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(54) **A machine for reel handling, in particular for paper material production lines**

Maschine für die Handhabung von Rollen, insbesondere für Papierproduktionslinien

Machine pour la manipulation de rouleaux, particulièrement pour des installations de production de papier

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EP 0 915 047 B1

Description

[0001] The present invention relates to a machine for handling reels, in particular for paper material production lines, of the type described in the preamble of Claim 1.

[0002] It is known that in plants for producing sheet materials, paper or corrugated board materials for example, paper or paperboard reels are required to be moved from lowered positions corresponding to the positions of the carriages usually sliding on rails on which said reels are disposed, to raised work positions, and vice-versa from the last-mentioned positions to the former.

[0003] For these reel-handling operations apparatuses of various kinds can be used, which are for example either of general use and of the moving type such as elevators, or in the form of specific and dedicated apparatuses such as handler arms oscillatably connected to a base structure.

[0004] Practically, in the last-mentioned solution the handler arms generally consist of levers emerging from a base structure and spaced apart from each other by a distance proportional to the longitudinal sizes of the reels to be lifted or lowered.

[0005] These handler arms have free ends provided with grasping means capable of engaging the hollow cores of the reels on opposite sides and therefore these arms are such movable that they get closed clamp-wise on the end faces of the reels or they open for release.

[0006] Obviously, the hollow cores of the reels to be gripped are required to be exactly in alignment with the grasping means supported by the handler arms, to enable said arms to close clamp-wise.

[0007] For reel lifting and lowering, the handler arms are provided with a rotatory motion about a horizontal axis and therefore the grasping means describes a trajectory in the form of an arc of a circle capable of intercepting the hollow core of a reel placed on a carriage only if this core is at a predetermined fixed height, corresponding to a reel of standard and constant diameter.

[0008] If the reel diameter is different from the usual one, manual adjustments of the position of the carriage on which the reel is disposed or manual displacements of the reel position on the carriage are necessary, at all events in such a manner that the reel centre is brought to intersect the trajectory of the grasping means. For this purpose GB-A-2 217 690 suggests a lifter for lifting the reel supporting carriage to the position in which the reel axis is aligned with the grasping means in the loading or unloading position.

[0009] In any case, additional adjustment operations for the reel loading or unloading steps take place, if the reel does not correspond to the expected diameter, which operations give rise to slowdowns in the production rates and, as a result, to increases in costs.

[0010] These production slowdowns and cost increases are of great amount when a repeated Loading

and unloading of small-sized reels having varying diameters is concerned.

[0011] It is to point out that the frequency of the loading and unloading operations is due, among other things, to the necessity of quickly making production comply with the diversified and fragmentary requirements of the market.

[0012] For handling reels of different diameter it is further known from US-A-3 321 147 to use a reel handling machine having handler arms composed of two arm portions pivotally connected to each other according to the preamble of claim 1.

[0013] The arms are controlled to catch the reels with their grasping means at a position outside the roll stand and to roll the reels on the ground into the roll stand into a position allowing safe raising of the reels to the work position without the risk of tilting the roll stand owing to the size and weight of the reels.

[0014] However, such a machine requires manual adjustment of the arms each time reels of different size or diameter are to be handled.

[0015] Since manual-adjustment interventions are required in the known art, an automatic running of the machine during the reel loading/unloading operations is not allowed and therefore there is a serious limit in the paper material production lines.

[0016] It is also to point out that when the handler arms lift a reel and reach a work position, at which the reel is being unwound, they keep said reel at a predetermined fixed position, its central axis being exactly horizontal and perpendicular to the unrolling direction. This predetermined position is the optimal one only in the case of well shaped reels having paper or the like of perfectly uniform basis weight.

[0017] In case of unevennesses in winding or irregularities in the paper basis weight, it very easily happens that during the reel unwinding a reel side and a side of the paper ribbon or the like is tauter (more tensioned) than the other side.

[0018] As a result, malfunctions in the whole chain of workings carried out downstream of the reels take place.

[0019] No remedies substantially exist for the above drawbacks when presently known handler arms are used, since it is surely impossible to provide the latter with wide plays or tolerances in order to remedy the reel irregularities: in any case an imprecise and not very stable positioning of the reels themselves would be obtained.

[0020] Under this situation, the technical task of the present invention is to devise a machine for handling reels which is capable of substantially obviating the above drawbacks.

[0021] Within the scope of this technical task, it is an important aim of the present invention to devise a machine enabling the loading/unloading times of the reels to be reduced, even when the reels have greatly differentiated diameters, while avoiding any intervention of the manual type.

[0022] Another important aim of the invention is to devise a flexible and adjustable machine capable of enabling the most appropriate positioning of a reel to be achieved, when said reel has been raised and is being unwound, so that possible imprecisions of the same are compensated for, without however introducing uncertainty or imprecision elements in the reel positioning.

[0023] The aims specified are achieved by a reel handling machine, in particular for paper material production lines, as claimed in the appended claim 1.

[0024] The features and advantages of the invention will become more apparent from the following detailed description of a reel handling machine in accordance with the invention, illustrated in the accompanying drawings, in which:

Fig. 1 is an elevation front view of a machine in accordance with the invention, provided with two pairs of arms for handling two reels;

Fig. 2 shows a detail of one end of a handler arm;

Fig. 3 shows a reel in a partial perspective view, and the ends of two arms of a pair of handler arms intended for moving the reel;

Fig. 4 is an elevation view similar to the one in Fig. 1 showing an overall functional diagram of the machine, at some of its operating positions;

Fig. 5 is a diagrammatic sectional view of a telescopic handler arm of the machine;

Fig. 6 is similar to Fig. 5 and shows an alternative embodiment of said arm;

Fig. 7 is an elevation view showing the structure of the grasping means of a reel placed at the ends of the handler arms; and

Fig. 8 is a perspective view showing how the handler arms can modify the work position of a reel.

[0025] With reference to the drawings, the machine in accordance with the invention has been generally identified by reference numeral **1**. It comprises, as shown in Figs. 1 and 4, a base structure **2** alongside which there are rails **2a** on which preferably power-driven reel supporting carriages **2b** run.

[0026] The base structure **2** defines at least one pivot axis **4** which is substantially horizontal or parallel to the rest surface of the machine **1**, along which a shaft **4a** of great length or two shafts **4a** coaxial with each other are disposed.

[0027] Linked to the base structure **2** is at least one pair of handler arms **3**, merely referred to as arms **3** in the following. Two pairs of arms **3** are shown in the figures and each pair is independent of the other pair.

[0028] Arms **3** of each pair are disposed in side by side relationship and spaced apart from each other and they are simultaneously movable with at least two movements: a rotatory movement around the shaft **4a** coaxial with the horizontal pivot axis **4**, and a translational movement along shaft **4a** and parallelly to the pivot axis **4**.

[0029] Said translational movement, identified by ar-

rows **6a** in Fig. 3, is provided to enable the arms **3** of each arm pair to move close to or away from each other, in order to conform the distance between said arms **3** to the axial sizes of a reel **5** to be submitted to movement.

[0030] Said reel **5** (Fig. 3) externally has a cylindrical surface and two end faces **5a** which are substantially flat and parallel to each other, and internally has a cylindrical and hollow core **5b**, coaxial with a central axis **6**. Intersection between the central axis **6** and the two end faces **5a** defines two centres identified by **5c**.

[0031] It is pointed out that each reel **5** is loaded or unloaded always in an extended position, that is with its central axis **6** substantially horizontal, onto and from a respective reel support defined by carriage **2b** guided by rails **2a** extending parallel to the pivot axis **4**. Therefore in the loading or unloading positions the central axis **6**, seen in plan view, always lies centrally over rails **2a** and a respective carriage **2b** and parallel to the pivot axis **4**, independently of the diameter of reel **5**.

[0032] The rotatory movement enables displacement of each arm **3** between lowered loading/unloading positions of a reel **5** and one or more raised work positions, to be used for the intended operations to which reel **5** is to be submitted. Movements of arms **3** are controlled by a driving apparatus **7**, described in the following.

[0033] Arms **3** comprise each grasping means consisting of grasping heads **8** projecting from arms **3** and adapted to be fitted into the core **5b** when arms **3** are approached to each other.

[0034] As shown in Figs. 3 and 7, heads **8** are provided with a spindle assembly **8a** to be fitted in core **5b**, a flange assembly **8b** supporting the spindle assembly **8a**, and a control unit **8c**.

[0035] The control unit **8c** controls rotation of the two above mentioned assemblies **8a**, **8b** and therefore of the whole reel **5**, by means of a clutch device preventing accidental rotations of reel **5**.

[0036] The spindle and flange assemblies **8a** and **8b** are integral with each other and oscillatable along a short stroke towards arm **3**, when the flange assembly **8b** is submitted to the pressure of an edge of core **5b**. This oscillation movement actuates a contrivance inside the spindle assembly **8a** causing expansion of keys **8d** placed on the spindle assembly itself, so as to lock core **5b** from the inside. Practically the spindle and flange assemblies **8a** and **8b** embody an expanding spindle, known per se.

[0037] Arms **3** are defined by a plurality of arm portions, which are mutually movable in order to be able to continuously vary the position of each arm **3** and take a variable setting between a contracted setting, defining the minimum length of arm **3**, and an extended setting defining the maximum length of arm **3**.

[0038] In detail, each arm **3** comprises a rigid first arm portion **9** hinged on the pivot axis **4**, and a rigid second arm portion **10** connected to the first portion **9** and terminating at a head **8**. The first and second portions, **9** and **10**, of each arm **3** are in engagement with each oth-

er in a telescopic manner (Figs. 5, 6) or in the form of an open kinematic chain (Figs. 1, 2, 4) through connections adapted to enable said contracted and extended settings and a plurality of intermediate settings.

[0039] When portions 9 and 10 are telescopically engaged with each other, the second portion 10 is provided to have (Figs. 5, 6) a connection defined by a stem **10a** of the second portion 10 itself, which is axially slidable relative to the first portion 9.

[0040] When portions 9 and 10 are engaged with each other like an open kinematic chain, pivotal connection between portions 9, 10 is provided to be made (Figs. 1, 2, 4) by a pivot pin or hinging axis **11** parallel to the pivot axis 4.

[0041] Sizes of portions 9 and 10 and the maximum and minimum distances between heads 8 and the pivot axis 4 are such selected that each head 8 is allowed to be positioned at any point of a substantially rectilinear and vertical grasping stretch **12** (Fig. 4), which is coincident with or defined by the positions of the centres 5c and axes 6 of reels 5 of different diameter disposed on carriage 2b.

[0042] In particular each arm 3 in said contracted setting has such a length that its head 8 can be disposed at a distance from its pivot axis 4 equal to or lower than the distance between a median line of a carriage 2b and the pivot axis 4 itself. In said extended setting, each arm 3 has such a length that its head 8 is disposed at a distance from its pivot axis 4 which is greater or much greater than the distance between a median line of a carriage 2b and the pivot axis 4 itself.

[0043] The above stated different movements of arms 3, i.e. the translational movement for mutual approach or separation and the rotatory movement about the pivot axis 4, and the movements between portions 9 and 10 to cause expansion or contraction in length of arms 3, are controlled by the driving apparatus 7.

[0044] In particular, for the translational movement involving mutual approach or separation of arms 3, parallelly to the pivot axis 4, the driving apparatus 7 comprises elements known per se, not shown, such as operating screws for example, that make arms 3 slide along shaft 4a.

[0045] For the rotatory movement of arms 3 around the pivot axis 4 and said other movements of said arms in the case of an open kinematic chain, as shown in particular in Fig. 4, the driving apparatus 7 comprises a control centre **13**, to be made in a manner known per se and suitably computerized, to which a fluid-operated circuit **14** is interlocked.

[0046] The fluid-operated circuit 14 comprises several members: at least one pump **15** connected to a feeding source **15a**, a plurality of sets of distributors **16**, and a plurality of fluid-operated actuators.

[0047] Provision is made for the same number of sets of distributors 16 as that of arms 3 and for each arm 3 actuators are made of a first fluid-operated cylinder **17** arranged between the base structure 2 and the first arm

portion 9 for operating the first arm portion 9 rotating about the pivot axis 4, and a second fluid-operated cylinder **18** arranged between the first arm portion 9 and the second arm portion 10 for operating the second arm portion 10 rotating about the hinging axis 11.

[0048] The piston rod of the first cylinder 17 is in engagement with a bent tailpiece **9a** of the first portion 9 so as to create an arm conveniently spaced away from the pivot axis 4 in order to reduce the force to be exerted by cylinder 17, the obtained torque being the same.

[0049] The control centre 13 is programmed for coordinating the angular movement of each first portion 9, rotating about the pivot axis 4 and therefore shifting the hinging axis 11 along a trajectory in the form of an arc of a circle **19**, with the movement of each second portion 10 rotating about the hinging axis 11.

[0050] This coordination is adapted to position the grasping heads 8 close to the grasping stretch 12, along which at different heights the centres 5c and axes 6 of reels 5 of different diameter supported on carriage 2b are located.

[0051] If the two portions 9 and 10 of each arm 3 are connected to each other in a telescopic manner, as diagrammatically shown in Fig. 5, the driving apparatus 7 remains substantially the same and the second fluid-operated cylinder 18 intervenes making the second portion 10 project from the first arm portion 9 to a greater or less extent, so as to place head 8 on the grasping stretch 12.

[0052] With reference to Fig. 6, it is also to point out that the telescopic engagement between the first and second portions 9 and 10 makes it easy to replace the second fluid-operated cylinder 18 with an electric-control operating unit **26**, in which a reduction motor **27** operates a toothed wheel **28**, through a worm screw **27a**.

[0053] The toothed wheel 28 is prevented from translation by means of brackets **29** and is screwed down and engaged with an axially movable operating worm screw **30** which is rigid at the end with the second portion 10 of arm 3.

[0054] Obviously, when a fluid-operated cylinder is replaced by the operating unit 26, only electric connections are provided between the operating unit 26 and the control centre 13. Advantageously, sensor means **20** is provided which is for example defined by photoelectric elements capable of detecting the size of a reel 5 placed on carriage 2b and adapted to supply the control centre 13 with a corresponding signal.

[0055] Based on this signal, the control centre 13 operates setting of arms 3 and disposes heads 8 along the grasping stretch 12 and in line with the central axis 6 of the reel 5 supported on the carriage 2b.

[0056] Shown in Figs. 2 and 4 by way of example is a photoelectric cell placed on the second rigid portion 10 of arm 3, alongside the respective head 8, on the side thereof which is the first to come close to a reel 5 placed on a carriage 2b. When arm 3 rotates downwardly, the photoelectric cell signals where the outer cylindrical edge of reel 3 is placed. This placement is univocally

correlated with the reel diameter and therefore the control centre 13 is capable of exactly positioning heads 8 at the axis 6 of the respective reel 5. The sensor means 20 can be disposed axially relative to heads 8 or at another position.

[0057] Referring now to Figs. 4 and 8, it is pointed out that the control centre 13 may advantageously be adapted to intervene separately on each of the arms 3 of each arm pair, since each arm 3 is associated with its own set of distributors 16, and since the driving apparatus 7, and in particular the control centre 13, includes offsetting commands denoted by numbers **13a** and **13b**.

[0058] By these offsetting commands, each of the two arms 3 or only one of them can be offset as regards its position, in particular angularly, relative to the other arm 3, so as to lose parallelism therewith.

[0059] Preferably, displacement takes place with reference to the raised work position and in the direction shown in Fig. 8, that is in the direction bringing the central axis 6 of a raised reel 5 in a work position to oscillate angularly in a plane **21** which is substantially horizontal, or substantially parallel to the pivot axis 4 of the arms 3.

[0060] By a machine structured as shown in the drawings, practically a small rotation of a single arm 3 about the pivot axis 4 is operated, which rotation is carried out optionally in opposite ways.

[0061] For instance, each time the offsetting command 13a is operated, it imposes a one-degree displacement to a given arm 3 in the paper unrolling direction, whereas command 13b acts in the opposite way, on the same arm 3.

[0062] Alternatively or in addition to the offsetting commands 13a, 13b, the driving apparatus 7 also comprises a sensor apparatus **22** placed on arms 3 or immediately downstream of reel 5 at a work position and adapted to detect the tension efforts exerted on the unwound paper or similar material at the side edges of the reel 5.

[0063] The sensor apparatus 22, which is connected to the control centre 13, comprises an auxiliary roller **23**, located close to the reel 5 and causing the paper to carry out a deviation, so as to exert pressure thereon, and sensors or load cells **24** in contact with the roller 23 and capable of detecting pressures at the ends of this auxiliary roller 23.

[0064] It is pointed out that in Fig. 8 there are shown and denoted by **25** normal conveyor and guide rollers for the paper material or the like unrolled from reel 5.

[0065] Operation of the machine is as follows.

[0066] All arms 3 are first oriented upwardly and, in each arm pair, arms 3 are at the maximum mutual distance so that a power-driven carriage 2b, on which a reel 5 rests, can be freely inserted between them.

[0067] Only after a signal indicating that carriage 2b is correctly inserted between a pair of arms 3, at the base thereof, reaches the control centre 13, descent of arms 3 is operated.

[0068] In addition, first the first and second arm por-

tions 9 and 10 are maintained in a contracted setting, as shown in solid line in Figs. 4, 5 and 6, i.e. a setting in which the second portions 10 are bent or placed over the first portions 9.

[0069] The contracted setting is abandoned as arms 3 begin rotating to bring heads 8 at once close to the vertical grasping stretch 12 and then run along it; preferably the contracted setting which is less bulky, may be also abandoned only when, due to rotation of arms 3, the sensor means 20 detects the presence of reel 5.

[0070] At all events, when the sensor means 20 detects the presence of reel 5, a signal is issued and, based on the angular position of the first portion 9, the control centre 13 determines the diameter and placement of the central axis 6 of the reel and, as a result, makes portions 9 and 10 take their final settings so as to dispose heads 8 in alignment with the central axis 6 of the reel 5.

[0071] When this final position has been reached, arms 3 move closer to each other closing the reel clamp-wise, while inserting the spindle assemblies 8a into cores 5b. The flange assemblies 8b are squashed towards arms 3 causing a consequent expansion of keys 8d and locking of reel 5.

[0072] When the reel has been grasped, arms 3 move upwardly and dispose said reel at a raised work position, where the control units 8c adjust and control rotation thereof.

[0073] If the reel 5 or the wound paper show any defect bringing to a greater tensioning of one side of reel 5 during unwinding thereof, an adjustment remedying this drawback can be carried out.

[0074] In fact an angular displacement of a single arm 3 and therefore of the central axis 6 can be operated through the offsetting commands 13a or 13b.

[0075] This displacement is carried out based on empiric controls, by watching how the reel unwinding takes place for example, or on the basis of tensioning data detected by the sensor apparatus 22.

[0076] The sensor apparatus 22 can also directly operate an angular adjustment of one arm 3 and the central axis 6 to obtain displacement of the latter, so that the reel edges have the same tensioning.

[0077] For the unloading cycle, descent of arms 3 is operated until they lay down reel 5 on carriage 2b, if part of the reel 3 is to be returned, or until the end of their stroke if the core 5b alone is to be unloaded. Then arms 3 are moved away and lifted until they reach said starting position.

[0078] Carriage 2b can be started while the machine is waiting for the beginning of a new loading cycle.

[0079] The invention achieves important advantages.

[0080] In fact, the machine lends itself to handle reels of any diameter without requiring manual interventions.

[0081] Therefore, times for placing new or partly used reels to their work position and for returning said reels once they have been partly or fully used are reduced, which will bring about a reduction in the production

costs, above all when frequent reel changes are required by the working processes.

[0082] It is in particular pointed out that adaptability of the arms 3 to different reel diameters is obtained through employment of particularly simple mechanical structures for said arms, which results in reduced installation and management costs.

[0083] In addition, the machine is also particularly flexible and adapted to compensate, also in an automatic manner, for reel winding irregularities or irregularities in the base weight of the paper or similar material wound on the reels.

Claims

1. A machine for handling reels, in particular for paper material production lines, comprising a base structure (2), at least one pair of movable handler arms (3) connected to said base structure (2) for pivotal movement about a pivot axis (4) parallel to the axis (6) of said reels (5) and for translational movement in mutually approaching or separating directions parallel to said pivot axis (4), a driving apparatus (7) for moving said arms (3) between reel loading or unloading positions and reel work positions, each of said arms (3) comprising at least two arm portions (9, 10) connected to each other and movable relative to each other for enabling each of said arms (3) to take a variable setting including a contracted setting and an extended setting, defining respectively a minimum and a maximum length of said arms (3), and a plurality of intermediate settings, and grasping means (8) on the arm portions (10) spaced from said base structure (2) for grasping said reels (5) at the axis (6) thereof,

characterised in that said base structure (2) has at least one reel support (2a, 2b) for supporting reels (5) of different diameter, and **in that** said driving apparatus (7) coordinates movement of said arm portions (9, 10) to cause said grasping means (8) to travel along substantially rectilinear and vertical grasping stretches (12) lying above said reel support and defined by the axes (6) of reels (5) of different diameter supported in loading or unloading position on said reel support (2a, 2b).

2. A machine as claimed in claim 1, **characterised in that** said reel support comprises a reel supporting carriage (2b) movable along rails (2a) extending parallel to said pivot axis (4) of said arms (3).
3. A machine as claimed in claim 1, **characterised in that** said arms (3) have each a first arm portion (9) pivotally connected with said base structure (2) and a second arm portion (10) supporting said grasping means (8) and pivoted to said first arm portion (9) about a hinging axis (11) parallel to said pivot axis

(4).

4. A machine as claimed in claim 1, **characterised in that** said arms (3) have each a first arm portion (9) pivotally connected with said base structure (2) and a second arm portion (10) telescopically engaged with said first arm portion (9).
5. A machine as claimed in 3, **characterised in that** said driving apparatus (7) comprises a first fluid-operated cylinder (17) between said base structure (2) and said first arm portion (9), and a second fluid-operated cylinder (18) between said first and second arm portion (9, resp. 10), and a control centre (13) for co-ordinatingly actuating said first and second fluid-operated cylinders (17, 18) to move said grasping means (8) along said grasping stretches (12).
6. A machine as claimed in claim 4, **characterised in that** said driving apparatus (7) comprises a fluid-operated cylinder (17) between said base structure (2) and said first arm portion (9), and an electric-control operating unit (26) between said first arm portion (9) and said second arm portion (10), said unit comprising a reduction motor (27) driving said second arm portion (10) through worm screw means (27a, 30), said fluid-operated cylinder (17) and said electric-control operating unit (26) being operatively connected with a control centre (13) for coordinately actuating said fluid-operated cylinder (17) and said electric-control operating unit (26) to move said grasping means (8) along said grasping stretches (12).
7. A machine as claimed. in claims 1 and 5 or 1 and 6, **characterised in that** it further comprises sensor means (20) on said arms (3) for detecting the size of said reels (5), said sensor means being operatively connected with said control centre (13).
8. A machine as claimed in claim 1, **characterised in that** the arms (3) of said at least one pair of arms are angularly movable relative to one another in said work position to angularly displace the axis (6) of said reels (5) in a plane (21) substantially parallel to said pivot axis (4).
9. A machine as claimed in claim 8, **characterised in that** it further comprises a sensor apparatus (22) for detecting tensioning of the material being unwound from said reels (5), said apparatus (22) having an auxiliary roller (23) located close to said reels (5) and load cells (24) in contact with said auxiliary roller (23), said apparatus (22) being operatively connected with a control centre (13) for controlling the angular displacement of said arms (3) relative to one another.

Patentansprüche

1. Eine Maschine für die Handhabung von Rollen, insbesondere für Papierproduktionslinien, die eine Basisstruktur (2) umfaßt, mindestens ein Paar bewegliche Handhabungsarme (3), die mit der genannten Basisstruktur (2) zwecks Drehbewegung um eine Drehachse (4) verbunden sind, die parallel zu der Achse (6) der genannten Rollen (5) verläuft, und zwecks Translationsbewegung in sich einander nähernden oder voneinander entfernenden Richtungen parallel zu der genannten Drehachse (4), einen Antriebsmechanismus (7) für die Bewegung der genannten Arme (3) zwischen den Rollenauf- und Abladestellungen und den Rollenarbeitsstellungen, wobei jeder der genannten Arme (3) mindestens 2 Armabschnitte (9, 10) umfaßt, die miteinander verbunden und zueinander beweglich sind, um jeden der genannten Arme (3) in die Lage zu versetzen, eine variierbare Stellung einzunehmen, einschließlich einer kontrahierten und einer expandierten Stellung, wodurch jeweils eine Mindest- und eine Höchstlänge der genannten Arme (3) entsteht, sowie eine Vielzahl von Zwischenstellungen, und Greifelemente (8) an Armabschnitt (10), die von der genannten Basisstruktur (2) distanziert sind, zum Erfassen der genannten Rollen (5) an deren Achse (6),
dadurch gekennzeichnet, daß die genannte Basisstruktur (2) mindestens einen Rollenträger (2a, 2b) für die Halterung von Rollen (5) unterschiedlichen Durchmessers aufweist, und daß der genannte Antriebsmechanismus (7) die Bewegung der genannten Armabschnitte (9, 10) koordiniert, um die genannten Greifelemente (8) zu veranlassen, an im wesentlichen geradlinigen und senkrechten Greifausdehnungen (12) entlangzufahren, die oberhalb des genannten Rollenträgers liegen und von den Achsen (6) der Rollen (5) unterschiedlichen Durchmessers gebildet werden, die in der Auf- und Abladestellung auf dem genannten Rollenträger (2a, 2b) gehalten werden.
2. Eine Maschine gemäß Anspruch 1, **dadurch gekennzeichnet, daß** der genannte Rollenträger einen Rollenhaltewagen (2b) umfaßt, der sich über Schienen (2a) bewegt, die sich parallel zu der genannten Drehachse (4) der genannten Arme (3) erstrecken.
3. Eine Maschine gemäß Anspruch 1, **dadurch gekennzeichnet, daß** die genannten Arme (3) jeweils einen ersten Armabschnitt (9) aufweisen, der drehbar mit der genannten Basisstruktur (2) verbunden ist, und einen zweiten Armabschnitt (10), der die genannten Greifelemente (8) hält und drehbar über eine Schamierachse (11), die parallel zu der genannten Drehachse (4) verläuft, mit dem genannten ersten Armabschnitt (9) verbunden ist.
4. Eine Maschine gemäß Anspruch 1, **dadurch gekennzeichnet, daß** die genannten Arme (3) jeweils einen ersten Armabschnitt (9) aufweisen, der drehbar mit der genannten Basisstruktur (2) verbunden ist, und einen zweiten Armabschnitt (10), der teleskopisch mit dem genannten ersten Armabschnitt (9) einrastet.
5. Eine Maschine gemäß Anspruch 3, **dadurch gekennzeichnet, daß** der genannte Antriebsmechanismus (7) einen ersten, fluidbetriebenen Zylinder (17) zwischen der genannten Basisstruktur (2) und dem genannten ersten Armabschnitt (9) umfaßt, und einen zweiten fluidbetriebenen Zylinder (18) zwischen dem genannten ersten und zweiten Armabschnitt (jeweils 9, 10), und eine Steuerzentrale (13) zur Koordination und Betätigung des genannten ersten und zweiten fluidbetriebenen Zylinders (17, 18), um die genannten Greifelemente (8) entlang der genannten Greifausdehnungen (12) zu bewegen.
6. Eine Maschine gemäß Anspruch 4, **dadurch gekennzeichnet, daß** der genannte Antriebsmechanismus (7) einen fluidbetriebenen Zylinder (17) zwischen der genannten Basisstruktur (2) und dem genannten ersten Armabschnitt (9) umfaßt, und eine elektrische Steuereinheit (26) zwischen dem genannten ersten Armabschnitt (9) und dem genannten zweiten Armabschnitt (10), wobei die genannte Einheit einen Getriebemotor (27) umfaßt, der den genannten zweiten Armabschnitt (10) mit Hilfe einer Schneckenschraube (27a, 30) antreibt, und der genannte fluidbetriebene Zylinder (17) und die genannte elektrische Steuereinheit (26) funktionsfähig mit einer Steuerzentrale (13) verbunden sind, um den genannten fluidbetriebenen Zylinder (17) koordiniert anzutreiben, die genannten Greifelemente (8) entlang der genannten Greifausdehnungen (12) zu bewegen.
7. Eine Maschine gemäß Anspruch 1 und 5 oder 1 und 6, **dadurch gekennzeichnet, daß** sie des weiteren einen Sensoren (20) an den genannten Armen (3) für die Feststellung der Größe der genannten Rollen (5) umfaßt, wobei der genannte Sensor funktionsfähig mit der genannten Steuerzentrale (13) verbunden ist.
8. Eine Maschine gemäß Anspruch 1, **dadurch gekennzeichnet, daß** die Arme (3) des genannten mindestens einen Armpaars in der genannten Arbeitsstellung winklig zueinander bewegt werden können, um die Achse (6) der genannten Rollen (5) in einer Ebene (21), die im wesentlichen parallel zu der genannten Drehachse (4) verläuft, winklig zu

verstellen.

9. Eine Maschine gemäß Anspruch 8, **dadurch gekennzeichnet, daß** sie des weiteren ein Sensorge-
rät (22) für die Feststellung der Spannung des Ma-
terials umfaßt, das von den genannten Rollen (5)
abgewickelt wird, wobei das genannte Gerät (22)
eine Hilfsrolle (23) aufweist, die in der Nähe der ge-
nannten Rollen (5) angeordnet ist, sowie Ladezel-
len (24), die sich in Kontakt mit der genannten Hilfs-
rolle (23) befinden, wobei das genannte Gerät (22)
funktionsfähig mit der Steuerzentrale (13) verbun-
den ist, um die Winkelverstellung der genannten Ar-
me (3) zueinander zu steuern.

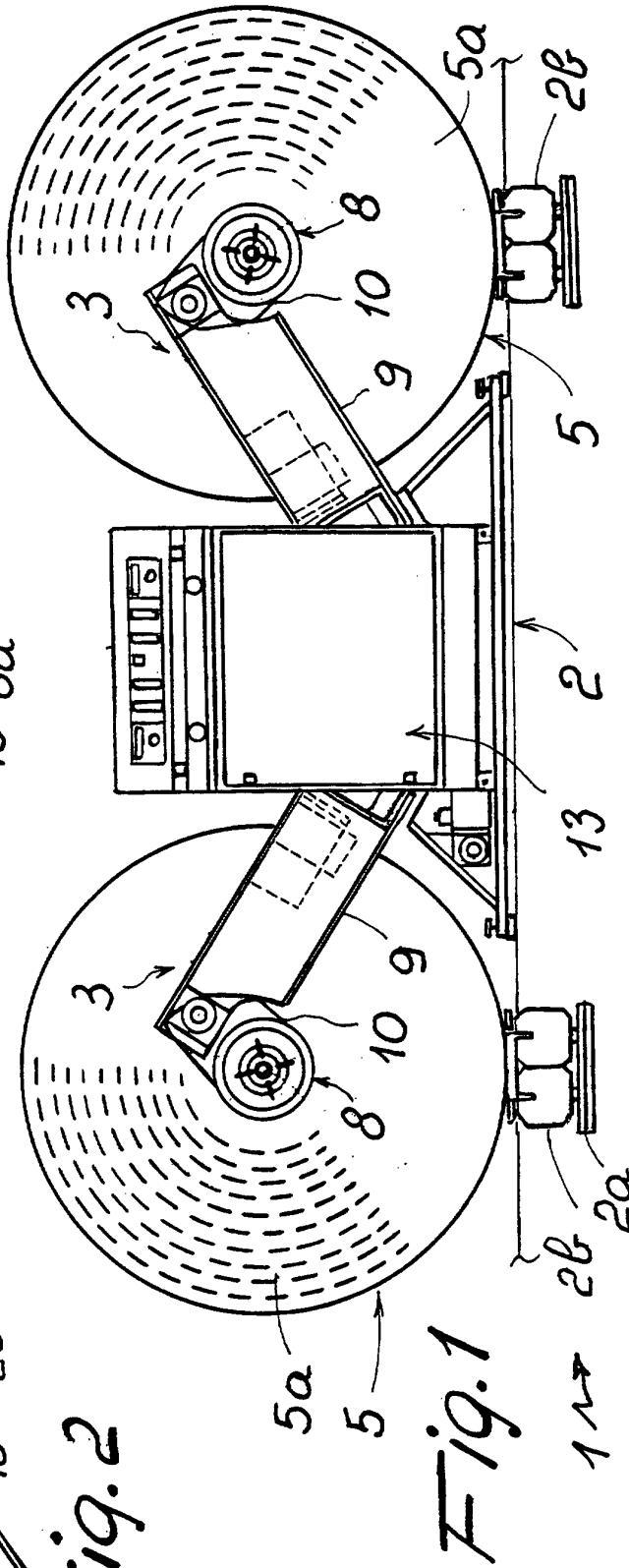
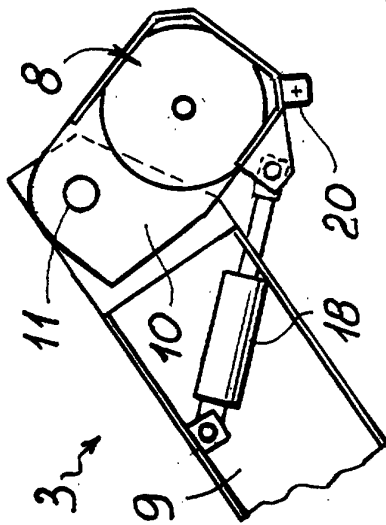
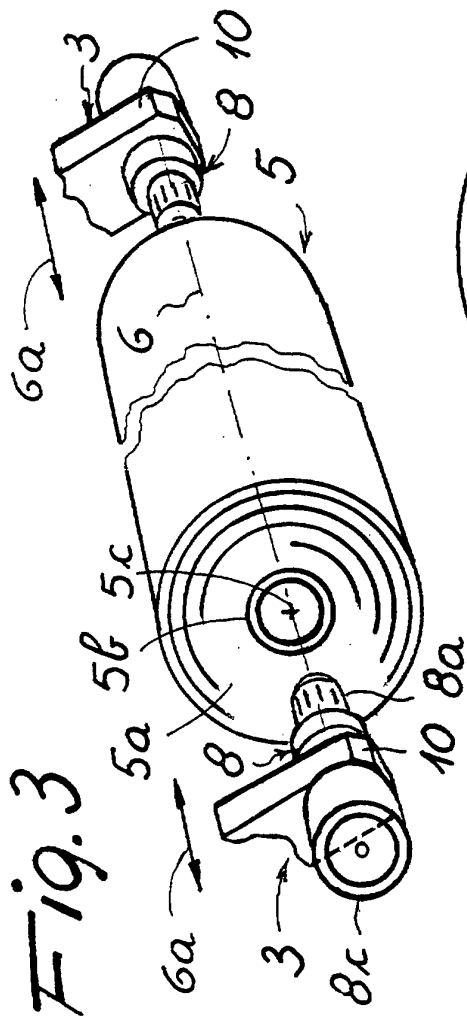
Revendications

1. Machine pour la manipulation de rouleaux, particu-
lièrement pour des installations de production de
papier, comprenant une structure de base (2), au
moins une paire de bras de manipulation mobiles
(3) reliés à ladite structure de base (2) pour le mou-
vement à pivotement autour d'un axe de rotation (4)
parallèle à l'axe (6) desdits rouleaux (5) et pour le
mouvement de translation dans des directions de
rapprochement réciproque ou de séparation paral-
lèlement audit axe de rotation (4), un appareil de
manoeuvre (7) pour déplacer lesdits bras (3) entre
des positions de chargement ou déchargement des
rouleaux et des positions de travail des rouleaux,
chacun desdits bras (3) comprenant au moins deux
portions de bras (9, 10) reliées l'une à l'autre et mo-
biles l'une par rapport à l'autre pour permettre à
chacun desdits bras (3) de prendre un positionne-
ment variable comprenant une position contractée
et une position étendue, définissant respectivement
une longueur minimum et maximum desdits bras
(3), et une pluralité de positions intermédiaires, et
des moyens de prise (8) sur les portions de bras
(10) espacés de ladite structure de base (2) pour
saisir lesdits rouleaux (5) à l'emplacement de leur
axe (6), **caractérisée en ce que** ladite structure de
base (2) a au moins un support de rouleau ou porte-
rouleau (2a, 2b) pour supporter les rouleaux (5) de
diamètres différents, et **en ce que** ledit appareil de
manoeuvre (7) coordonne le mouvement desdites
portions de bras (9, 10) pour permettre auxdits
moyens de prise (8) de se déplacer le long d'éten-
dues de prise sensiblement rectilignes et verticales
(12) qui sont disposées au-dessus dudit porte-rou-
leaux et sont définies par les axes (6) des rouleaux
(5) de diamètres différents supportés dans la posi-
tion de chargement ou de déchargement sur ledit
porte-rouleau (2a, 2b).
2. Machine selon la revendication 1, **caractérisée en
ce que** ledit porte-rouleaux comporte un chariot de

support des rouleaux (2b) mobile le long de rails
(2a) s'étendant parallèlement audit axe de rotation
(4) desdits bras (3).

3. Machine selon la revendication 1, **caractérisée en
ce que** lesdits bras (3) ont chacun une première
portion de bras (9) reliée à pivotement à ladite struc-
ture de base (2) et une deuxième portion de bras
(10) soutenant lesdits moyens de prise (8) et pivo-
tée sur ladite première portion de bras (9) autour
d'un axe d'articulation (11) parallèle audit axe de ro-
tation (4).
4. Machine selon la revendication 1, **caractérisée en
ce que** lesdits bras (3) ont chacun une première
portion de bras (9) reliée à pivotement à ladite struc-
ture de base (2) et une deuxième portion de bras
(10) engagée de manière télescopique à ladite pre-
mière portion de bras (9).
5. Machine selon la revendication 3, **caractérisée en
ce que** ledit appareil de manoeuvre (7) comporte
un premier cylindre hydraulique (17) entre ladite
structure de base (2) et ladite première portion de
bras (9), et un deuxième cylindre hydraulique (18)
entre lesdites première et deuxième portions de
bras (9, respectivement 10), et un centre de contrô-
le (13) pour commander de manière coordonnée
lesdits premier et deuxième cylindres hydrauliques
(17, 18) pour qu'ils causent le mouvement desdits
moyens de prise (8) le long desdites étendues de
prise (12).
6. Machine selon la revendication 4, **caractérisée en
ce que** ledit appareil de manoeuvre (7) comporte
un cylindre hydraulique (17) entre ladite structure
de base (2) et ladite première portion de bras (9) et
une unité de commande électrique (26) entre ladite
première portion de bras (9) et ladite deuxième por-
tion de bras (10), ladite unité de commande com-
prenant un motoréducteur (27) entraînant ladite
deuxième portion de bras (10) par l'intermédiaire de
moyens à vis sans fin (27a, 30), ledit cylindre hy-
draulique (17) et ladite unité de commande électri-
que (26) étant reliés de manière opérationnelle à un
centre de contrôle (13) pour commander de maniè-
re coordonnée ledit premier cylindre hydraulique
(17) et ladite unité de commande électrique (26)
pour qu'ils causent le mouvement desdits moyens
de prise (8) le long desdites étendues de prise (12).
7. Machine selon les revendications 1 et 5 ou 1 et 6,
caractérisée en ce qu'elle comporte en outre des
moyens capteurs (20) sur lesdits bras (3) pour dé-
tecter la dimension desdits rouleaux (5), lesdits
moyens capteurs étant reliés de manière opération-
nelle audit centre de contrôle (13).

8. Machine selon la revendication 1, **caractérisée en ce que** les bras (3) de ladite au moins une paire de bras sont mobiles angulairement l'un par rapport à l'autre dans ladite position de travail pour déplacer angulairement l'axe (6) desdits rouleaux (5) dans un plan (21) sensiblement parallèle audit axe de rotation (4). 5
9. Machine selon la revendication 8, **caractérisée en ce qu'elle** comporte en outre un appareil détecteur (22) pour détecter la tension de la matière en cours de déroulement desdits rouleaux (5), ledit appareil (22) ayant un rouleau auxiliaire (23) placé à proximité desdits rouleaux (5) et des cellules de charge (24) en contact avec ledit rouleau auxiliaire (23), ledit appareil (22) étant relié de manière opérationnelle audit centre de contrôle (13) pour commander le déplacement angulaire desdits bras (3) l'un par rapport à l'autre. 10 15 20 25 30 35 40 45 50 55



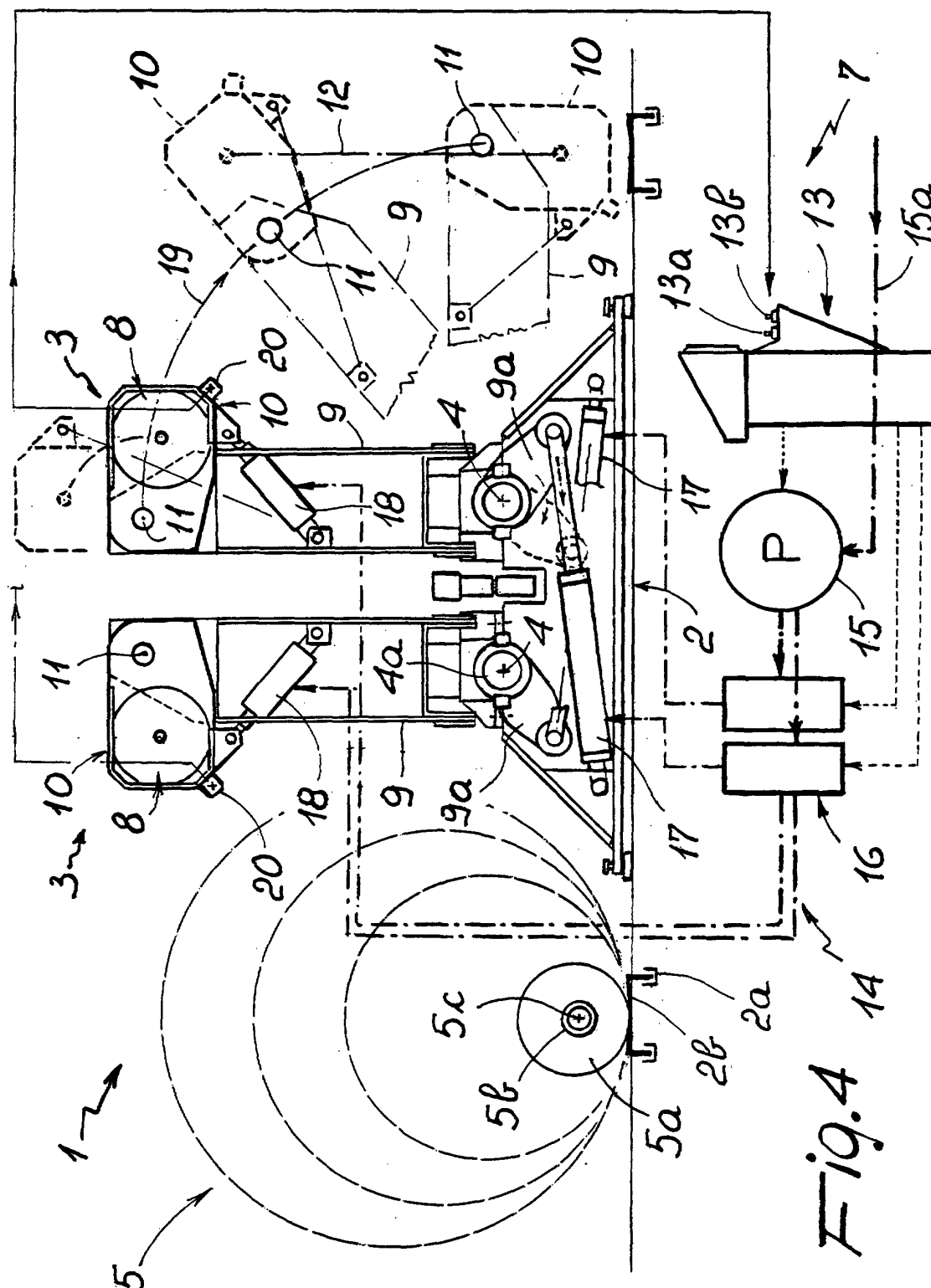


Fig. 4

