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(54) **CABLE TRANSPORT DEVICE**

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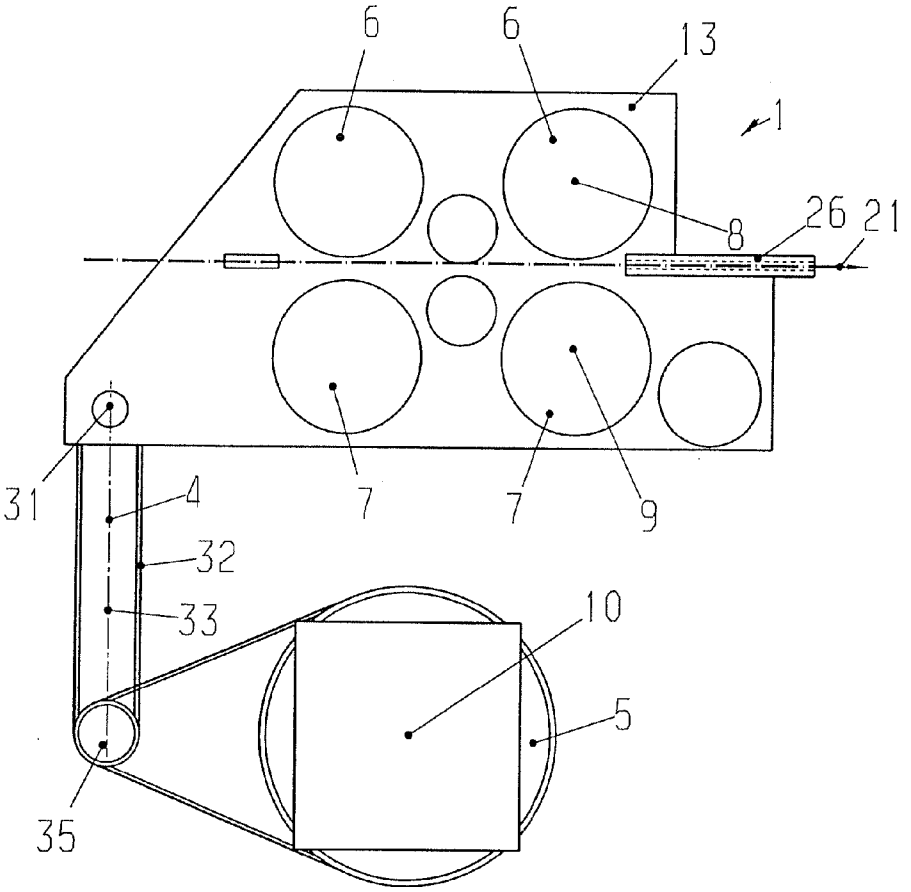
(57) **ABSTRACT**

A cable transport device having a pivotably mounted cable transporter, a first drive means connected in a stationary manner to a base frame and intended for achieving an exactly defined pivot movement of the cable transporter around a pivot axis and a second drive means for synchronous driving of at least two cooperating pressure rollers. The second drive means with a drive axle for the pressure rollers is connected in a stationary manner to the base frame, and the drive axle of the second drive means coincides with the pivot axis for the cable transporter. The transmission of the pivot movement is effected via a toothed belt which is tensioned symmetrically to the center of rotation of the pivot axis between a first intermediate shaft arranged on a base plate of the cable transporter and a second intermediate shaft fixed to the machine frame, the pitch axis of the cable transporter being identical to the axis of the first intermediate shaft.



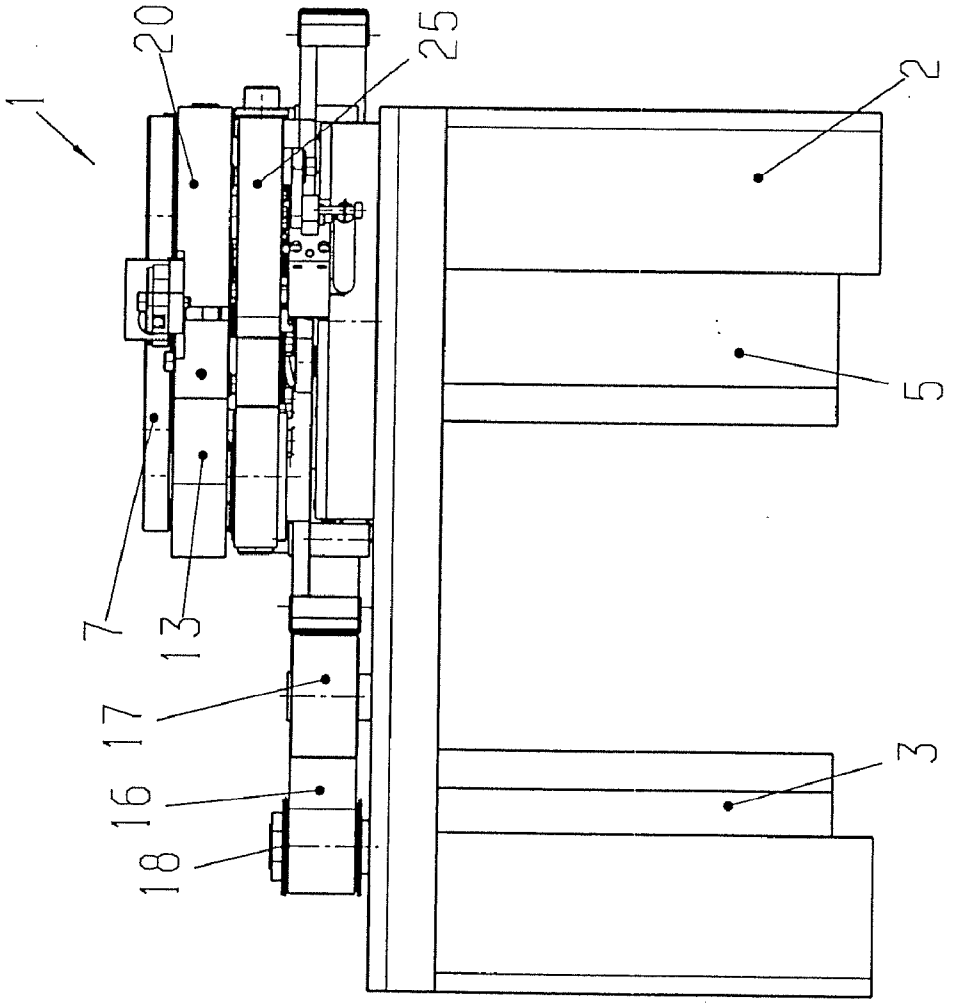


FIG. 1

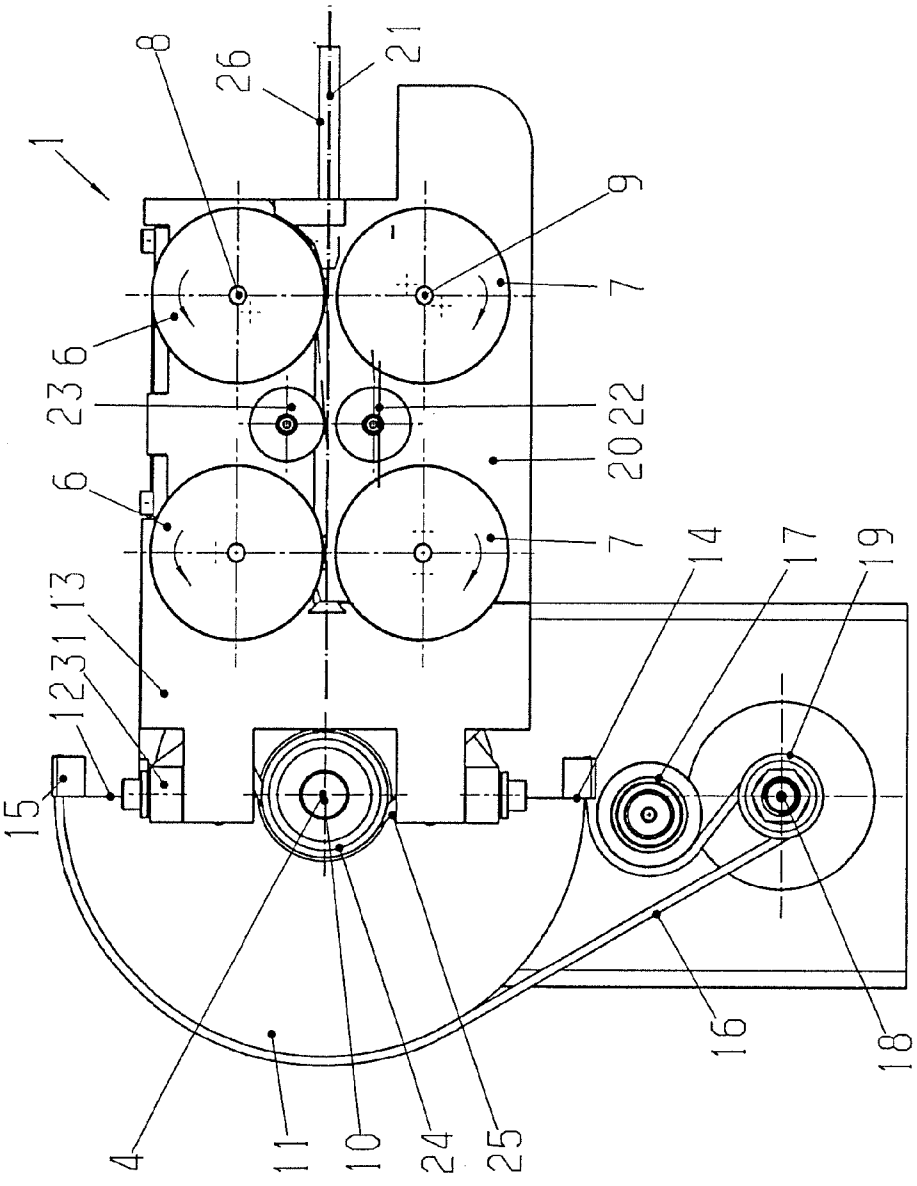


Fig. 2

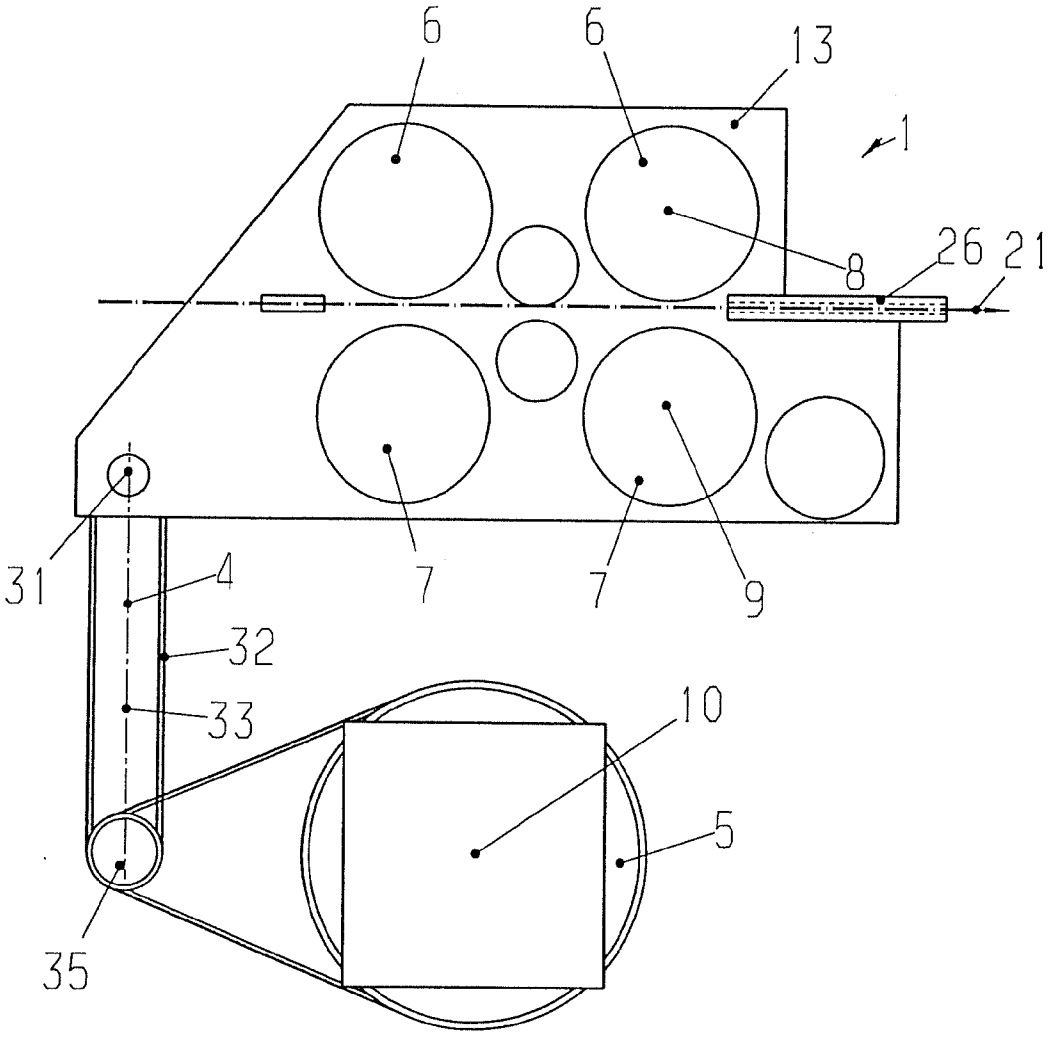


Fig. 3

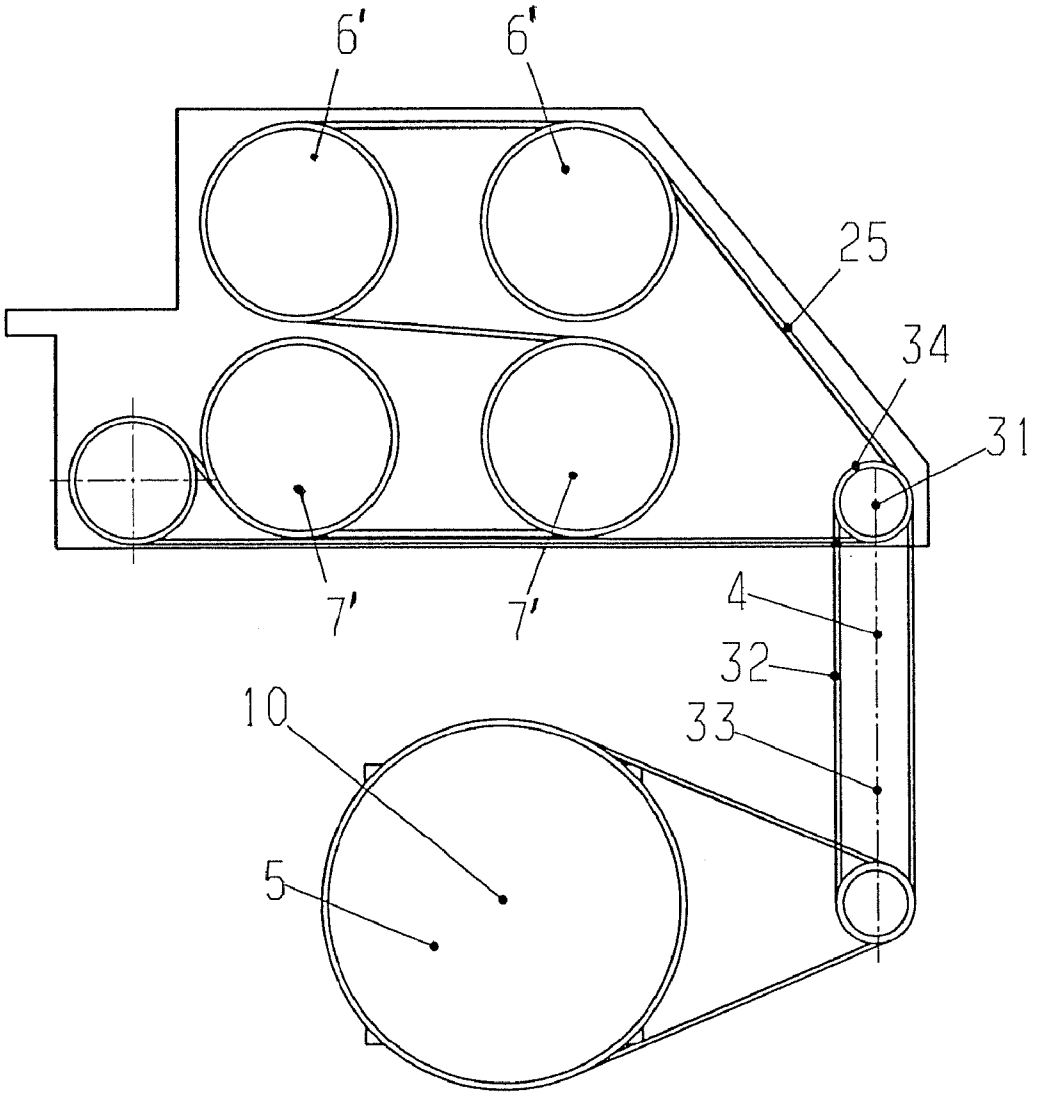


Fig. 4

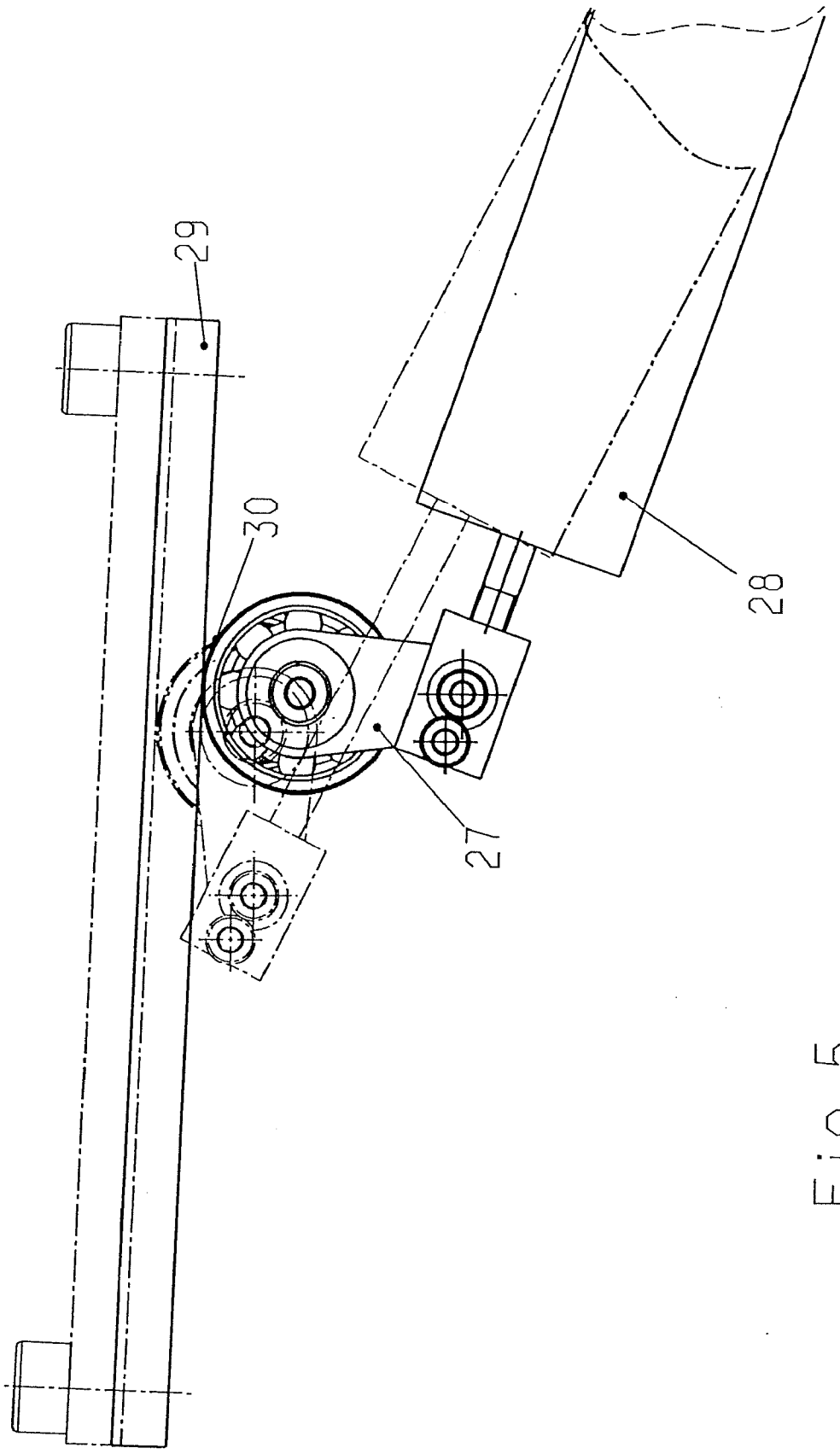


Fig. 5

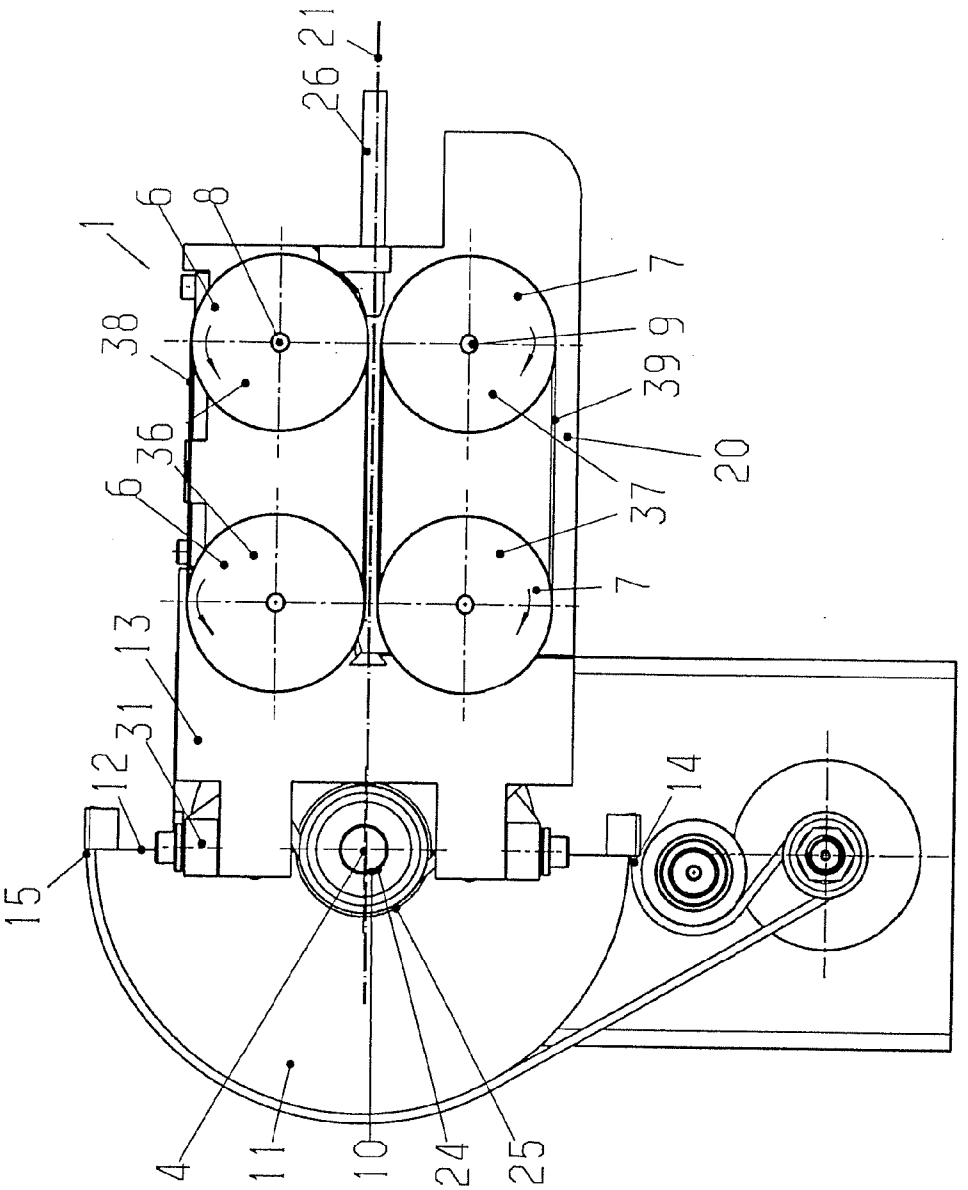


Fig. 6

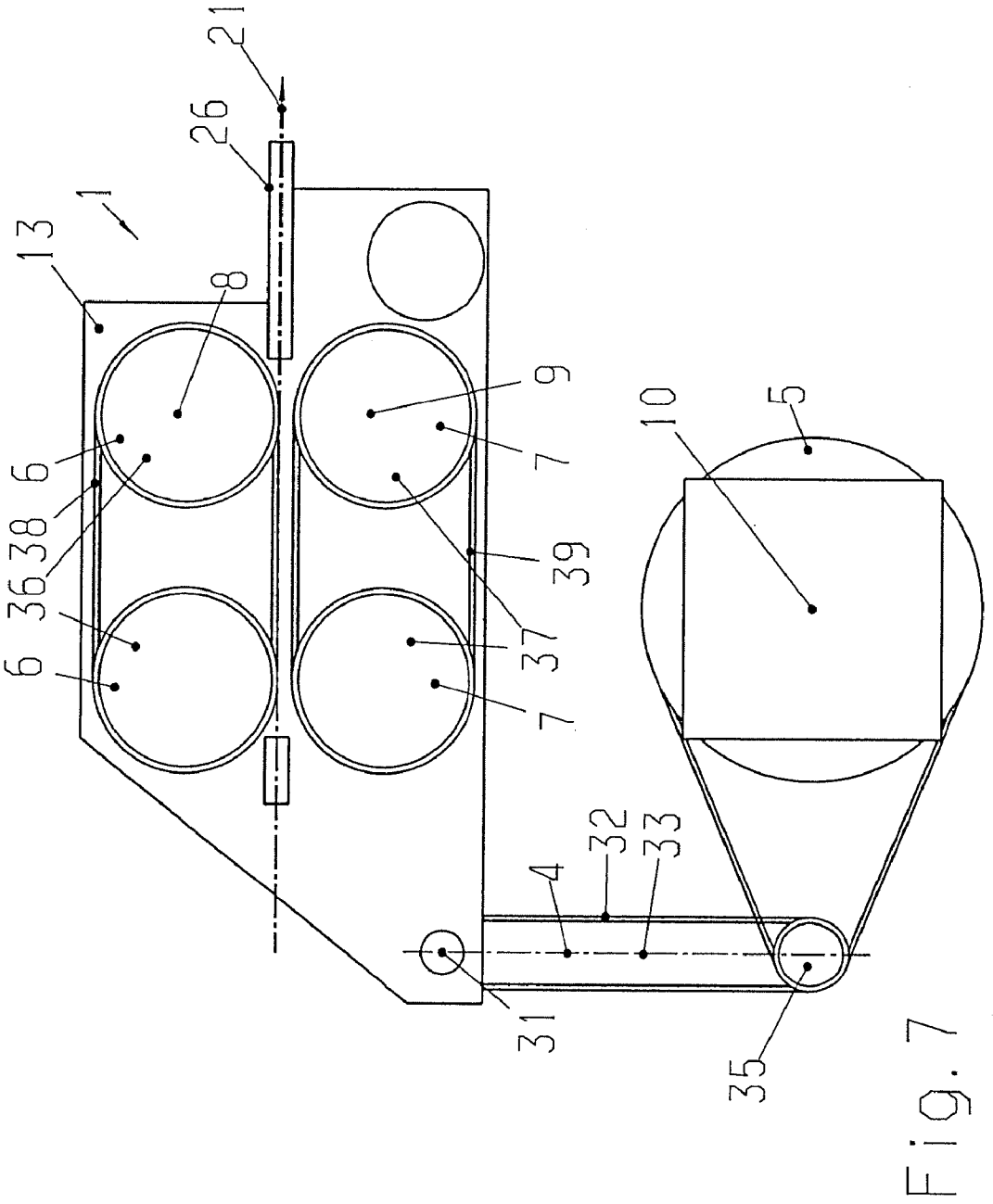


Fig. 7

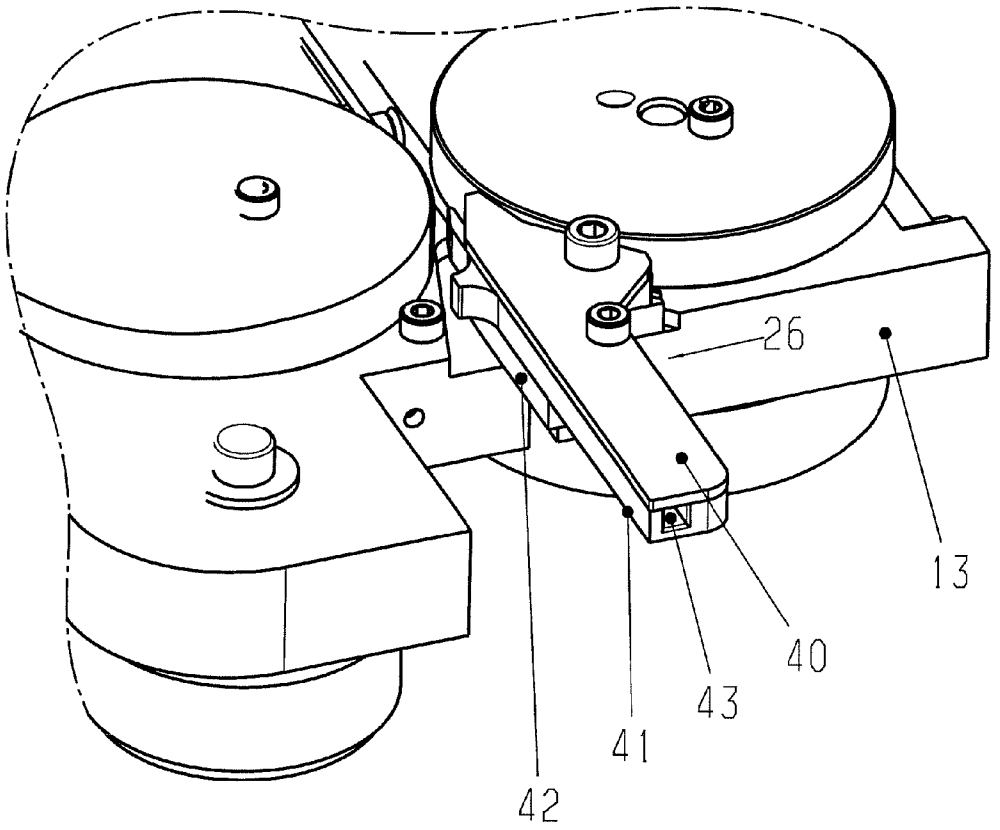


Fig. 8

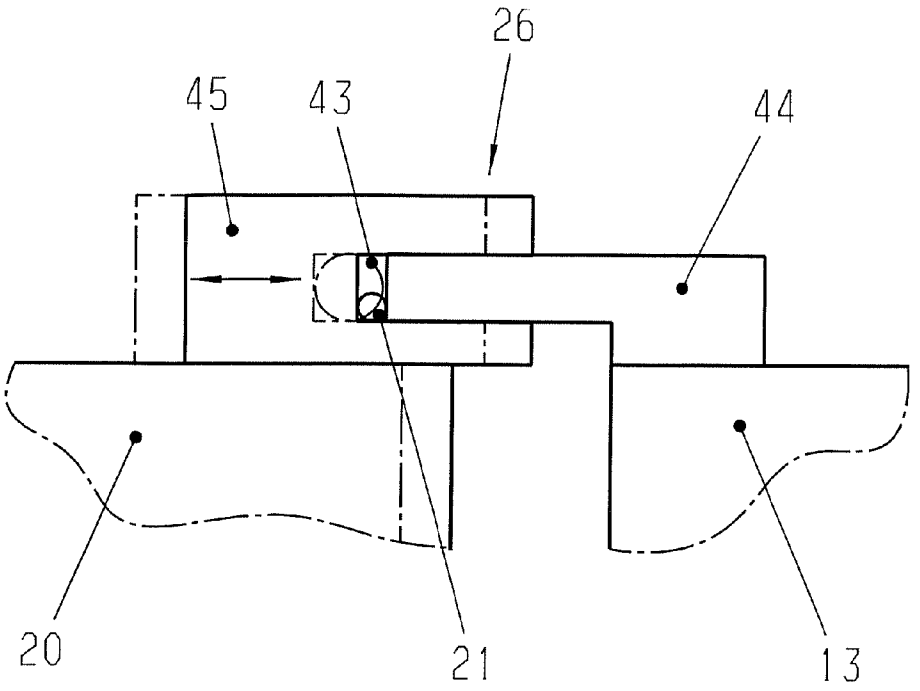


Fig. 9

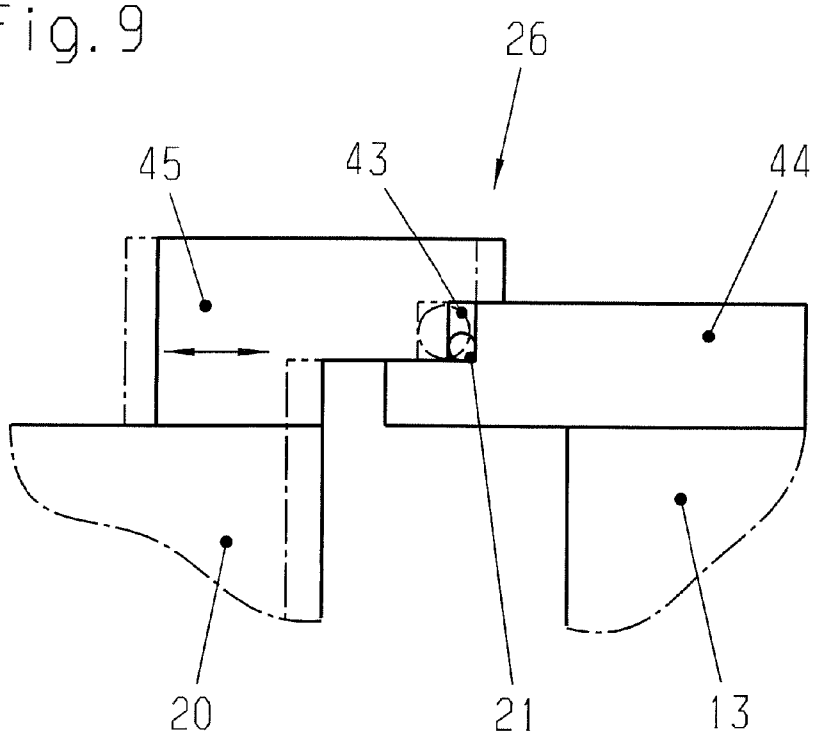


Fig. 10

CABLE TRANSPORT DEVICE

[0001] The invention relates to a cable transport device having a pivotably mounted cable transporter for a cable to be drawn in and to be transported, a first drive means connected in a stationary manner to a base frame and intended for achieving an exactly defined pivot movement of the cable transporter about a pivot axis and a second drive means for synchronous driving of at least two cooperating pressure rollers, at least one pressure roller being arranged so as to be laterally adjustable, and a cable transport device having a guide sleeve.

PRIOR ART

[0002] Cable transport devices are known, for example from a CrimpCenter of the applicant. Such cable transport devices are fixed in a stationary manner on a base frame. A first gripper is arranged in the cable transport axis on the base frame on a pivot device having a moveable guide carriage, this gripper cooperating with processing stations, for example with a cutting and insulation stripping station arranged in the cable transport axis and with a crimping device arranged outside the cable transport axis. The electric cable is led from a store, for example from a cable drum, through a guide sleeve and two alignment units to a cable transporter. In the cable transporter, the cable is clamped between two coated toothed belts. The toothed belts are each driven by drive and deflection belt sprockets and supported several times by smaller belt sprockets in the region between the drive and deflection belt sprockets. The two toothed belts are pressed by a suitable pressing device, for example pneumatically, with a force against one another so that there is sufficient frictional force between the coated toothed belts and the cable to be transported between the toothed belt coatings. The cable transporter is driven by a controlled servo drive motor. In this way, the clamped cable present between the toothed belts is transported in the longitudinal direction. A measuring wheel of a longitudinal measuring device, which measuring wheel rests with spring force outside the transport system against the cable, detects the required cable length with the aid of an encoder. The signals of this encoder are fed into the control of the servo motor so that the process for cutting the cable to length is controlled in this way.

[0003] The cable is led through guide sleeves and a guide tube from the cable transporter into the working region of a cutting and insulation stripping station and is gripped by the first gripper at the cable beginning. The zero cut is now carried out at the cable beginning in the cutting and insulation stripping station and is detected by the measuring wheel. This is followed by the stripping of insulation from the cable beginning. The pivot device then pivots the gripper to the laterally arranged processing stations where, for example, a seal and/or a crimp contact is mounted on the cable end stripped of insulation.

[0004] With a cable transport and pivot device according to EP 0 708 050 B1, the gripper arranged on a pivot device could be omitted if the cable transport device was mounted on a pivot device. In this way, the distance between the cable transport device and the processing stations was considerably reduced. A disadvantage of this device is, however, the complicated design for force transmission via a plurality of axes of rotation. Another disadvantage is that the drive motor responsible for the cable transport is arranged directly on the pivot device and must be concomitantly swiveled by the drive motor responsible for the pivoting process.

[0005] For controlled guidance of the cable to be transported, EP 0 708 050 B1 provides, on the cable feed side, an entry cable guide connected to a flexible guide tube and, on the cable delivery side, an exit cable guide. A guide sleeve in the form of a tube has the disadvantage that it too has to be replaced when changing to a cable having a different cross-section and the cable has to be threaded again. Such a procedure is complicated and considerably increases the changeover times.

OBJECT OF THE INVENTION

[0006] It is an object of the invention considerably to simplify the design of a cable transport device having a pivotable cable transporter and in this way to produce said design more economically and nevertheless to ensure the necessary precision for the cable processing.

[0007] It is also an object of the present invention to provide a cable transport device having a guide sleeve, which does not have the disadvantages described and can be adapted to the cable according to the cable cross-section to be processed in each case.

ACHIEVEMENT OF THE OBJECT

[0008] This object is achieved by the features mentioned in patent claims **1**, **2** and **10**. Advantageous further developments of the invention form the subject of the subclaims.

[0009] According to the invention, the second drive means having a drive axle for the pressure rollers of the cable conveyor is connected in a stationary manner to the base frame, and the drive axle of the second drive means coincides with the pivot axis for the cable transporter.

[0010] With such a design of the cable transport device according to the invention, a very great deal of material can be saved. The number of moving parts is reduced and hence also the susceptibility to faults and the required maintenance.

[0011] In a second embodiment of the invention, the second drive means having a drive axle for the pressure rollers of the cable conveyor is likewise connected in a stationary manner to the base frame, the axes of rotation are parallel to one another and parallel to a common pitch axis, and the transmission of the pivot movement takes place via a toothed belt which is clamped symmetrically relative to the center of rotation of the pivot axis of the first drive means between a first intermediate shaft arranged on a base plate of the cable transporter and a second intermediate shaft fixed to the machine frame, the pitch axis of the cable transporter being identical to the axis of the first intermediate shaft.

[0012] A pivotable cable transport device according to patent claim **2** is also substantially more material- and space-saving than comparable cable devices of the prior art.

[0013] According to the invention, the guide sleeve is composed of a grooved plate and a cover plate. These plates can be replaced for adaptation to different cable diameters and for correction of the position of the cable and are equipped for this purpose with different groove geometries.

[0014] Such guide sleeves are not limited to pivotable cable transport devices but can also be used in stationary systems.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] A plurality of working examples of the invention are illustrated with reference to FIGS. **1** to **7**.

[0016] FIG. **1** shows a front view of a cable transport device according to the invention in a first embodiment according to patent claim **1**.

[0017] FIG. **2** shows a plan view of FIG. **1** in a 90° pivot position.

[0018] FIG. **3** shows a schematic diagram of a front view of a cable transport device according to the invention in a second embodiment according to patent claim **2** in a 90° pivot position.

[0019] FIG. **4** shows a schematic diagram of a back view of FIG. **3**.

[0020] FIG. **5** shows a schematic diagram of the device according to the invention for regulating the pressure for cable draw-in,

[0021] FIG. **6** shows a plan view of FIG. **1** in a 90° pivot position in a further embodiment.

[0022] FIG. **7** shows a schematic diagram of a front view similar to FIG. **3** and an embodiment according to FIG. **6**.

[0023] FIG. **8** shows a diagram of a guide sleeve according to the invention in plate design for a cable.

[0024] FIG. **9** shows a schematic diagram of a first variant of a divided, adjustable guide sleeve.

[0025] FIG. **10** shows a schematic diagram of a second variant of a divided adjustable guide sleeve.

WORKING EXAMPLES

[0026] The cable transport device according to FIGS. **1**, **2** and **6** has a pivotably mounted cable transporter **1** for a cable **21** to be drawn in and to be transported, and a first drive means **3** connected in a stationary manner to a base frame **2** and intended for achieving an exactly defined pivot movement of the cable transporter **1** about a pivot axis **4**. A second drive means **5** ensures synchronous driving of two cooperating pressure rollers **6** with two cooperating pressure rollers **7**, whose axes **8**, **9** of rotation are parallel to one another and parallel to the common pivot axis **4**. The two pressure rollers **7** are, as shown in FIG. **2**, arranged so as to be laterally adjustable.

[0027] According to the invention, the second drive means **5** with its drive axle **10** is connected in a stationary manner to the base frame **2**. The drive axle **10** of the second drive means **5** for the pressure rollers **6**, **7** of the cable transporter **1**, coincides with the pivot axis **4** for the cable transporter **1**.

[0028] In the embodiments of the invention according to FIGS. **1**, **2** and **6**, a semicircular pivot plate **11** is mounted horizontally around the pivot axis **4**. The semicircular pivot plate **11** is connected via the rotary bearing of the pitch axis **31** to a base plate **13** of the cable transporter **1**. In each case one end **14**, **15** of a toothed belt **16** is held on the two outsides of the semicircular pivot plate **11** by clamping in a stationary manner, the toothed belt **16** being led directly from its first end **14** via a deflection belt sprocket **17** and a drive belt sprocket **19** mounted on a first drive axle **18** of the drive means **3**, via the outer surface of the semicircular pivot plate **11**, to the second end **15** of the clamping of the toothed belt **16**.

[0029] The cable transport device shown in FIGS. **3**, **4** and **7** likewise has a pivotably mounted cable transporter **1** for a cable **21** to be drawn in and to be transported and a first drive means **3** connected in a stationary manner to the base frame **2** and intended for achieving an exactly defined pivot movement of the cable transporter **1** around the pivot axis **4**. In these embodiments, too, the cable transport device has a second drive means **5** for synchronous driving of at least two cooperating pressure rollers **6**, **7**, whose axes **8**, **9** of rotation are parallel to one another and perpendicular to the common pivot axis **4**. Moreover, two pressure rollers **7** are arranged in a laterally adjustable manner, although the adjustability is not shown in the schematic diagrams according to FIGS. **3**, **4** and **7**.

[0030] While FIG. **3** shows the front view of the schematic diagram of the cable transport device with four pressure rollers **6**, **7**, the back view of FIG. **3** is shown in FIG. **4**. According to the invention, according to FIGS. **3** and **4**, the second drive means **5** is likewise connected with a drive axle **10** for the pressure rollers **6**, **7** of the cable transporter **1** in a stationary manner to the base frame **2**. While in the embodiments according to FIGS. **1**, **2** and **6** the base plate **13** is arranged horizontally, the base plate **13** in the embodiments according to FIGS. **3**, **4** and **7** is oriented vertically. The axes **8**, **9** of rotation are parallel to one another and parallel to a common pitch axis **31**. The transmission of the pivot movement takes place via a toothed belt **32**, which is clamped symmetrically to the center **33** of rotation of the pivot axis **4** of the first drive means between a first intermediate shaft **34** arranged on a base plate **13** of the cable transporter **1** and a second intermediate shaft **35** fixed to the machine frame. The pitch axis **31** of the cable transporter **1** is identical to the axis of the first intermediate shaft **34**.

[0031] In order to control the pressure on the cable **21** to be transported, an adjustable plate **20** according to FIG. **2** is mounted so as to be transversely displaceable relative to the base plate **13** of the cable transporter **1** for the purpose of adjusting the pressure. Pressure rollers **6** rotating counterclockwise are arranged on the base plate **13** and pressure rollers **7** rotating clockwise are arranged on the adjustable plate **20**, or vice versa.

[0032] As further shown in FIG. **2**, two pressure rollers **6** are rotatably mounted on one axis **8** of rotation each on the base plate **13** of the cable transporter **1** and likewise two pressure rollers are rotatably mounted on one axis **9** each on the adjustable plate **20**, the respective axes **8**, **9** of rotation of the pressure rollers **6**, **7** being arranged opposite one another. A measuring wheel **22** for measuring the required cable length is located between two pressure rollers **7**, and a counter-wheel **23** is arranged between two pressure rollers **6**, or vice versa, directly against the cable **21** transported.

[0033] Belt sprockets (**6'**, **7'**) which have a drive connection via a double-sided toothed belt **25** to a second drive sprocket arranged on the drive axle **10** of the second drive means **5** are arranged on the axes **8**, **9** of rotation of the pressure rollers **6**, **7**, on the underside of the cable transporter **1** (FIG. **4**), the toothed belt **25** transmitting the rotation of the drive belt sprocket **24** to the pressure rollers **7** arranged on the adjustable plate **20**. The toothed belt **25** between the belt sprockets (**6'**) of the pressure rollers **6** and the belt sprockets (**7'**) of the pressure roller **7** is clamped diagonally, resulting in the counterclockwise movement of the pressure rollers **6** and the clockwise movement of the pressure rollers **7**.

[0034] The base plate **13** of the cable transporter **1** can, according to FIG. **2**, be mounted together with the adjustable plate **20** on the drive axle **10** or, according to FIG. **3**, on the pitch axis **31** so as to be pivotable together.

[0035] For the purpose of inserting the cable **21** to be transported, the adjustable plate **20** moves away from the base plate **13** of the cable transporter **1** and, after insertion of the cable **21** between the pressure rollers **6**, **7**, the adjustable plate **20** travels by means of compressed air or by means of the pressure of another mechanical energy accumulator **28**, for

example of a pneumatic cylinder, or a spring, to a position in which the pressure rollers **6**, **7** and the measuring wheel **22** and the counter-wheel **23** press with a defined force onto the cable **21** to be transported. A pressure mechanism **27** controls the pressure on the cable **21** to be transported, by the pressure rollers **7** mounted in a fixed manner on the adjustable plate **20** relative to the pressure rollers **6** mounted on the base plate **13** of the cable transporter **1**. Such a non linear pressure mechanism is shown in FIG. **5**. The pressure mechanism **27** consists, according to the invention, of a mechanical energy accumulator **28** or a pneumatic cylinder with recuperating spring, which are connected via a displaceably guided connecting part to an eccentric lever **30** displaceably guided on a carriage **29**. The lever geometry is chosen so that the pressure likewise decreases with decreasing distance between the pressure rollers **6**, **7**.

[0036] For avoiding forward and return transport of the cable **21** during the pivot movement, the second drive belt sprocket **24**, which is responsible for the rotation of the pressure rollers **6**, **7** of the cable transporter **1**, rotates in the same direction with the first drive belt sprocket **19** of the first drive means **3** via a control. In a further working example according to FIGS. **6** and **7**, the pressure rollers **6**, **7** are in the form of belt sprockets, two pressure rollers **6** forming a first pressure roller pair **36** and two pressure rollers **7** forming a second pressure roller pair **37**, and a first toothed belt **38** being tensioned over the first pressure roller pair **36** and a second toothed belt **39** being tensioned over the second pressure roller pair **37**, and the cable being clamped and guided between the first and the second toothed belts **38**, **39** and the transport of the cable **21** taking place by means of frictional contact.

[0037] According to FIG. **8**, the cable transporter **1** has a guide sleeve **26** for the cable **21**. The guide sleeve **26** is composed of a grooved plate **41** and a cover plate **40**. These plates can be replaced for adaptation to different cable diameters and for correction of the position of the cable **21** and are equipped for this purpose with different groove geometries.

[0038] In addition, the cover plate **40** and/or the grooved plate **41** may have openings which permit a cable inscriber, e.g. a printer, access to the cables **21**.

[0039] FIG. **9** and FIG. **10** show that the guide sleeve **26** is formed from two channel elements, a first channel element **44** being fixed to the base plate **13** of the cable transporter **1** and a second channel element **45** being fixed to the adjustable plate **20**. A guide channel **43** which is adapted to the respective cable in width is formed by the distance between base plate and adjustable plate, which distance is determined by the cable.

[0040] Alternatively, the first channel element **44** is fixed on the adjustable plate **20** and the second channel element **45** is fixed on the base plate **13** of the cable transporter **1**.

[0041] The adjustable plate **20** and base plate **13** of the cable transporter **1** move relative to one another so that both can also be moved onto the cable **21**.

[0042] It is within the scope of the invention to use one pressure roller **6**, **7** each depending on the cable to be transported and to be processed. More than two pressure rollers **6**, **7** each are also conceivable and, under certain conditions, can even replace an upstream orientation station.

[0043] It is also within the scope of the invention for the measuring wheel **22** and the counter-wheel **23** to be arranged upstream or downstream of the pressure rollers **6**, **7**. This will be required in particular in the case of cable transport devices according to FIGS. **6** and/or **7**.

[0044] It is also within the scope of the invention if a pressure mechanism differing from the disclosure is used.

LIST OF REFERENCE NUMERALS

[0045] **1**—Cable transporter
[0046] **2**—Base frame
[0047] **3**—First drive means
[0048] **4**—Pivot axis
[0049] **5**—Second drive means
[0050] **6**—Pressure rollers, counterclockwise, arranged on the base plate **13**
[0051] **6'**—Belt sprocket
[0052] **7**—Pressure rollers, clockwise, arranged on the adjustable plate **20**
[0053] **7'**—Belt sprocket
[0054] **8**—Axis of rotation of the pressure rollers **6**
[0055] **9**—Axis of rotation of the pressure rollers **7**
[0056] **10**—Drive axle of the second drive means **5**
[0057] **11**—Semicircular pivot plate
[0058] **12**—Straight lateral surface
[0059] **13**—Base plate of the cable transporter **1**
[0060] **14**—First end of the toothed belt **16**
[0061] **15**—Second end of the toothed belt **16**
[0062] **16**—Toothed belt
[0063] **17**—Deflection belt sprocket
[0064] **18**—First drive axle of the first drive means **3**
[0065] **19**—Drive sprocket of the first drive means **3**
[0066] **20**—Adjustable plate
[0067] **21**—Cable
[0068] **22**—Measuring wheel
[0069] **23**—Counter-wheel
[0070] **24**—Drive belt sprocket of the second drive means **5**
[0071] **25**—Toothed belt
[0072] **26**—Guide sleeve
[0073] **27**—Pressure mechanism
[0074] **28**—Mechanical energy accumulator, e.g. pneumatic cylinder, or spring
[0075] **29**—Carriage
[0076] **30**—Eccentric
[0077] **31**—Pitch axis
[0078] **32**—Toothed belt
[0079] **33**—Center of rotation
[0080] **34**—First intermediate shaft, top
[0081] **35**—Second intermediate shaft, bottom
[0082] **36**—First pressure roller pair
[0083] **37**—Second pressure roller pair
[0084] **38**—First toothed belt
[0085] **39**—Second toothed belt
[0086] **40**—Cover plate
[0087] **41**—Grooved plate
[0088] **42**—Holder
[0089] **43**—Guide channel
[0090] **44**—First channel element
[0091] **45**—Second channel element

1. A cable transport device having

a pivotably mounted cable transporter for a cable to be drawn in and to be transported,

a first drive means connected in a stationary manner to a base frame and operable to achieve an exactly defined pivot movement of the cable transporter around a pivot axis and

a second drive means for synchronously driving at least two cooperating pressure rollers whose axes rotation are parallel to one another and parallel to the common pivot

axis, at least one drive roller being arranged so as to be laterally adjustable, wherein the second drive means with a drive axle for the pressure rollers of the cable transporter is connected in a stationary manner to the base frame and the drive axle of the second drive means coincides with the pivot axis for the cable transporter.

2. A cable transport device having

a pivotably mounted cable transporter for a cable to be drawn in and to be transported,

a first drive means connected in a stationary manner to a base frame and operable to achieve an exactly defined pivot movement of the cable transporter around a pivot axis and

a second drive means for synchronously driving at least two cooperating pressure rollers with axes of rotation, at least one pressure roller being arranged so as to be laterally displaceable, wherein the second drive means having a drive axle for the pressure rollers of the cable transporter is connected in a stationary manner to the base frame, the axes of rotation are parallel to one another and parallel to a common pitch axis and transmission of the pivot movement takes place via a toothed belt which is tensioned symmetrically to the centre of rotation of the pivot axis of the first drive means between a first intermediate shaft arranged on a base plate of the cable transporter and a second intermediate shaft fixed to the machine frame, the pitch axis of the cable transporter being identical to the axis of the first intermediate shaft.

3. The cable transport device according to claim **1**, wherein at least two pressure rollers are rotatably mounted on the base plate of the cable transporter on one axis of rotation each and in that at least two pressure rollers are likewise rotatably mounted on an adjustable plate on one axis of rotation each, the respective axes of rotation of the pressure rollers being arranged opposite one another, and wherein, between two pressure rollers, a measuring wheel for measuring the required cable length rests directly against the transported cable and, between two pressure rollers, a counter-wheel rests directly against the transported cable, or vice versa.

4. The cable transport device according to claim **1**, wherein belt sprockets which have a drive connection via a double-sided toothed belt to a second drive belt sprocket arranged on the drive axle of the second drive means are arranged on the axes of rotation of the pressure rollers on an underside of the cable transporter, the toothed belt transmitting the rotation of the drive belt sprocket to the pressure rollers arranged on the adjustable plate and wherein the toothed belt is clamped diagonally between the belt sprockets of the pressure rollers and the belt sprockets of the pressure rollers, resulting in counter clockwise movement of the pressure rollers and clockwise movement of the pressure rollers.

5. The cable transport device according to claim **3**, wherein the adjustable plate moves away from the base plate of the cable transporter for the purpose of inserting the cable to be transported and, after insertion of the cable between the pressure rollers, the adjustable plate moves by means of compressed air or by means of the pressure of a mechanical energy accumulator to a position in which the pressure rollers and the measuring wheel and the counter-wheel press with a defined force onto the cable to be transported and that the base plate of the cable transporter together with the adjustable plate on the drive axle and/or on the pitch axis are mounted so as to be pivotable together.

6. The cable transport device according to claim **1**, wherein a pressure mechanism controls the pressure on the cable to be transported, by the pressure rollers mounted in a fixed manner on the adjustable plate relative to the pressure rollers mounted on the base plate of the cable transporter.

7. The cable transport device according to claim **6**, wherein the pressure mechanism consists of a pneumatic cylinder with recuperating spring or a pressure spring which is connected via a displaceably guided connecting part to an eccentric lever, the lever geometry being chosen so that the pressure likewise decreases with decreasing distance between the pressure rollers.

8. The cable transport device according to claim **4**, wherein, for avoiding forward and backward transport of the cable during the pivot movement, the second drive belt sprocket, which is responsible for the rotation of the pressure rollers of the cable transporter, concomitantly rotates in the same direction with a first drive belt sprocket of the first drive means via a control.

9. The cable transport device according to claim **1**, wherein the pressure rollers comprise belt sprockets, two pressure rollers forming a first pressure roller pair and two pressure rollers forming a second pressure roller pair, and a first toothed belt being tensioned over the first pressure roller pair and a second toothed belt being tensioned over the second pressure roller pair, and the cable being clamped and guided between the first and the second toothed belts and the transport of the cable being effected by means of frictional contact.

10. The cable transport device according to claim **1**, wherein the cable transport device comprises a guide sleeve for the cable, and the guide sleeve is composed of a grooved plate and a cover plate and these plates are replaceable for adaptation to different cable diameters and for correction of the position of the cable and are equipped for this purpose with different groove geometries.

11. The cable transport device according to claim **10**, wherein the cover plate and/or the grooved plate have openings which permit a cable inscriber access to the cables.

12. The cable transport device according to claim **3**, wherein the cable transport device comprises a guide sleeve for the cable, the guide sleeve being formed from two channel elements, a first channel element being fixed to the base plate of the cable transporter and a second channel element being fixed to the adjustable plate, a guide channel which is adapted to the respective cable in width being formed by the distance between base plate and adjustable plate, which distance is determined by the cable.

13. The cable transport device according to claim **3**, wherein the cable transport device comprises a guide sleeve for the cable, the guide sleeve being formed from two channel elements, a first channel element being fixed to the adjustable plate and a second channel element being fixed to the base plate of the cable transporter, a guide channel which is adapted to the respective cable in width being formed by the distance between base plate and adjustable plate, which distance is determined by the cable.

14. The cable transport device according to claim **12**, wherein the adjustable plate and the base plate of the cable transporter are movable relative to one another such that both can also be moved onto the cable.

15. The cable transport device according to claim **1**, wherein the base plate of the cable transporter is connected to the pivot axis via a rotary bearing of a pitch axis, the pitch axis intersecting the pivot axis.

16. The cable transport device according to claim **15**, wherein a semicircular pivot plate is mounted horizontally around the pivot axis, the semicircular pivot plate being connected via the rotary bearing of the pitch axis to the base plate of the cable transporter.

17. The cable transport device according to claim **1**, wherein a semicircular pivot plate is mounted horizontally around the pivot axis, the semicircular pivot plate being connected via a rotary bearing of a pitch axis to the base plate of the cable transporter, and wherein in each case one end of a toothed belt is held on two outsides of the semicircular pivot plate by clamping in a stationary manner, the toothed belt being led directly from its first end via a deflection belt sprocket and a drive belt sprocket mounted on a first drive axle of the drive means, via the outer surface of the semicircular pivot plate, to the second end of the clamping of the toothed belt.

18. The cable transport device according to claim **17**, wherein the pitch axis intersects the pivot axis.

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