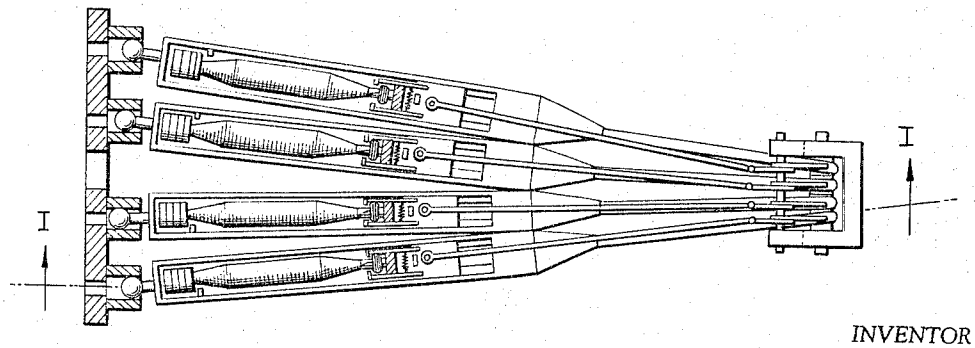

FIG. 2 PRIOR ART OF SN. 395,700

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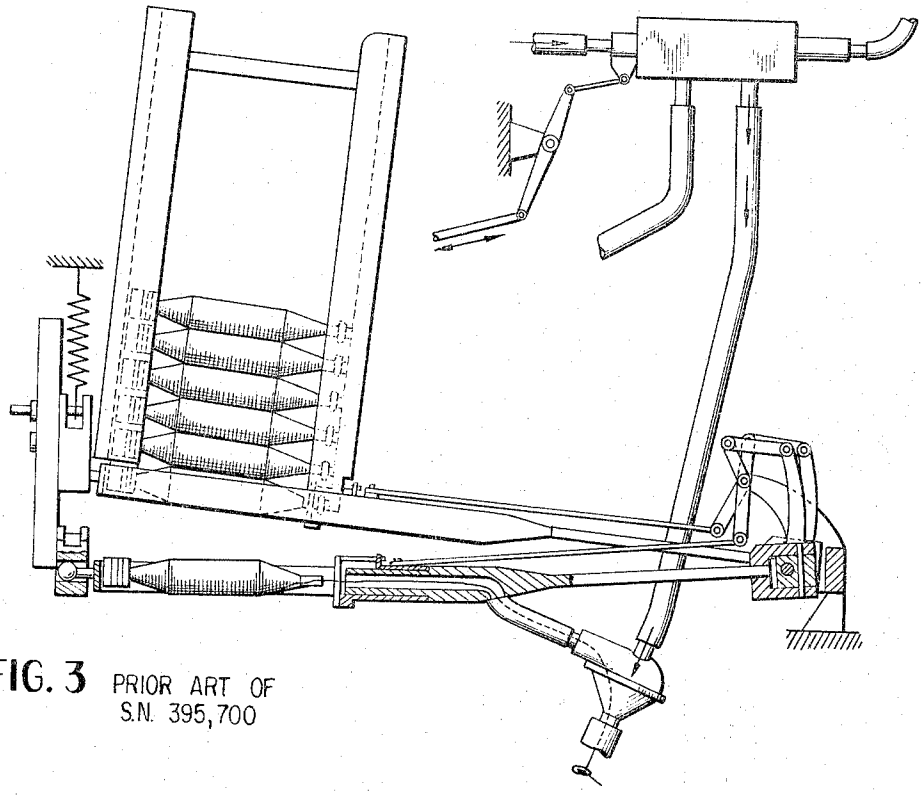

FIG. 3 PRIOR ART OF S.N. 395,700

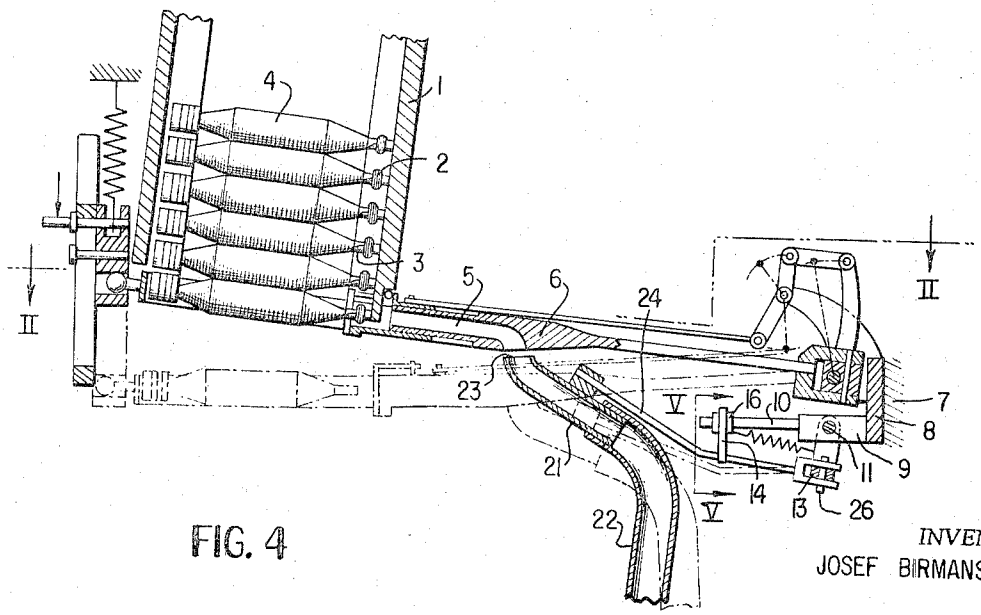

FIG. 4

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FIG. 5

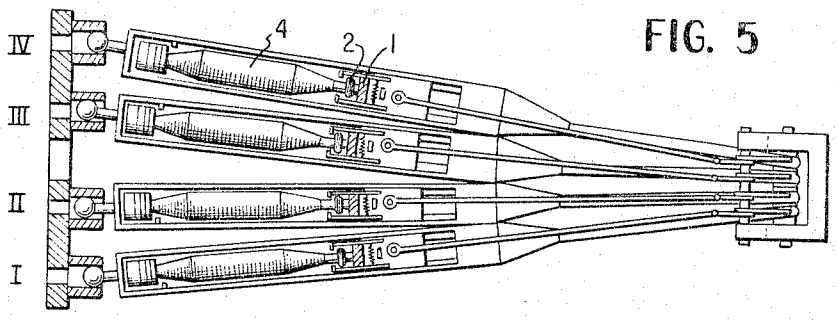


FIG. 6

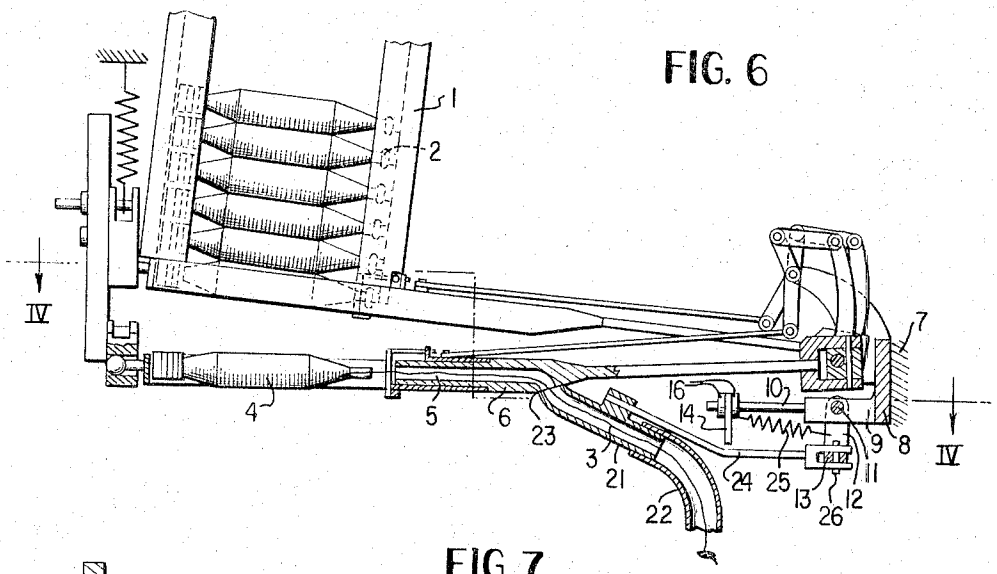


FIG. 7

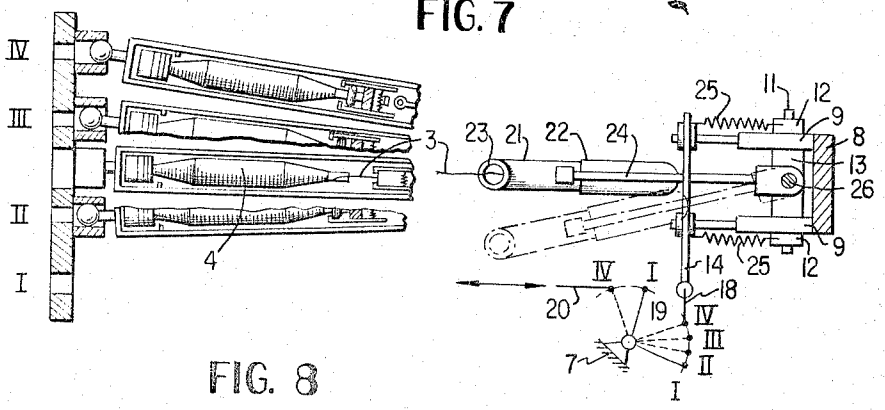
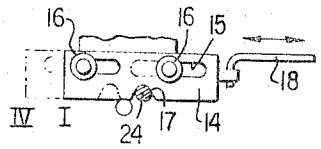


FIG. 8



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3,347,285

SUCTION DEVICE FOR DROP BOX LOOM HAVING WEFT REPLENISHMENT MEANS

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Filed Apr. 8, 1966, Ser. No. 541,150
Claims priority, application Switzerland, Apr. 13, 1965, 5,140/65
2 Claims. (Cl. 139—257)

ABSTRACT OF THE DISCLOSURE

In a suction drop box loom having a suction race and a weft replenishing device which transfers the weft from a pirn magazine to the suction race, a mechanism for guiding the suction pipe in a predetermined path with the mouth of the pipe communicating with the mouth of the suction race and a steering mechanism which guides the pipe in accordance with the reciprocating movement of the drop box.

This invention relates to automatic changer type looms of the type shown in Wiget et al., U.S. Patent No. 2,836,202, dated May 27, 1958. More particularly, it relates to a new suction pirn changing device for the end loops of weft pirns for drop box looms, this new device moving the weft pirns from the resting position into the weft operating position by means of a novel pivoting pirn catching mechanism which comprises pirn catchers having a suction transfer tube defining a suction race and a displaceable pre-guided suction pipe having a mouth piece which is placed directly under the exit opening of the suction race which is on the underside of said pirn catcher.

The Wiget et al. patent, referred to above, provides a loom with a pirn changer wherein each compartment of the magazine has a movable pirn guard of oblong configuration coordinated with it which is designed to intercept the pirn resting at the bottom of the pile in the compartment and where, for purposes of every pirn change operation, the respective pirn guard is moved automatically into a transfer position, common to all the guards, located above the shuttle which is to receive the pirn.

This improved pirn changing device of Wiget et al. replaced a changer for multi-compartment magazines. This older mechanical device comprised a series of pirns placed side by side in the magazine from which the selected pirn was pushed by a feeler on the loom to a gravity chute adjacent the magazine. The feeler in this old device must cooperate with the hammer of the shuttle so that the pirn which is being replaced is thrown out of the shuttle when the new pirn drops, by gravity, through a chute.

The Wiget et al. patent improved this old device by employing a new combination of an oblong pirn guard with the mechanical control rod crank lever mechanism which automatically displaces the oblong guard during the pirn change. The pirns which are employed in U.S. Patent No. 2,836,202 have no end loops and the free ends

of the threads (*e*) are led to the pegs **21** as shown in FIGS. 1 and 2 therein.

The copending application in the name of August Wirz, Ser. No. 395,700, filed Sept. 11, 1964 (now abandoned), and refiled at U.S. Ser. No. 585,794 on Aug. 11, 1966, and entitled "Bobbin Change Device for Weft Replenishing Looms," uses pirns with end loops in order to simplify the magazine construction and to facilitate more efficient pirn transfer based upon a suction draw-off principle which will be better understood by referring to FIGS. 1, 2 and 3 herein which are the prior art of this U.S. patent application Ser. No. 395,700.

The displaceable pre-guided suction pipe of the present invention and the novel steering means for this suction pipe which reciprocates in accordance with the drop box motion of the loom will be more clearly understood by referring to the accompanying drawings, FIGS. 4–8 thereof, illustrating the improvement in the machine environment of the Wirz application, Ser. No. 395,700, with exemplary FIGS. 1–3 reproduced.

FIG. 1 herein is a side elevation, partly in section along line I—I of FIG. 2 of the Wirz device;

FIG. 2 is a plan view of the Wirz device;

FIG. 3 is another side elevation view of the device of Wirz to illustrate the rocking displacement operation of the 2-armed lever connecting rod to the stripping slide which serves to remove the weft end loop at **48**, the end loop being gripped and held under the influence of suction;

FIG. 4 is a sectional view illustrating the mouth-to-mouth engagement of the reciprocally movable pneumatic pirn catcher and race passageway of the Wirz type in association with the novel laterally guiding steering means, the latter functioning reciprocally with rod and lever displaced by the drop box motion of the loom;

FIG. 5 is a view along line II—II of FIG. 4 and illustrates the operation of the oblong pirn transfer member in cooperation with its mounting rod, and further illustrates the output of the rocking arm movement of the 2-armed lever at the connecting rod end for the operation of the stripping slide;

FIG. 6 is another sectional view similar to that of FIG. 1 with parts shown in a different operating position during the controlled lateral movement of the suction pipe;

FIG. 7 is a sectional view taken along line IV—IV of FIG. 6; and

FIG. 8 is a side view of a fragment of the steering mechanism seen from line V—V of FIG. 4.

In the Wirz application, a fixed suction pipe **41** is proposed as the pneumatic means for cooperating with reciprocally movable pirn catcher, the fixed pipe being located below the pirn catcher and magazine **1**. In Wirz, fixed pipe **41** is brought into registration at its open end or mouth with the open end or mouth **26** of the race passageway **25**.

During weaving in Wirz, valve **37** (FIG. 1) controls pressurized air from the pump (not shown) to feed injector **40** through pipe **39** whereby, under the Bernouilli principle, a vacuum is created in fixed suction pipe **41**. Rod **45**, lever **46** and slide **47** serve to operate control valve **37** in synchronization with pirn transfer. Pirn slide plate transfer member **14** is brought into its transfer position to select bobbin **4** which is brought over the shuttle

during a first movement which is a downwardly directed movement of the transfer member **14**. Pins **49** (FIG. 2) operate in a manner similar to that shown in FIG. 5 of the Wirz application and these pins slide away from the wedge-shaped bottom portion of wall **3** and stripping jaws **50** are thereby actuated to grip the edge of the pirn. The downward movement of the transfer member **14** rocks lever **32** counterclockwise, produces a corresponding rocking movement through connecting lever **31** and the 2-armed lever **27**, **28** and thereby pulls connecting rod **29** and its stripping slide **30** towards the right. As a result of this movement towards the right, the weft end loop **48** is entrained in the vacuum, e.g. is effectively gripped and firmly held, under the influence of suction alone which is for as long as they are held in mouth-to-mouth relation.

This gripping and holding movement of the weft end loop by suction occurs at the very end of the path of the downward movement of the pirn catcher. Thereafter, in Wirz, the transfer member **14** is returned to its starting position (solid line showing of FIG. 1). Stripping slide **30** moves towards the left while transfer member **14** returns and the stripping slide is ready to receive the next pirn.

As shown in FIG. 5 of the Wirz application and as indicated in the present application in FIG. 2, during the return of transfer member **14** to its starting position, the pins **49** will connect with jaws **50** and thereby engage the wedge-shaped bottom portion of wall **3** against the force of spring **51** which causes the jaws **50** to open. This adapts the transfer member for its next pirn catching operation with jaws **50** in open condition and pins **49** pressing wedge parts of wall **3**.

The pirn catcher suction race **25** is brought into registration with the fixed suction pipe by following a critical path. The synchronization of the movement of the 2-armed lever **27**, **28** and transfer member **14** with the pirn magazine and with the pivoted bobbin transfer is such that the operative connection between the race passageway and pipe occurs at the very end of the path of the downward movement of the pirn catcher.

As a result of the last minute mouth-to-mouth connection between movable pirn catcher and fixed suction pipe, difficulties have been noticed in monitoring the Wirz device for proper operation. More specifically, the full benefits of the Wirz device have not been achieved because the movement of the weft pirns from the magazine resting position into the weft dosing position cannot be visually followed and the rocking lever and rod mechanism must be adjusted within very narrow limits.

The present invention achieves a new and inventive improvement in the pneumatic suction race by means of a displaceable suction jet, illustrated in FIGS. 4–8, which is steered so that its mouth is always in position relative to the suction race of the pirn catcher device and is placed directly under the mouth of the pirn catcher even in the early stages of pirn transfer movement. The pirn catcher is in the starting position and adjoined to the operating shuttle, and during a pirn change the suction jet is moved simultaneously with the pirn catcher into the transfer position. The suction jet synchronously reciprocates with a steering member, the movement of which is dependent on the drop box motion.

The weft pirns **4**, comprising the weft threads **3** with the end loops **2**, are arranged in the supply magazine **1** which is divided into four sections, as illustrated in FIG. 8 of the Wirz application. The pirn catcher **6**, with suction race **5** therein, is located underneath the supply magazine **1** to move the weft pirns **4** from the ready position into the weft position in the manner illustrated in FIGS. 6 and 7. As a result of the downward movement of the pirn catcher, the end loop **2** is stripped from the pirn end in the conventional manner (see FIG. 1 illustrating the operation in Wirz) and is guided to the suction race **5** of the pirn catcher **6**.

The two carriers **9**, with pins **10**, are attached to the

support **8** which is mounted on the loom frame **7**; and levers **12** are pivotally secured to these displacement parts by means of pin **11**. These levers are joined by traverse **13**. Slide plate **14** is placed on the free end of pins **10** and is laterally displaceable between the eyelets **16** within the range of slots **15** (FIG. 8). Slide plate transfer member **14**, with groove **17** located in the lower part, can be displaced by the movement of rod **18** which is connected, by means of angle lever **19**, to the control rod **20** leading to the drop box initiating mechanism. The displaceable pre-guided suction pipe **21** is connected to the flexible suction hose **22** and has a mouth piece **23** at its free end. One end of rod **24** is connected to the displaceable suction pipe **21**, while the other end, which is forked, is pivotally joined with traverse **13** by means of a pin **26**. Tension springs **25** are each attached to the eyelets **16** at one spring end and to the levers **12** at the other spring end to turn the levers **12** in a clockwise manner, so that mouth piece **23** of the suction pipe **21** is held firmly in mouth-to-mouth registration with the exit opening of the suction race **5** of the pirn catcher **6**.

The four positions of the shuttle boxes correspond to the positions I–IV of the angle lever **19**. The two extreme positions of transfer member **14** are illustrated in FIG. 8.

It is emphasized that the displaceable suction pipe **21** is always positioned under that section I–IV of the supply magazine **1** of which the shuttle is operaing at that particular time. For example, if the shuttle operating with the pirns corresponds to section I, the lever **19** is positioned and aligned according to the solid line in FIG. 7 and, simultaneously, the slide plate transfer member **14** takes its position towards the far right of FIG. 7 so that rod **24**, catching the groove **17** of the slide plate transfer member **14**, holds the suction pipe **21** under the pirn catcher **6** of section I.

When a pirn change takes place, the pirn catcher **6** will be displaced by the drop box initiating mechanism away from its starting position into the transfer position as shown in FIG. 6, and simultaneously the end loop **2** is stripped from pirn **4** and drawn into the suction race **5** of the pirn catcher **6**. By virtue of the mouth-to-mouth registration of the exit opening of the suction race with the mouth **23** of the displaceable suction pipe **21**, the end loop **2** is drawn downwardly through the flexible suction hose **22** into a receiver which is not shown because it is not part of the pirn catcher. The pirn catcher **6** then returns to its starting position underneath the supply magazine **1** and the tension springs **25** effect the displacement of the displaceable suction pipe **21** into the position under the pirn catcher **6** which is shown in FIG. 4.

From the foregoing, it will be seen that the novel pre-guided suction pipe provides a new coaction in the drop box loom fitted with a pirn magazine for the delivery of weft threads, the new coaction resulting from the downward movement of the pivotally mounted pirn catcher having the suction race mouth at its lower surface and the registering lateral movement of the suction pipe which is always ready for mouth-to-mouth connection because of the steering mechanism providing guidance for the pipe. This steering guidance for the pipe is based upon the operation of the laterally displaceable slide plate with a groove for reciprocating rod and lever connection which laterally swivels the pipe in accordance with the 2-armed lever and rod movement of the pirn catcher.

I claim:

1. A drop box loom comprising a drop box, an operating shuttle, a pirn magazine for delivery of weft pirns, a pivotally mounted movable pirn catcher including a suction race having a mouth opening on the underside of said pirn catcher, a pneumatic transfer device for gripping the end loop of the weft pirn drawn through said suction race including a reciprocably movable pre-guided suction pipe placed directly below the mouth opening of said suction race in said pirn catcher, said pre-guided

pipe having a mouth opening which is in the same position relative to the mouth of said suction race during pirn transfer movements of said pirn catcher, and a steering mechanism providing guidance for said pipe, said steering mechanism being operatively connected from said drop box to said suction pipe to guide said pipe reciprocally in accordance with the movement of said drop box.

2. A pneumatic transfer device as claimed in claim 1, wherein said steering mechanism comprises a laterally displaceable slide plate transfer member having a groove therein, a traverse member, a bifurcated rod having one leg connected to said traverse member, the other leg reciprocating in said groove and with the other end of said rod being rigidly connected to said pipe, and a lever pivotally mounted on said traverse member thereby providing a lateral swivelling movement for said suction

pipe which maintains the mouth of said suction pipe in alignment with the mouth of said suction race.

References Cited

UNITED STATES PATENTS

3,101,099	8/1963	Payne	139—257 X
3,199,545	8/1965	Kohler	139—257
3,208,480	9/1965	Zollinger	139—257

FOREIGN PATENTS

1,337,693	8/1963	France.

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