

Dec. 10, 1963

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3,113,771

AUTOMATIC PICKUP FOR STACKING MATERIAL

Filed Feb. 20, 1962

5 Sheets-Sheet 1

Fig. 1.

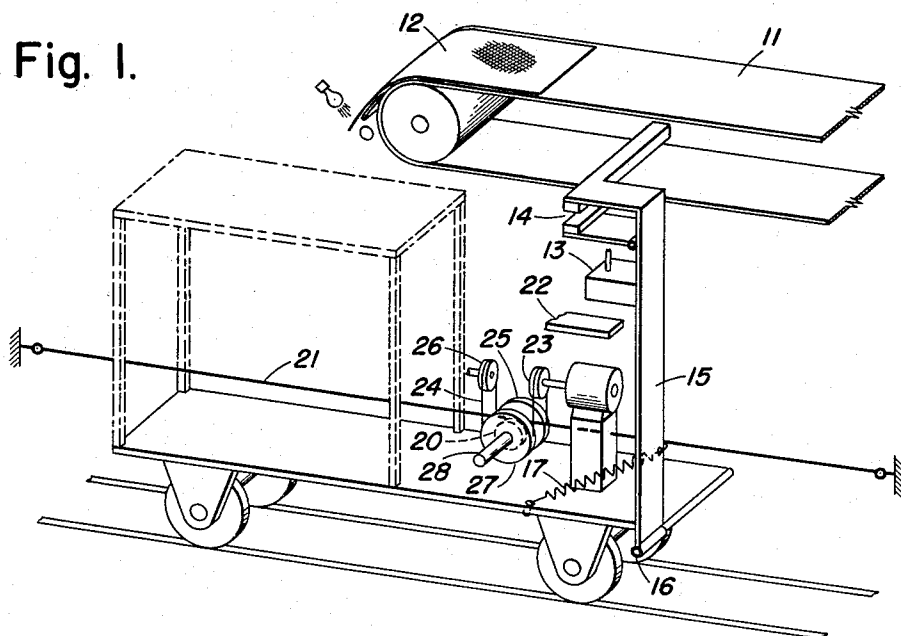
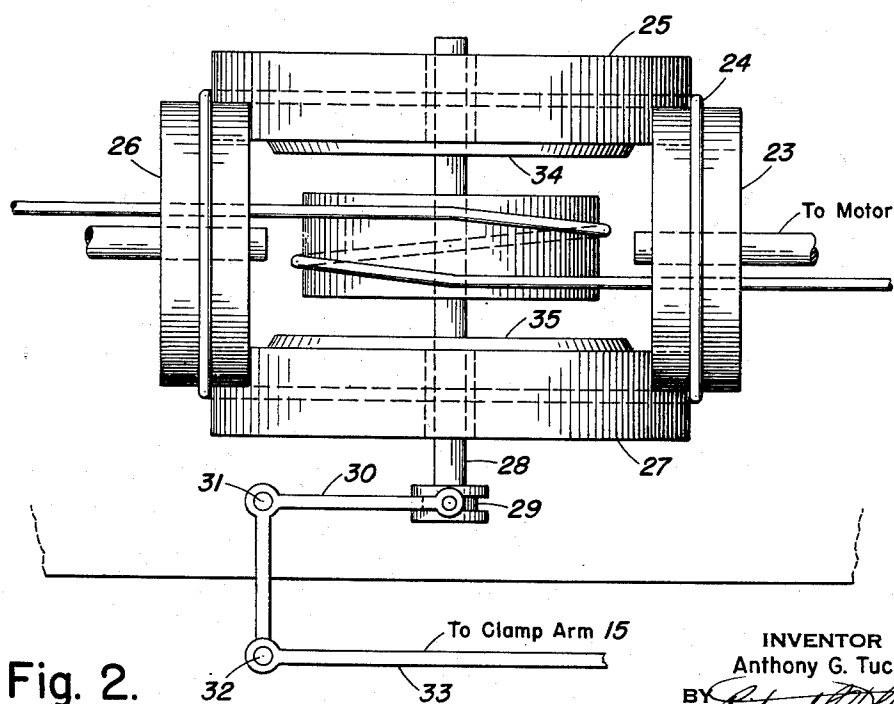


Fig. 2.

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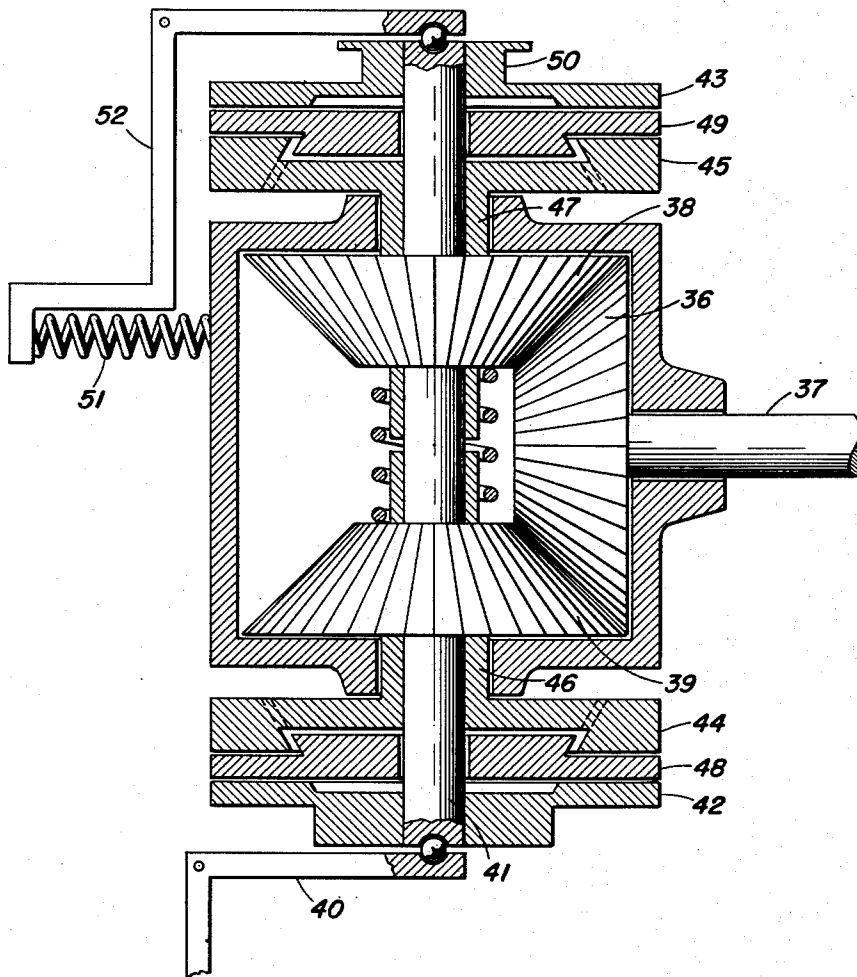


Fig. 3.

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5 Sheets-Sheet 3

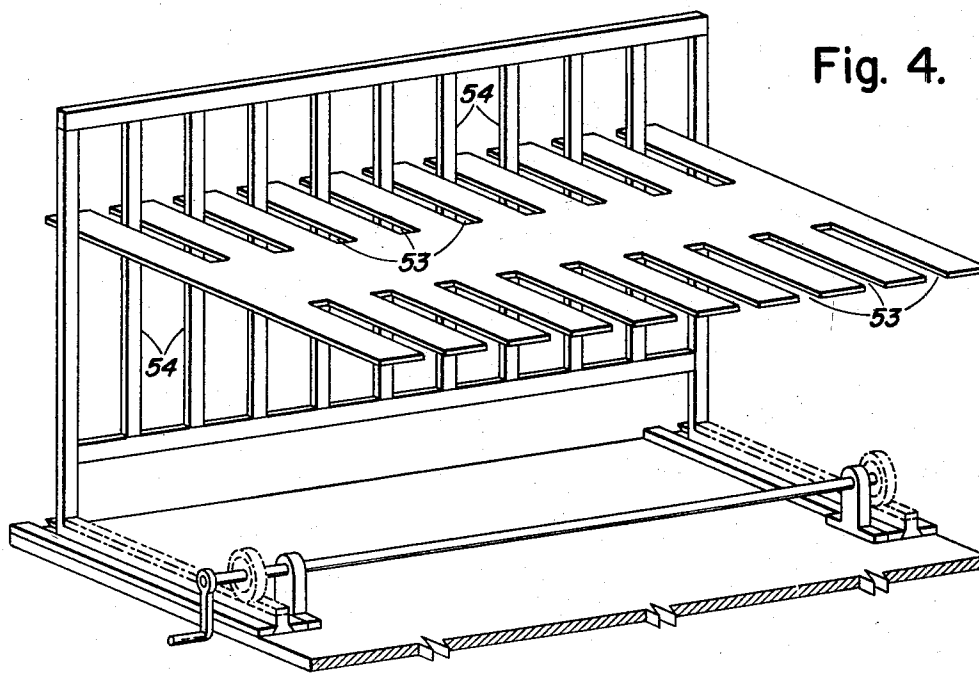
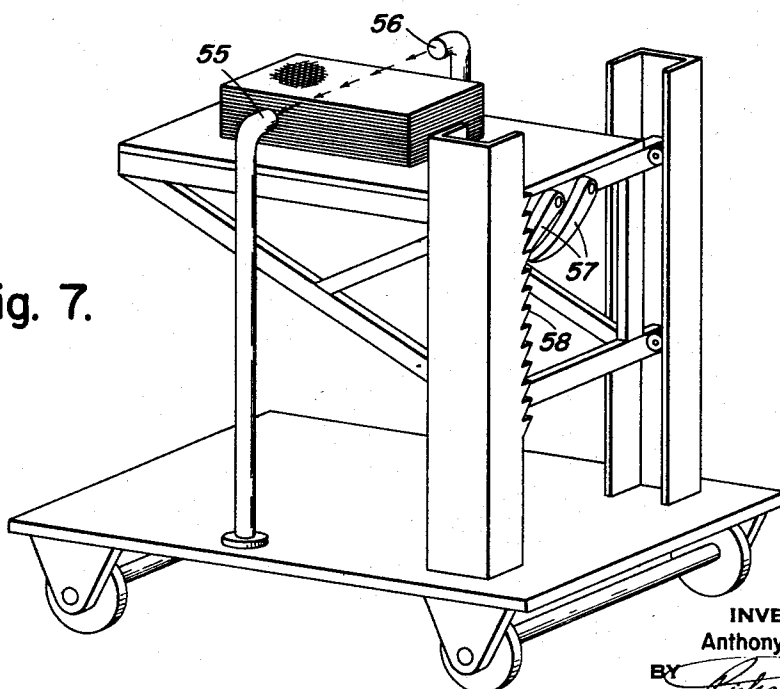


Fig. 7.



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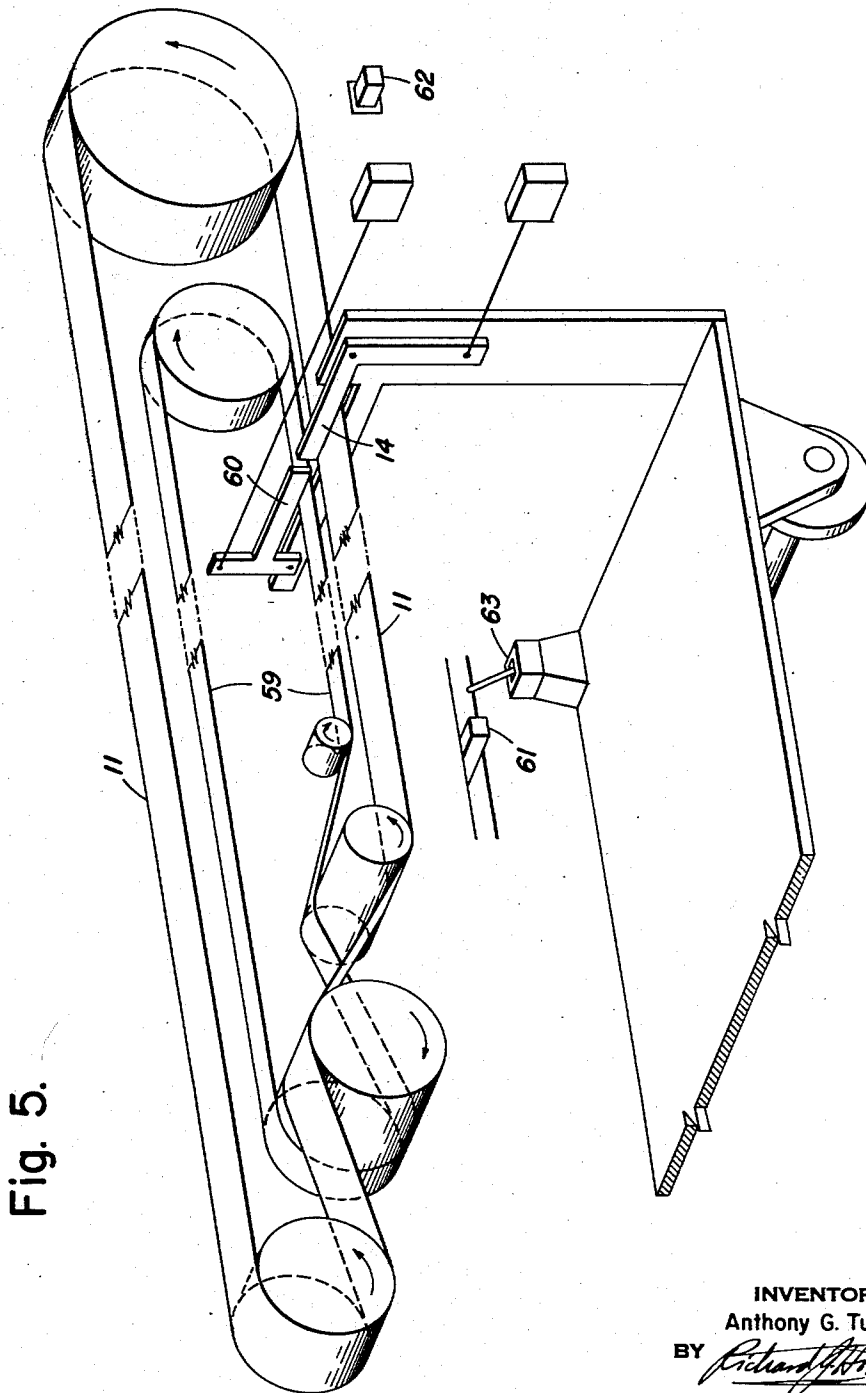


Fig. 5.

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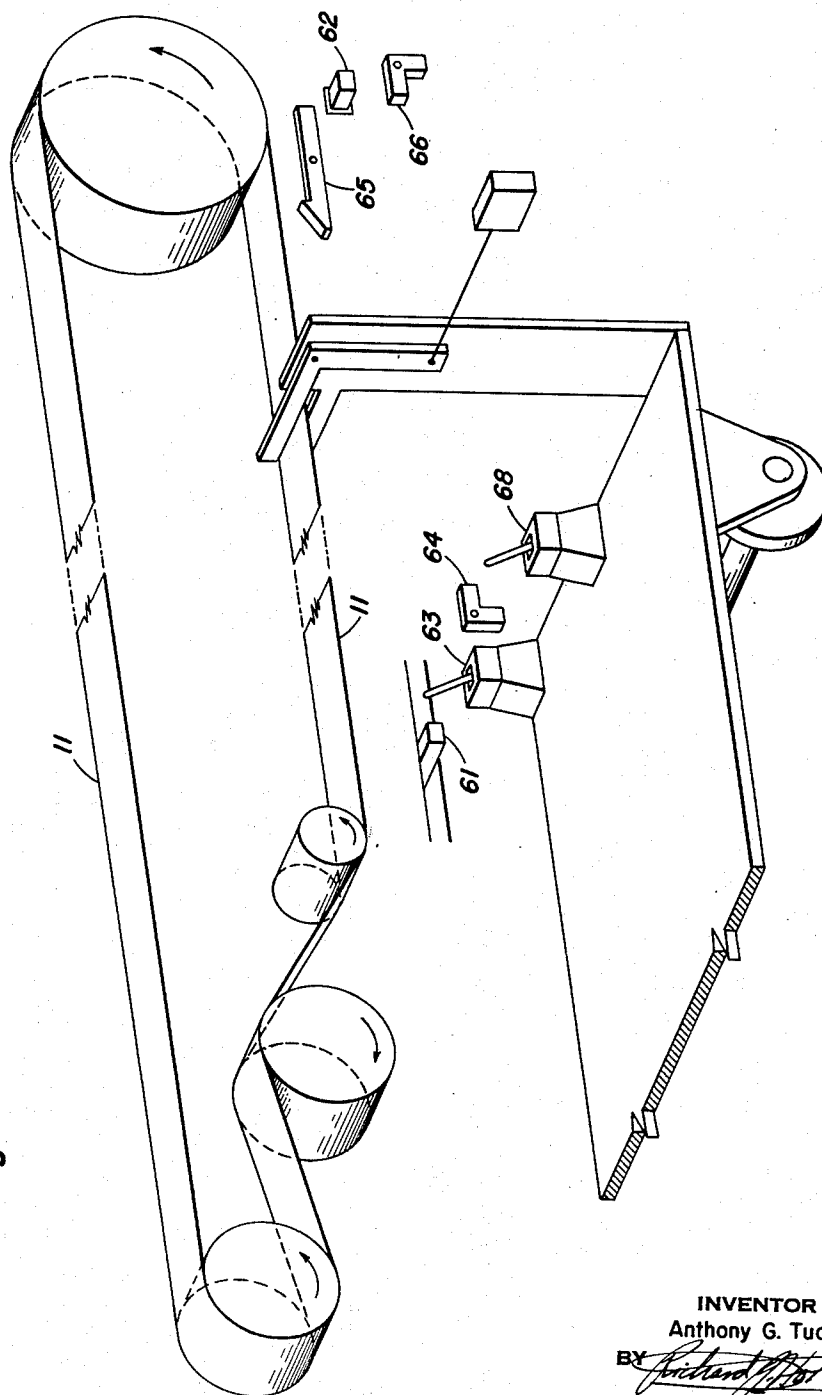
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Fig. 6.



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AUTOMATIC PICKUP FOR STACKING MATERIAL

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11 Claims. (Cl. 270-61)

This invention relates to a device for receiving and stacking or otherwise handling a succession of flexible articles or a continuous run of flexible material. In particular, this invention relates to an automatic device for receiving cloth workpieces discharged from a pressing machine or the like.

Many devices have been proposed for the purpose of receiving and stacking workpieces or material discharged from an apparatus performing one operation or another on such material. For example, many devices have been proposed for stacking cardboard carton blanks discharged from the cutting machine, for receiving and stacking printed matter as it emerges from the printer, and for similar purposes.

In the handling of fabric workpieces, however, the problem is somewhat different because of the nature of the fabric itself. Thus, machines of the type employed in the manufacture of cardboard carton blanks generally depend for their proper functioning on the stiffness of the cardboard material. Similarly, machines designed to handle paper workpieces such as printed matter also usually depend on the relative stiffness of the paper which, although much less than that of cardboard, is nevertheless appreciable in an edgewise direction. Such machines cannot be successfully employed in connection with a comparatively limp material such as cloth.

In addition, previously-suggested means of the type described have in general been of very complicated construction, and were consequently costly to build and expensive to maintain, and subject to failure because of the large number of working parts involved. For these and other reasons, the garment industries have generally not employed pickup or stacking machines for the purpose indicated, but have been forced to the expense of employing manual labor for the purpose, because there has not been any machine available that was equal to the job.

Aside from the stacking of individual workpieces, it is sometimes necessary to deal with a continuous length of material, such as a series of workpieces which are connected together. In the modern mass-production garment factory, it is customary to employ a modification of the well-known assembly-line technique, whereby a series of garments made from various materials is made by first cutting the various pieces, running them through the various required operations in the same order in which they were cut, and subsequently reassembling the various partly-finished pieces for final assembly into finished garments. In order for this type of operation to be successful, it is essential that the various pieces in any one operation (representing corresponding pieces from a series of different garments), retain their relative order. Otherwise, the final assembly point would quickly become cluttered with incomplete units, each waiting for one or another of its components to reach the assembly point, and the result would be chaos. In practice, the preferred and most economical way of preserving the proper order is to string successive pieces together with the sewing machine, and to leave the strings intact until they reach the assembly point. For a pickup or stacking device to be completely satisfactory, therefore, it should be capable of accommodating pieces which are strung together in the manner described, and the machines which have been suggested up to the present in general lack this capability.

In some operations, it is desirable for the operator of

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the machine, for example a pressing machine, to be able to pick up the workpiece after he has performed an operation on it, for example a pressing operation, and either perform a second operation on the same workpiece or dispose of it otherwise as the requirements of the process may dictate. In many instances, this is rendered impossible by the design of the machine, which discharges the workpiece at a point remote from the operator, who is normally stationed at the feed end of the machine. This situation obviously necessitates providing an additional operator near the discharge point, unless a suitable auxiliary apparatus is provided to return the workpiece from the discharge end of the presser, or the like, to a point near the operator. To date, no satisfactory auxiliary apparatus has existed.

An object of this invention, therefore, is to provide an improved type of pickup device. Another object is to provide a pickup device capable of handling limp materials such as textile fabrics and the like. Still another object is to provide a pickup device capable of automatically and accurately stacking continuous lengths of material folded repeatedly upon itself. Another object is to provide a device of the type described which is simple in construction and operation, and inexpensive to build and maintain. A further object is to provide such a device, which is capable of accommodating successive workpieces which are strung together. A still further object is to provide a device adapted to receive a workpiece from a machine at a discharge point remote from the operator of said machine, and deliver said workpiece back to a point near said operator.

Other objects and advantages will become apparent from the following more complete description and claims, and with reference to the accompanying drawings, in which:

FIG. 1 is a perspective view of one embodiment of the invention;

FIG. 2 is a plan view of a detail of the clutch mechanism of the embodiment shown in FIG. 1;

FIG. 3 is a plan view of another detail similar to FIG. 2, showing an alternative type of clutch mechanism;

FIG. 4 is a perspective view of a preferred form of stacking table for use in conjunction with the embodiment shown in FIG. 1;

FIG. 5 is a perspective view, partially diagrammatic, of an embodiment of the invention adapted to the folding or laying-up of continuous lengths of material;

FIG. 6 is a perspective view, partially diagrammatic, of an embodiment of the invention adapted to return each piece discharged from the seam-presser or other machine to a point near the operator thereof.

FIG. 7 is a diagrammatic representation of a stacking table provided with a preferred type of height adjustment mechanism.

In FIG. 1, there is shown a belt 11, which is part of the mechanism of an associated machine—for example a seam-presser. Workpiece 12, as it is discharged from the belt, intercepts a light and photocell assembly which (through a relay if required) actuates solenoid 13 (electrical connections not shown). The plunger of solenoid 13 presses against clamp 14, causing it to engage with the lower run of belt 11. This causes clamp arm 15 to move to the right about pivot 16 at its lower end, against the tension of spring 17. The movement of the clamp arm is transmitted through a suitable linkage (not shown in this view) to a reversing disc clutch which is so arranged that when arm 15 moves to the right, the clutch is engaged so as to move drum 20 in a counterclockwise direction. Cable 21, which is fixed at both ends, is looped over drum 20 in such a way that counterclockwise rotation of drum 20 causes the pickup device as a whole to roll to the right.

If the speed of the carriage to the right exceeds that of

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the belt, clamp arm 15 tends to return to a vertical position, which, through the above-mentioned linkage, results in relaxing the pressure on the faces of the disc clutch, permitting enough slippage to adjust the speed of the carriage to that of the belt. The result of this synchronization is that the workpiece is paid out onto the pickup table in flat form. The pickup table surmounts the carriage and travels back and forth with it, and is shown in dotted outline in FIG. 1.

When the end of the workpiece has passed the photocell assembly, the light again falls on the photocell with the result that solenoid 13 is deactivated, releasing the clamp from the belt. This permits spring 17 to move the clamp arm through the vertical to a position on the left, and this positioning of the clamp arm, through the clutch operating linkage, moves the clutch through the central or neutral position to the "reverse" position, causing drum 20 to rotate in a clockwise direction, and the action of drum 20 on cable 21 returns the carriage to its starting or rest position, ready for another workpiece. When the starting position is reached, clamp arm 15 is intercepted by stationary member 22. This causes clamp arm 15 to assume a vertical position, corresponding to a neutral position of the clutch, and no further movement takes place until the photocell is again excited. It should be noted that if, because of inertia or for any other reason the clamp arm comes to rest in a position other than vertical (neutral), the resulting slight motion of the carriage will be in the direction tending to return the clamp arm to the neutral position.

The clutch assembly is shown in more detail in FIG. 2. Drive pulley 23 is connected to the shaft of the motor. Belt 24 passes under drive pulley 23, over "forward" pulley 25, the inner face of which is provided with a friction clutch disc 34, over idler pulley 26, and under "reverse" pulley 27, back to the starting point. Pulley 27 is also provided with a friction clutch disc 35 on its inner face. Pulleys 25 and 27 rotate freely on shaft 28.

Between pulleys 25 and 27 is drum 20, keyed to shaft 28.

Shaft 28 is arranged to slide longitudinally, causing drum 20 to contact either pulley 25 or pulley 27, or to assume the intermediate neutral position shown.

Shaft 28 terminates at one end in cap 29 within which it rotates freely in either direction. Cap 29 is pivotally connected to one arm of bell-crank 30. The latter is pivoted to a fixed point at 31, and the other end of the bell-crank is pivoted at 32 to link 33, the remote end of which is connected to clamp arm 15.

The motor, together with pulleys 23, 25, 26, and 27 operates continuously in the same direction. When the photocell is interrupted, and clamp arm 15 is drawn to the right (FIG. 1), link 33 is also drawn to the right (FIG. 2). This causes bell-crank 30 to rotate counterclockwise around pivot 31, causing shaft 28 to move toward the opposite side of the carriage, and thus bringing drum 20 in contact with disc 34 on "forward" pulley 25, and causing drum 20 to rotate counterclockwise (as seen in FIG. 1). Opposite motion of the clamp arm and link brings the drum in contact with disc 35 on pulley 27, causing the reverse action, while a vertical attitude of the clamp arm places the drum in the intermediate neutral position.

It will be understood that the foregoing description relates to one embodiment of the invention, and numerous alternatives will readily occur to those skilled in the art. For example, instead of the clamp being mounted on a clamp arm, and the latter pivotally mounted on the carriage, and a separate linkage connecting the clamp arm to the clutch, a single member may serve as both clamp arm and linkage, running directly from the clamp to the clutch.

As shown in FIG. 3, the same result can be obtained by making use of an arrangement of bevel gears. Thus,

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drive gear 36 is keyed to the motor shaft 37, and drives "forward" gear 39 and "reverse" gear 38. When the linkage to the clamp arm is pulled by the clamp and moves to the right in FIG. 3, the bell-crank 40 turns in a counterclockwise direction, causing shaft 41 to move inward. Clutch plate 42 is keyed to shaft 41, as is clutch plate 43, which is used in reverse operation. Mating clutch plate 44 is keyed to a hollow shaft 46, to which is also keyed forward gear 39, so that clutch plate 44 rotates constantly in the same direction as forward gear 39. Shaft 41 extends through hollow shaft 46, and also through hollow shaft 47, to which are keyed both reverse gear 38 and clutch plate 45, so that clutch plate 45 and reverse gear 38 rotate continuously together, in the direction opposite to the direction of rotation of forward gear 39 and clutch plate 44. Between clutch plate 42 and clutch plate 44 is clutch friction disc 48, which serves to provide a frictional transmission of power from clutch plate 44 to clutch plate 42. The friction member may be made integral with either clutch plate 42 or 44, or two such members, one integral with each of the clutch plates, may be employed. The preferred arrangement, however, is that shown, in which the friction disc is a double-faced floating member mounted to rotate freely on shaft 41. Similarly, friction disc 49 is mounted between clutch plates 43 and 45, for the same purposes.

As the bell crank 40 rotates in a counterclockwise direction, it causes shaft 41 to move in such a way as to bring clutch plate 42, and with it, friction disc 48, into engagement with "forward" clutch plate 44, thereby imparting to clutch plate 42 and shaft 41 a rotation in the same direction as that of forward gear 39.

Also keyed, or fixed in any appropriate manner to shaft 41 is power take-off 50, which is represented in FIG. 3 as a pulley integral with clutch plate 43. Such a pulley operates in conjunction with a fixed cable in the same manner as shown in FIG. 1. Obviously, the power take-off may be a chain-and-sprocket arrangement, or a pinion operating in conjunction with a fixed rack, or other equivalent arrangement if desired.

When the linkage moves in the opposite direction, shaft 41 is caused by suitable spring bias to move axially in the opposite direction to that just discussed. The spring bias is provided by spring 51 operating through bell-crank 52 to urge shaft 42 to a position in which clutch plate 43 and friction disc 49 are engaged with clutch plate 45, and thereby given a rotation in the direction opposite to that imparted, in forward operation, by clutch plate 44.

The foregoing discussion relates to a preferred embodiment of the invention in which the carriage is provided with its own drive means and controlled by a reversible clutch. In an alternative embodiment, the clamp may be fastened directly to the carriage in such a way that the motive power for the carriage is taken directly from the belt. Such an arrangement is illustrated in FIG. 5. In FIG. 5, the return trip is provided for by a second clamp 60 which connects the carriage to a second belt 59 travelling in a direction opposite to that of belt 11.

The stacking table may be simply a flat work-receiving platform mounted directly on the carriage, at a level slightly below the level at which work-pieces are discharged from the presser or other associated apparatus. Such a platform is indicated in dotted outline in FIG. 1.

A preferred type of stacking table, however, is that illustrated in FIG. 4. As shown in this figure, the platform is provided with slots 53 extending from the sides of the platform inwardly toward the center. These slots are provided in order to accommodate sides in the form of vertical rails 54 which may be manually moved closer together to help align a stack of relatively narrow workpieces, such as coatsleeves or the like, or farther apart, to help align a stack of relatively wide workpieces, for example coat backs or entire garments. The sides may

be mounted in any convenient fashion, as by means of brackets on the underside of the platform or on the carriage under the platform. Preferably, the sides are made readily demountable so that they may be readily removed from the machine altogether when they are not needed for the purpose of aligning and supporting a vertical stack of uniformly-sized workpieces.

For the best and most uniform operation of the device in stacking the workpieces discharged from the presser or other apparatus, it is desirable to keep the top surface of the stack at a more or less uniform level. This may be accomplished by providing suitable means for lowering the height of the platform in proportion as the stack of workpieces on top of it grows in height. Various expedients may be employed for this purpose. For example, the platform may be resiliently supported so as to be forced down by the weight of material deposited on it. This method is somewhat limited in operation, however, because it is necessary to provide some tension adjustment on the resilient supports to compensate for differences in the weight-thickness ratio of different size workpieces and different types of material. In practice, it is preferred to employ a device of the type illustrated diagrammatically in FIG. 7. As indicated in FIG. 7, there is provided a photoelectric sensing device 55 with an associated light source 56 so positioned that the beam from the light source is interrupted by the passage of a stack of workpieces in front of it, after the stack has reached a predetermined height. The sensing device, in turn, activates an escapement mechanism 57 which operating in conjunction with a ratchet 58 allows the platform of the table to descend by a suitable predetermined amount. The result of this operation is to keep the top of the stack at a substantially constant level.

When it is desired to fold or lay up a continuous length of material by repeatedly doubling it back upon itself, or to handle a string of connected workpieces in the same manner, the embodiment of the invention as shown in FIG. 5 is employed. In this embodiment, the presser or other associated apparatus is provided with a second belt 59, suitably driven by the same drive roll and passing over some, at least, of the same idlers as the main belt. The second belt is arranged to operate at the same linear speed as the main belt 11, but in the opposite direction, and its function is to control the speed of the receiving platform on the reverse run in the same manner as the main belt controls it on the forward run. To complete the arrangement, there is provided a second clamp 60 which cooperates with the second belt in the same way as the first clamp 14 cooperates with the first, or main, belt. Finally, means are provided to activate the two clamps in alternate fashion, so that the first clamp controls the motion of the carriage in the forward direction until the carriage, platform, etc. have reached a predetermined point, whereupon the first clamp 14 is disengaged from the first belt 11 and the second clamp 60 engaged with the second belt 59, causing the whole assembly to move in a controlled manner back to the starting point, and the whole cycle repeated.

When operating on continuous lengths of material, the sensing function of the photoelectric sensing device of FIG. 1, to signal the approach of a workpiece from the presser or the like, is obviously not needed, and it is inactivated, and if desired, demounted from the machine altogether.

The reciprocating motion of the table, as described above, is controlled by the clamps, and by the means provided to actuate one clamp and deactivate the other, each time the carriage has reached one end of its designed travel. Obviously, this actuation and deactuation of the respective clamps may be achieved in many ways, but a particularly desirable arrangement is that indicated in FIG. 5, in which there are provided block members 61 and 62 to intercept a double-throw toggle switch in such fashion that when the block nearest the feed end of the

presser or the like, i.e. block 62 intercepts the switch, the circuit energizing the first clamp 14 is opened, causing that clamp to release its hold on the first belt 11, and the circuit energizing the second clamp 60 is closed, causing the second clamp 60 to engage with the second belt 59, which in turn causes the carriage, table, etc. to move toward the discharge end of the presser or the like. Similarly, when the block 61 intercepts the toggle switch, the second clamp 60 is deactivated, and the first clamp 14 reactivated, causing the carriage to reverse its direction and start back toward the feed end of the presser.

In order to control the distance of travel of the carriage, and consequently the width of the successive courses of folded material deposited on the stacking table, it is desirable to provide for an adjustment in position of one or both of the intercepting blocks. Of the two, it is preferable that the block nearest the discharge end of the presser, i.e. block 61 be made adjustable. In this manner, block 62 near the feed end of the presser can be permanently fixed at such a point that the carriage will travel as far as possible under the belt. Adjustment of the second block, as a moment's consideration will show, then causes the carriage to move out beyond the end of the belt by only that amount which is needed for the length of course desired in the folded stack. This feature is advantageous because it conserves floor space in the shop.

In some cases, it is desired to return each workpiece, as it is discharged from the presser or the like, to be returned to the feed end, where it can be picked up by the operator for the purpose of performing another operation. This is accomplished by the embodiment of the invention represented in FIG. 6. As shown in FIG. 6, the photoelectric sensing element is employed to detect the approach of a workpiece discharged from the presser or the like, and this sensing element initiates the engagement of clamp 14 with the belt, and the resulting movement of the carriage toward the feed end of the presser, exactly as described with reference to the basic form of the invention as shown in FIG. 1. With respect to the invention as illustrated in FIG. 1, it will be recalled that when the end of the workpiece passed clear of the sensing element, the clamp was deactivated and the return motion automatically commenced.

In the device as shown in FIG. 6, however, means are provided to turn off the energizing light, to the presence or absence of which the photocell is responsive. The means illustrated for this purpose in FIG. 6 is a toggle switch 63 and pivoted block 64, the switch being wired in series with the light. As the approach of a workpiece is signalled by the sensing element, the clamp is activated and the carriage starts to move toward the feed end of the presser, as described in connection with FIG. 1. As it does so, however, toggle switch 63, which is mounted on the carriage, is intercepted by pivoted block 64 and the circuit opened. The result is that, even after the workpiece has cleared the sensing element, the latter responds as to absence of light—i.e. as if the workpiece were still there—and continues to maintain the clamp engaged with the belt. This condition, and the motion of the carriage toward the feed end of the presser, persist until the carriage has passed a point near the operator, where it is engaged by hook 65. When this point is reached, limit switch 63 is thrown by block 62 thereby deactivating the clamp and causing the clutch to initiate the return of the carriage. The return of the carriage, however, is prevented by the hook, which operates on the clamp arm in a fashion similar to that of stationary member 22 in FIG. 1, causing the clamp arm to assume a vertical position and thereby disengaging the clutch. The carriage and the stacking table therefore remain in position near the operator until he is ready to pick up the workpiece. When he does so, he manually disengages the hook, and the spring-biased clamp swings to a position to the left of vertical, engaging the clutch so as

to return the carriage to its starting position near the discharge end of the presser and the remainder of the cycle is completed as described in connection with FIG. 1. On the return trip, toggle switch 68 is tripped by a second pivoted block 66, turning the light on again, and at the end of the return trip, limit switch 63 is reset by block 61.

Many variations of the device according to this invention may be made to suit the needs of particular users. For example, by reversing the spring bias on the clamp arm, the apparatus may be so modified that the "home" position of the carriage is near the feed end, instead of the discharge end, of the presser or other associated apparatus. In this as in other respects, while this invention has been described with respect to certain preferred embodiments and illustrated by drawings of specific forms, these are illustrative only, as many alternatives and equivalents will be apparent to those skilled in the art, without departing from the spirit and scope of the invention and the invention is not to be construed as limited, except as set forth in the appended claims.

I claim:

1. A work-receiving device for receiving workpieces discharged from a conveyor belt, said device comprising in combination a movable work-receiving platform, said platform including normally-disabled means for connecting said platform to said belt and causing the same to travel in a first direction at substantially the speed of said belt, means for sensing the approach of a workpiece toward said platform, means responsive to said approach-sensing means for enabling said normally-disabled connecting means, and means for returning said platform in a second and opposite direction to its initial position.

2. A work-receiving device according to claim 1, wherein said normally-disabled connecting means comprises a clamp adapted to clamp on said belt.

3. A work-receiving device according to claim 1, wherein said carriage is provided with drive means independent of said belt, said drive means being controlled by said normally-disabled connecting means.

4. A work-receiving device according to claim 3, wherein said drive means comprises a motor and a reversible clutch, said clutch being engaged by motion of said belt transmitted through said normally-disabled connecting means.

5. A work-receiving device according to claim 1, wherein said approach-sensing means comprises a photosensitive element responsive to the interception of light by a workpiece being discharged from said belt.

6. A work-receiving device according to claim 5, wherein said means for returning said platform to its initial position is actuated by restoration of light to said photosensitive element as the end of said workpiece clears the same.

7. A work-receiving device according to claim 1, wherein said means for returning said platform to its initial position comprises limiting means independent of said approach-sensing means, said limiting means being operative to re-disable said normally-disabled connecting means

after said carriage has travelled a predetermined distance.

8. A device according to claim 2, in which said clamp means is directly connected to said platform, and the motive power for said platform is taken from said belt.

9. A work-receiving device for receiving workpieces discharged from a conveyor belt, said device comprising in combination a movable work-receiving platform, clamp means adapted to clamp on a work-discharging conveyor belt, said clamp means being pivotally mounted on a carriage, said work-receiving platform being mounted on said carriage, said pivotally mounted clamp being linked to a reversible clutch, said pivotally-mounted clamp being spring-biased toward a pivotal position different from the position toward which it is urged by said belt when clamped thereon, said linkage being operative to engage said clutch in a first sense when said clamp is in the position to which it is urged by said belt and in a second and opposite sense when said clamp is in the position to which it is urged by said spring bias, and to leave said clutch in a neutral, disengaged condition when said clamp is in an intermediate position, motor means for driving said carriage, said motor means operating through said clutch, and traction means operative to transport said carriage in the direction of travel of said belt when said clutch is engaged in said first sense and in the opposite direction when said clutch is engaged in said opposite sense.

10. A work-receiving device for receiving workpieces discharged from a conveyor belt, said device comprising in combination a movable work-receiving platform, clamp means for clamping on a work-discharging conveyor belt, drive means for causing said platform to move in a direction generally parallel to said conveyor belt, reversible clutch means for controlling the motion imparted to said platform by said drive means, linkage means for causing the engagement of said clutch in a forward direction in response to changes in the position of said clamp means relative to said platform, limiting means for disengaging said clamp from said belt after said platform has travelled a predetermined distance, and means for causing the engagement of said clutch in a reverse direction when said clamp means is disengaged from said belt.

11. A work-receiving device for receiving workpieces discharged from a conveyor belt, said device comprising in combination a movable work-receiving platform, said platform including normally-disabled means for causing said platform to travel in a first direction at a speed substantially equal to and controlled by the speed of said belt, means for sensing the approach of a workpiece toward said platform, means responsive to said approach-sensing means for enabling said normally-disabled means, and means for returning said platform in a second and opposite direction to its initial position.

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