

The invention relates to a storage device according to the preamble of Claim 1.

GB-A-2 071 059 discloses a device of this type for storing bank notes in the case of which the bank note, depending on the type of construction, is wound onto the storage spool, on a strip unwound from a strip spool or between two strips unwound from a common strip spool or from separate strip spools in each case. In the case of the construction having two strips and two strip spools, the drive arrangement has a drive device, which is not described in greater detail, with a motor, of which the speed can be regulated, and which is to drive the storage spool in the winding-up and unwinding directions and simultaneously drive the strip spools in the unwinding and winding-up directions such that a braking effect, preventing the rotation of the spool or spools rotating in each case in the unwinding direction, acts upon the latter in order to keep the strips clamped such that they coincide uniformly. The manner in which this is to be achieved by the control of the speed of the motor or by means of the drive device, which is only mentioned in brief, cannot be deduced from this prior art, in particular since both the running movement and the clamping of each strip does not

only depend on the rotational speeds of the strip and storage spools but also on the peripheral speed of the winding which is determined by the rotational speed and the respective outer diameter of the winding, which increases during the winding-up process and decreases during the unwinding process, the outer diameter of the storage winding also being different depending on the thickness of the bank notes and the distance at which these bank notes are wound up in succession.

In the case of a storage device of a similar type (US-A-2 981 492) which likewise comprises a storage spool and two strip spools and in the case of which, for storing the objects, only the storage spool is driven by a motor and, for discharging previously stored objects, only the strip spools are driven by hand, the strip spools are driven by an equalising gear (differential gear) in order to achieve identical tension on the strips. Thus, during storage, the rotational speed of the storage spool is constant such that the strip tension increases as the diameter of the storage winding becomes larger and, at the same time, the braking moment, which the idling equalising gear thus exerts, on the strip winding, decreases.

WO 82/00025 discloses a storage device for bank notes. The bank notes are stuck on a strip which is rolled up to form a storage winding. In order to remove the bank notes, the strip is unwound from a first spool onto a second spool. A drive device engages both on the strip and on the second spool accommodating the empty strip. The spools are rigidly mounted such that they can rotate in a discharge device. This storage device also entails the above-mentioned disadvantages.

The object of the invention is to overcome these disadvantages. As characterised in the claims, the invention achieves the object of providing a storage device for lamellar, flexible objects, in particular bank notes, in which the strip speed and strip tension are independent of the respective operating state, i.e. independent of the diameters of the storage winding and of the strip winding or windings which alter in opposite directions.

Since the drive device primarily operates not on the spools but on the strip or strips, a constant peripheral speed of the windings can be achieved simply and reliably, although the diameter of the winding or windings rotating in the winding-up direction increases and the diameter of the

windings rotating simultaneously in the unwinding direction decreases. The number, thickness and distance between the objects stored in the respective operating state thus have no influence on the strip tension.

In the case of one embodiment, the driven rollers engage the strip or strips at the periphery of the windings. Thus the rollers can be support rollers, rigidly disposed for simplifying their drive, for the windings of the spools mounted so as to be vertically displaceable relative to their axes.

A further embodiment has a pair of rollers which can be driven in one direction in order to draw the strip or strips off the strip spool or spools and in the opposite direction to remove the strip or strips from the storage winding, and a gear arrangement which transfers the rotation of the winding or windings rotating in each case in the unwinding direction to the other winding or windings in their winding-up direction such that their peripheral speeds correspond at least approximately in order to maintain the strip tension.

When this gear arrangement is used, the above-mentioned object can also be achieved in that one of the wheels of the gear arrangement is driven. In order to maintain a desired strip tension, the drive arrangement of the storage device according to the invention can be constructed in such a way that the peripheral speed of the winding or windings rotating in each case in the winding-up direction is slightly greater than that of the winding or windings rotating simultaneously in the unwinding direction, a rotationally resilient coupling absorbing the tension force of the strip or strips and a torque transmission delimiting the strip tension with slip advantageously being provided, in particular if the elasticity of tension of the strip or strips is very low.

In the following, the invention will be described in further detail with reference to the enclosed schematic drawings which only illustrate embodiments and in which:

Figure 1 is the schematic diagram of a storage device with a strip during the storage process;

Figure 2 is an illustration corresponding to

Figure 1 showing the discharge of the previously stored objects;

Figure 3 is a side view of the storage device with a strip;

Figure 4 is an oblique plan view in the direction IV in Figure 3;

Figure 5 is a view corresponding to Figure 3 of a storage device having two strips;

Figure 6 shows a plan view in the direction VI in Figure 5;

Figure 7 shows a device for delivering objects to be stored and for conveying previously stored objects away at the device according to Figures 1 to 4 or 5 and 6, in section along the line VII-VII in Figure 8; and

Figure 8 shows a section along the line VIII-VIII in Figure 7.

According to Figure 1, the bank notes 1 (or other lamellar, flexible objects) are wound, lying on a

strip 2, onto a storage spool 3. The strip 2 is thus unwound from a strip winding 5 on a strip spool 6 and a storage winding 7 is formed on the storage spool 3. The strip 2 runs about a roller 9 of a pair of rollers 9, 10, between the rollers of which the bank notes 1 are delivered to the strip 2. In order to facilitate the winding-up of the bank notes, the storage spool 3 has a larger diameter than the strip spool 6.

According to Figure 2, in order to discharge or return previously stored bank notes 1, the strip 2, together with stored bank notes 1a, is removed from the storage winding 7 and wound onto the strip spool 6, after the bank notes have been separated from the strip 2 as they leave the pair of rollers 9, 10.

Figure 1 shows the state in which the strip 2 has not yet been used for storage and is wound onto the strip spool 6 over almost its entire length, forming the strip winding 5. Figure 2 shows the state in which the strip 2 is wound onto the storage spool 3 over almost its entire length, forming the storage winding 7. As can be seen, the diameters of the windings 5 and 7 vary considerably during operation.

The storage spool 3 or its storage windings 7 is/are supported on a rigidly mounted support roller 12, and the strip spool 6 or its strip windings 5 is/are supported on a likewise rigidly mounted support roller 13. In order to enable this to occur as the diameters of the windings 5 and 7 vary during operation, the spools 3 and 5 are mounted such that they can be displaced perpendicular to their spindles 15 and 16. Consequently, as the diameter of the storage winding 7 increases, the spindle 15 of the storage spool 3 moves further away from the support roller 12, on which the strip 2 with the bank notes runs onto the storage winding 7 and runs away therefrom, and this allows the strip 2, on which the bank notes lie, to have a short path between the pair of rollers 9, 10 and the point at which the strip, adjacent the support roller 12, runs onto the winding or away therefrom. This is important, since each bank note in this way is retained between the rollers 9 and 10 on the strip 2 and/or must be held such that it projects somewhat into the storage winding 7 in order for the bank notes to be reliably conveyed in this way. If the storage spool spindle 15 were rigidly mounted, as is conventional, this path would have to be longer in consideration of the largest diameter of the storage winding 7, and the path

would alter its position as a function of the diameter of the storage winding 7, and it would be impossible, or at least considerably more awkward, to dispose a stripper 18 which strips the bank notes as the strip 2 unwinds from the storage winding 7. The increase in the distance between the spindle 15 of the storage spool and the pair of rollers 9, 10 as the diameter of the storage winding 7 increases is further increased in that the displacement line 20 of this spindle and the path, which the strip covers between the pair of rollers 9, 10 and the storage winding 7, form an obtuse angle. Thus the position of the point at which the strip runs onto or off the winding 7 also varies less.

As a result of the fact that the strip spool 6 or the strip winding 7 is also supported on the rigidly mounted support roller 13, a strip length which is independent of the respective outer diameter of the two windings (on the spools 3 and 5) is achieved on the path from one winding to the other. This is essential for a constant strip tension. At the transition between the strip winding on the spool 5 and the support roller 13, the strip 2 follows an S-shaped path. As a result, the spools 3 and 6 and their support rollers 12 and 13 always rotate in the same

direction. This simplifies the construction of the gear arrangement described hereinbelow.

The other type of construction of the storage device, in which the bank notes are wound between two strips onto the storage spool or the storage winding, differs with respect to its fundamental construction from that which is described in conjunction with Figures 1 and 2 in that a second strip is guided about the roller 10 of the pair of rollers and the two strips are either wound jointly above one another onto a strip spool or are each wound onto a strip spool. Since the bank notes are thus held between the two strips on the path from the pair of rollers to the storage winding and vice versa, their length is of less significance. Nevertheless, the supporting of the storage spool or of the storage winding and the supporting of the storage spool or spools and/or windings on support rollers is also advantageous in this embodiment since a strip length between the windings is thereby achieved which is independent of the diameter of the windings and, in addition, the gear arrangement described hereinbelow with a transmission ratio which is dependent on the diameters of the windings, can be constructed more simply. Even if, as described hereinbelow, rollers are used which act on the

strip or strips on the exterior of the windings, their drive is simpler if these rollers are rigidly mounted support rollers of displaceably guided windings.

In the embodiment illustrated in Figures 3 and 4, the strip 2 consists of two steel strips which are, for example, 0.05 mm thick and 6 mm wide, resulting - with the given dimensions of the device - in a very great strip length and high storage density and a high degree of resistance to wear on the rollers 9, 10, on the support rollers 12 and 13, and on the stripper 8. The two steel strips run jointly, are jointly wound up and unwound, and act jointly, as described with reference to Figures 1 and 2. Accordingly, the rollers 9 and 10, the spools 3 and 6 and the support rollers 12 and 13 also each consist of two parts. These parts of the roller 10 are mounted on a common shaft 22 and this also applies for the roller 9. The parts of the storage spool 3 are connected to one another in a rotationally rigid manner by means of a rod 23, are jointly mounted on a hollow shaft 24 such that they rotate, and are connected thereto in a rotationally resilient manner by a torsion spring 25. The hollow shaft 24 is rotatably mounted on the spindle 15. The spool parts of the strip spool 6 are each

connected to one of the two sun wheels of an equalising gear 28 (differential gear) of which the planet wheel carrier is mounted on a hollow shaft 29 which is rotatably mounted on the spindle 16 of the strip spool 6.

In order to mount the spools 3 and 6 displaceably, as explained with reference to Figures 1 and 2, the ends of their spindles 15 and 16 respectively are displaceable in guides 31 and 32 respectively which are equipped with toothed rods 34 and 35 respectively which extend in the direction of guiding and with which pinions 37 and 38 respectively mounted on the spindle ends mesh, ensuring parallel guiding.

The rollers 9 and 10 of the pair of rollers are connected to one another by means of a pair of pinions (not illustrated) and are driven by a reversible drive motor 40 in one direction for storing bank notes and in the opposite direction for discharging previously stored bank notes. Figures 3 and 4 show, by means of solid arrows, the senses of rotation of the individual parts and the running direction of the strip when bank notes are stored and, by means of dash-dotted arrows, the discharge of previously stored bank notes.

There is mounted on the hollow shaft 24, of the storage spool 3, which is displaceable along the displacement line 20, a crown wheel 42 on which runs a wheel 43 which is mounted on a rigidly mounted shaft 44 extending in the direction of the line 20, and is disposed such that it runs over a circle of the crown wheel 42 of which the diameter corresponds to the diameter of the storage winding 7 on the storage spool 3. For this purpose, the plane of the wheel 43 is perpendicular to the displacement direction 20 of the spool 3 at or near the line on which the support roller 12 contacts the winding 7. In this way it is achieved that the peripheral speed of the wheel 43 corresponds to the peripheral speed of the storage winding 7 and thus to the speed of the strip.

Accordingly, there is mounted on the hollow shaft 29 belonging to the strip spool 6 a crown wheel 46 on which a wheel 47, which is mounted on a rigidly mounted shaft 48, runs at a peripheral speed corresponding to the peripheral speed of the strip winding 5. The two wheels have the same diameter.

The wheel shafts 44 and 48 are connected to one another by means of two belt drives 51 to 54 and 57 to 60. One pulley 51 of the first belt drive is rigidly mounted on the shaft 44 and the other 52 is mounted on the shaft 48 by means of an

overriding clutch 43 which only transmits a rotation of the shaft 48 to the pulley 52 in the direction corresponding to the winding-up direction of the spool 6. The diameter of the pulley 51 is somewhat smaller than that of the pulley 52. The belt 54 is advantageously a toothed belt. The pulley 57 is rigidly mounted on the shaft 48 and the other pulley 58 is mounted on the shaft 44 by means of an overriding clutch 59 which only transmits the rotation of the shaft 44 corresponding to the winding-up direction of the spool 3 to the pulley 57 by means of the belt 60. The diameter of the pulley 57 is somewhat smaller than that of the pulley 58.

In order to store bank notes, the pair of rollers 9, 10 is driven by the motor 40 in the sense illustrated by the solid arrows. Thus the strip 2 is withdrawn from the strip winding 5. The gear arrangement, consisting of the two friction gears 42, 43 and 46, 47 and the two belt drives 51 to 54 and 57 to 60, transmits the rotation of the strip spool 6 to the storage spool 3 in order to wind up the unwound strip 2, together with bank notes delivered between the rollers 9 and 10, onto the storage spool 3 or the storage winding 7. Thus - as described in further detail below - the peripheral speed of the storage spool 3 or of the

storage winding 7 rotating in the winding-up direction is somewhat greater than the peripheral speed of the strip winding 5 rotating in the unwinding direction, as a result of which the strip 2 is held under tension. The difference between the winding-up speed and the unwinding speed is taken up by the torsion spring 25 and, if there is excessive strip tension, the limit of the frictional adherence of one or both wheels 43 and 47 against the crown wheels 42 and 46 is exceeded such that slip occurs which delimits the strip tension. This static friction is determined by compression springs 62 and 63 of which one acts between one of the pinions 37 and the hollow shaft 24 and the other acts between one of the pinions 38 and the hollow shaft 29 in order to urge the crown wheel 42 against the wheel 43 or the crown wheel 46 against the wheel 47. Thus a sliding ring (not illustrated) is disposed between the pinions 37 and 38 respectively and the springs 62 and 63 respectively.

The wheel 47 is driven by the crown wheel 46 at a peripheral speed corresponding to the peripheral speed of the strip winding 5 in the direction associated with the unwinding rotation of the strip winding 5. When the shaft 48 rotates in a corresponding manner, the overriding clutch 53

engages such that the pulley 52 transmits the rotation of the shaft 48, via the belt 54, to the pulley 51 rigidly mounted on the shaft 44. Thus, owing to the different diameters of the pulleys 52 and 51, the rotational speed of the shaft 44 and thus the peripheral speed of the wheel 43 are somewhat greater than that of the wheel 47, and the peripheral speed of the storage winding 7 (in its winding-up direction) is somewhat greater than that of the strip winding 5, such that the strip 2 is held under tension. Via the belt 60, the pulley 57, which is rigidly mounted on the shaft 48, drives the pulley 58 which, because of the different diameters of the pulleys 57 and 58 and 51 and 52, rotates more slowly than the pulley 51 or shaft 44. When there is a corresponding difference in the rotational speeds in the relevant sense of rotation, the overriding clutch 59 idles and the second pulley 57 to 60 is ineffective.

In order to discharge previously stored bank notes, the pair of rollers 9, 10 is driven by the motor 40 in the sense of the arrows shown in dash-dotted lines. The strip 2, which is wound onto the storage spool 3 together with bank notes 1a, forming the storage winding 7, is thus removed from the storage winding 7, releasing previously

stored bank notes as it leaves the pair of rollers 9, 10. The removal of the strip 2 from the storage winding 7 produces a rotation of the storage spool 3 which is transferred by the gear arrangement to the strip spool 6 in order to wind the removed strip onto the strip spool 6 or the strip winding 5. In this case also, the peripheral speed of the spool 6 driven by the gear arrangement is somewhat greater than that of the driving spool 3 in order to keep the strip tensioned, as mentioned. Thus, apart from the other direction of rotation, the friction gears operate in a manner corresponding to that described for the storage process. In the case of the direction of rotation of the shaft 44 illustrated by the dash-dotted arrow, the overriding clutch 59 engages, and the pulley 58 of the second belt drive drives the pulley 57 rigidly mounted on the shaft 48, the rotational speed of the pulley 57 being somewhat greater than that of the pulley 58. The pulley 51, of the first belt drive, mounted on the shaft 44 drives the pulley 52 via the belt 54, the rotational speed of the pulley 52 being lower than that of the pulley 51 and thus also lower than that of the pulley 57 and of the shaft 48. When there is a difference in the rotational speeds of the shaft 48 and the pulley 52 and the direction of rotation is

appropriate, the overriding clutch 53 idles and the gear of the belt drives 51-54 is ineffective.

The embodiment illustrated in Figures 5 and 6 differs from the one described with reference to Figures 3 and 4 in that the bank notes are wound onto the storage spool 3 between two strips 2 and 68, forming the storage winding 66. Accordingly, in addition to the strip spool 6 with the strip winding 5, a second strip spool 67 is provided onto which the second strip 68 is wound to form a second strip winding 69. The second strip spool 67 is of the same construction as the strip spool 6 and is provided with a differential gear 72. A friction gear, corresponding to the friction gear 46, 47, with a crown wheel 74 and a wheel 75 is associated with the second strip spool 67. The shaft 77 of the wheel 75 is connected to the shaft 48 of the wheel 47 by a belt drive 78 with a rotational speed ratio of 1:1. In this embodiment with two strips 2 and 68, differences in the tension of the two strips could be compensated by means of a differential gear, as is known from the storage device according to the above-mentioned US-A-2 981 492. For this purpose, a third differential gear (not illustrated) would be provided, of which one sun wheel would be connected to the hollow shaft 29 of the one strip

spool 6, of which the other sun wheel would be connected to the corresponding hollow shaft 80 of the second strip spool 67, and of which the planet wheel carrier would be connected to the pulleys 52 (with overriding clutch 53) and 57. In the case of the embodiment with one strip (Figures 3 and 4), the torsionally resilient coupling (torsion spring 25) can also be provided on the strip spool 6 instead of on the storage spool 3 and, in the case of the embodiment with two strips (Figures 5 and 6), it can be provided with a torsionally resilient coupling in accordance with each of the strip spools 6 and 67.

Since, in the case of the embodiments described with reference to Figures 3 and 4 or 5 and 6, the pair of rollers 9, 10 and the wheels 43, 47 and 43, 47 and 75 necessarily rotate at almost identical peripheral speeds, the shaft 44 or 48 or 77 can also be driven instead of the pair of rollers 9, 10. Accordingly, instead of the motor 40, a reversible motor could also be provided for driving one of these shafts.

Since the support rollers 12 and 13 or 12, 13 and 81 also rotate at almost identical peripheral speeds corresponding to the running speed of the strip 2 or of the strips 2 and 68, the support

rollers can also be driven at corresponding peripheral speeds, with the same roll diameter and a corresponding rotational speed, in particular since they are rigidly mounted, which simplifies their drive. In the case of this type of drive, the drive arrangement is particularly simple.

However, if the strip or strips is/are divided into two narrow partial strips, their friction on the support rollers is low, and, if the support roller of the storage winding is of such a length that it lies on the entire winding, its friction on the winding is greater than its friction on the partial strips. This is unfavourable for the winding-up and unwinding of the storage winding.

For this reason, one drive of the support rollers is in principle used when the strip or strips is/are not subdivided and its/their width corresponds to the length of the storage spool and thus also to the strip spool or spools. In this case, the friction gears 42, 43 and 46, 47 or 74, 75 are not required, the support roller 12, 13 or 81 is to be disposed directly on the shaft 44 or 48 and 77, and what was stated for the belt drives 51 to 54, 57 to 60 and 78 applies when the support rollers 12 and 13 and, if necessary, 81 have the same diameter, a reversible motor for driving one of the shafts 44, 48 and/or 77 having to be provided instead of the motor 40, and the belt

drives causing the winding-up speed both when bank notes are stored and when previously stored bank notes are discharged to be somewhat greater than the unwinding speed in order to hold the strip or strips under tension.

Figures 7 and 8 show a conveyor belt with a conveyor path 84 for bank notes which are to be stored and are to be delivered to the pair of rollers 9, 10, and a conveyor path 85 for previously stored bank notes which are to be discharged, and are separated from the strip 2 on leaving the pair of rollers 9, 10. This conveyor belt consists of guide walls 87, 88, 89 with pairs of conveyor rollers of which only two are illustrated and are designated 91, 92, and is equipped with a shunt with frog points 94. The guide wall 87 with the guide wall 88 and the pairs of rollers 91, forms the conveying path 84 and, with the guide wall 89 and the pair of conveyor rollers 92, the conveyor path 85. The guide walls 88 and 89 have parts converging in a curved manner relative to the contact line of the pair of rollers 9, 10. The frog points 94 can be moved into two positions by a lever system 97, 98 by means of an electromagnet 96. In the position shown in solid lines, the frog points 94 with the curved portion of the guide wall 89 delimit a

connection path which leads from the pair of rollers to the conveyor path 85, and in the position shown in dash-dotted lines, with the curved portion of the guide wall 88, they form a connection path adjoining the conveyor path 84 to the pair of rollers 9, 10. The pairs of conveyor rollers 91 and 92 are driven at a peripheral speed corresponding to the running speed of the strip, when the conveyor belt leads to the pair of rollers 9, 10, at the peripheral speed thereof. As a result, satisfactory cooperation, i.e. a correspondence of the storage speed or of the discharge speed of the storage device with the conveying speed of its conveyor belt, is ensured in a simple manner. The friction gear wheels and the rollers acting on the strip can be provided with a friction coating in all the embodiments.

CLAIMS

1. Storage device for lamellar, flexible objects, in particular bank notes, in which the objects (1) to be stored are wound on a strip (2) or between two strips (2, 68) onto a storage spool (3) in order to form a storage winding (7; 66) and previously stored objects (1a) are unwound from the storage winding (7; 66) for discharge together with the strip (2) or the strips (2, 68) wherein, in order to store the objects (1), the strip (2) is unwound from one or both strips (2, 68) from a common strip winding or from each strip winding (5; 5, 69) of a strip spool (6; 6, 67); and a drive arrangement is provided for simultaneously rotating the storage spool (3) with the storage winding (7; 66) and the strip spool (6) or spools (6, 67) with the strip windings (5; 5, 69), wherein the strip spool (6) or spools (6, 67) and the storage spool (3) can be driven at at least approximately coinciding peripheral speeds of the windings (5, 7; 5, 69, 66) supported thereby, characterised in that at least one of the spools (3, 6, 67) is guided such that it can be displaced perpendicular to its spindle and its winding (5, 7, 66) is supported on a rigidly mounted support roller (12, 13, 81).



2. Device according to Claim 1, characterised in that rollers (9, 10; 12, 13) which act on the strip (2) or strips (2, 68) can be reversibly driven by the drive arrangement (40, 42-44, 46-48, 51-54, 57-60; 51-54, 57-60) at at least approximately identical peripheral speeds.

3. Device according to Claim 2, characterised in that the spindle (15, 16) of the displaceably guided spool or spools (3, 6, 67) is rigidly connected at each end to a pinion (37, 38) which meshes with a rack (34, 35) extending along a guide (31, 32) displaceably guiding the spindle.

4. Device according to either of Claims 2 and 3, characterised in that the rollers or support rollers acting on a strip on the generated surface of the windings can be reversibly driven by the drive arrangement in such a way that, when the roll diameters are the same, the speed of the roller or rollers, which act on the winding or each winding in the winding-up direction thereof, slightly exceeds the speed of the roller or rollers which simultaneously act on the or each winding in the unwinding direction thereof, in order to tension the strip or strips, wherein a torsionally resilient coupling and torque



transmission suitable for slip are advantageously provided.

5. Device according to any one of Claims 1 to 4, characterised by two rollers or support rollers of which, in a first drive direction, the first acts on one winding in the winding-up direction thereof and the second acts on the other winding in the unwinding direction thereof, and, in the opposite drive direction, the first acts on one winding in the unwinding direction thereof and the second acts on the second winding in the winding-up direction thereof; and by two gear units, for example belt drives, which are each provided with an overriding clutch and of which the first gear unit transmits the rotation of the first roller rotating one winding in the winding-up direction to the second roller in order to rotate the second winding in the unwinding direction, and of which the second gear unit transmits the rotation of the second roller rotating the second winding in the winding-up direction thereof to the first roller in order to rotate one winding in the unwinding direction; wherein, when the roll diameters are the same, the output speed of these gear units slightly exceeds the drive speed for tensioning the strips, and one



of the rollers or a pair of rollers acting on the strip or strips can be driven reversibly.

6. Device according to any one of Claims 1 to 3, characterised by a gear arrangement having two gear units, of which the first (46, 47, 51-54) transmits the rotation occurring when the strip or strips (2) is/are withdrawn from the strip winding or windings (5) to the strip spool or spools (6) thereof in the unwinding direction to the storage spool (3) in the winding-up direction thereof, and of which the second gear unit (42, 43, 57-60) transmits the rotation occurring when the strip or strips (1) is/are withdrawn from the storage spool (3) in the unwinding direction thereof to the strip spool or spools (6) in the winding-up direction thereof, wherein the gear transmission ratio of the first and second gear units relative to the peripheral speeds of the windings (5 and 7) is advantageously such that the output rotation slightly exceeds the drive rotation in order to tension the strip or strips (2), and a torsionally resilient coupling (25) and a limited-slip force transmission device are provided in the transmission path of the gear units.



7. Device according to Claim 6, characterised in that the strip spool (6) is connected to a crown wheel (46) of a first friction gear (46, 47) and the storage spool (3) is connected to a crown wheel (43) of a second friction gear (43, 44); in that a wheel (43, 47) runs on each crown wheel (42, 46) on or closely adjacent the line on which the strip or storage winding (5 or 7 respectively) is supported on a support roller (12 or 13 respectively); in that there is connected downstream of the first friction gear (46, 47) a gear unit (51-54) which transmits the rotation of the wheel (47) corresponding to a rotation of the strip spool (6) in the unwinding direction to the wheel (43) of the second friction gear (43, 44) in order to rotate the storage spool (6) in the winding-up direction; in that there is connected downstream of the second friction gear (42, 43) a gear unit (57-60) which transmits the rotation of the wheel (43) corresponding to a rotation of the storage spool (3) in the winding-up direction to the wheel (47) of the first friction gear in order to rotate the strip spool (6) in the winding-up direction; wherein the output speed of each of the gear units (51-53, 57-60) connected downstream slightly exceeds their drive speed for tensioning the strip (1).



8. Device according to Claim 7, characterised in that the shaft (44, 48) of one of the wheels (43, 47) can be driven reversibly or, optionally, a wheel shaft can be driven in one or other of the opposite directions.

9. Device according to Claim 6 or 7, characterised by a pair of rollers (9, 10) which can be driven in one direction for withdrawing the strip or strips (1; 1, 68) from the strip winding or windings (5; 5, 69) and in the opposite direction for withdrawing the strip or strips (1; 1, 68) from the storage winding (7; 66).

10. Device according to Claim 9, characterised in that the strip or strips (1) forms/form an obtuse angle with the displacement line (20) of the storage winding (3) between the pair of rollers (9, 10) and the storage winding (7).

11. Device according to at least one of Claims 1 to 10, characterised by at least one holding-down and stripping device (18) for holding down the objects running to the storage winding (7) and stripping the objects to be unwound therefrom.



12. Device according to any one of Claims 1 to 11, characterised by a conveyor belt having a conveyor path (84) for the supply and a conveying path (85) for the removal of the objects (1) to and from a pair of rollers (9, 10) respectively at which the strip (1) or each strip (1, 68) is deflected, and a shunt with guide walls (88, 89) converging in a curved manner towards the pair of rollers and a frog point (94) which delimits the supply path in a first position with one (88) of the guide walls and delimits the removal path in a second position with the other guide wall (89).

13. Device according to any one of Claims 1 to 12, characterised in that at least one strip (1) is divided into two strips extending parallel at a distance from one another, the strip spool (6) or spools is/are divided accordingly into coaxial spool parts, and are connected by means of a differential gear (28) to a shaft (29) which drives both spool parts.