This invention relates to registering mechanisms for counting the number of operations or sequences of movement of machines or the like. As an instance of a use to which the present invention may be applied, reference may be had to weaving looms wherein it is desirable that the number of operations of the machine during each of the several shifts may be counted in order to determine the amount of pay to be received by the several operators. It is the usual practice in connection with looms to provide a counter machine having a casing housing a number of counter devices, one device for each shift. The number of picks is adapted to be selectively registered on the counter devices. It is apparent that my improved arrangement may be employed on machines other than looms but, for convenience, the following description will proceed on the assumption that the mechanism disclosed is to be employed in that connection.

An aim of the present invention is to provide a plurality of separable counter units which may be connected together in variable numbers in order to meet the demands of the trade for counting mechanisms for machines adapted to be operated by different operators during several periods of time, that is, in shifts. With my improved arrangement, if a machine is provided with counting mechanism to take care of a certain number of shifts and it is desired to increase the number of shifts at which the machine is run, an additional counter unit or units may be very quickly and easily attached to the unit or units already installed, and the units may then be selectively operated through the same mechanism without in any way affecting or disarranging the units already installed. Thus, the customers may, at relatively low cost, change over, for example, from a two shift to a three shift arrangement, by merely adding an additional unit to the already installed unit or units, whereas heretofore it would have to discard the double pick counter and install an entirely new triple pick counter. Further, with my improved arrangement, it is not necessary for the manufacturer of the counting mechanisms to manufacture and carry in stock integral counting machines varying from one another in the number of counting devices or registers incorporated therein, thus permitting of economy in manufacture, reduction of carrying charges, and increasing the ability to readily and quickly meet the demands of the trade.

A further object of the invention is to provide an improved arrangement having the above and other advantages and which is characterized by its extreme simplicity in construction, economy in manufacture, the ease with which the units may be added to or subtracted from as desired, and the facility with which the assembled units may be selectively rendered operative at will.

This application is a continuation-in-part of application Serial No. 686,330 filed by me August 23, 1933.

Other objects will be in part obvious and in part pointed out more in detail hereinafter.

The invention accordingly consists in the features of construction, combination of elements and arrangement of parts which will be exemplified in the construction hereinafter set forth and the scope of the application of which will be indicated in the appended claims.

In the accompanying drawings:

Figure 1 is a front view of an arrangement in which there is incorporated three separable counter units;

Fig. 2 is a vertical sectional view through the arrangement, this view being taken on line 2—2 of Fig. 1 and showing the manner in which the several counting devices are locked against resetting;

Fig. 3 is a sectional view taken on line 3—3 of Fig. 1 and showing the drive for the counting devices and the means for selectively rendering the units operable one at a time;

Fig. 4 is a transverse sectional view taken on line 4—4 of Fig. 1;

Fig. 5 is a detail view showing the means whereby the resetting shaft picks up the totalizer 35 wheels;

Fig. 6 is a detail view showing the means for preventing the resetting shaft from being rotated in the wrong direction;

Fig. 7 is a view similar to Fig. 2 and showing the units in a different arrangement; and

Fig. 8 is a detail view taken substantially along line 8—8 of Fig. 7.

Referring to Figs. 1 to 6, inclusive, of the drawings in detail, A, B, and C designate three separable counter units secured in mutually operable and assembled relation. The unit A may be referred to as the first shift or primary unit, the same being provided with a manually operable member 10 for shifting the several units 30 into and out of operation; a lock 14 for preventing resetting of the counting devices, and a primary shaft section 12a through which the counting devices are operated. The lower end of the section 12a is provided with means, such as
as a flattened projecting end 13, whereby the shaft may be associated with an operating part of the loom or other machine (not shown). The units B and C may be respectively referred to, for convenience in description, as the second and third shift sections respectively, both being preferably identical in construction in all details.

Each unit includes a casing 15 having an individual removable cover 16 provided with awindow 17 through which the numerals on the numeral or indicating wheels 18 may be observed. The covers 16 are secured in place, at least in part, by screws 5 which when used by a hanger that they cannot be tampered with. In the present instance, these screws extend through openings in the bottom walls of the casings and are screwed into lugs 5' on the covers. The casings are preferably of oblong shape and of like depth and length in order that the abutting sides may register when the units are placed on top of (or alongside of) one another. The units B and C are preferably of the same height, but the unit A is of greater height in order to accommodate the lock 11 and the shift operating member 10.

The units are detachably connected together, as by means of bolts 15, to unit A and the top and bottom walls of the units B and C being provided with registering openings adapted to receive these bolts. The openings in the top of the casing A which receive these bolts are threaded, and the bolts are screwed into these threaded openings. In the event that but two units are to be employed, the second unit will be secured to the primary one by bolts shorter than those illustrated in the drawings. In order to prevent an operator from removing one unit from another, a seal screw 6 is employed for sealing the several units together. This seal screw extends upwardly through the several casings, the head of the screw being located in the bottom wall of the lower casing. The upper wall of each casing is provided with a stepped opening 7. A plug or nut 8 is positioned in the topmost opening 7 and the upper end of the screw 6 is threaded into this plug. The upper end of the nut or block 8 is plain and is flush with the top surface of the uppermost casing so that a tool cannot be applied to it for the purpose of turning it. The assembled units are installed on a bracket which is shown in the accompanying drawings more or less diagrammatically by dotted lines. It is indicated by the numeral 9. The lowest casing is adapted to be secured and sealed to the bracket 9, the securing and sealing means not being shown, as they may be of any suitable form. It will be noted, however, that when the parts are installed as described access cannot be had to the sealing screw 6 because of the bracket 9 so that an operator cannot surreptitiously separate the several units. Also, access to the sealing screws 5 for the cover cannot be had. Thus, it is impossible for an operator to remove the several seal screws and cover with the counters without first breaking the seal between the bracket and the lowest casing.

Mounted within each casing is a counting device, these counting devices being illustrated more or less conventionally and diagrammatically in the drawings as the particular construction thereof forms a part of the present invention. Counting devices of an old and well-known type are illustrated. It is here sufficient to say that each counting device comprises a plurality of numeral wheels positioned side by side upon a shaft 20, there being between the wheels transfer mechanism whereby a wheel of higher order is advanced one step each time a wheel of the next lower order has made a complete revolution. The wheels are shown as being arranged in a decreasing order from the left in Fig. 1. The transfer means is not illustrated as any suitable type of such means may be employed.

Referring now to the means for operating or driving the numeral wheels, each unit has a vertical drive shaft section, the sections of the several units being so arranged that they cannot be tampered with. Upon each shaft section is pinned a worm 21 meshing with a worm wheel 22 loose on the associated shaft 20. The shaft sections may be held against axial movement by sleeves 33. Between each worm wheel 22 and the respective counting device is a breakable connection which is here shown as being in the form of a clutch. Each clutch includes a sleeve 23 slidably mounted on the associated shaft 20 and having a flange 24 at one end provided with notches 25 adapted to disengageably receive pins 26 projecting from the face of the gear 27. The other end of the sleeve 23 carries a flange 28 which is fixed one element 28 of a dislodgeable connection. The other element of the dislodgeable connection is designated by the numeral 29 and is suitably associated with the numeral wheel of lowest order through a wheel 30 for the purpose of permitting of a number of revolutions of the driven clutch sleeve between each step of the first numeral wheel. The elements 28 and 29 are in the form of cylindrical members having intermeshing fingers adapted to slide longitudinally relative to one another, thus permitting of longitudinal movement of the clutch sleeve 23 on the shaft 20. Between the elements 28 and 29 are springs 34 which normally urge the clutch sleeves towards the right, referring to Fig. 1. The shaft sections 12a, 12b, and 12c are so positioned that when the several units are assembled these sections are aligned. Between each shaft section and the next succeeding one is a quick detachable connection so that, when the units are assembled, the three sections are connected together. In the present illustrated disclosure, the detachable connection between the adjacent shaft sections comprises a diametrically extending tongue 31 on the end of one section, and a kerf 32 on the end of the other section adapted to receive the tongue. In the present instance, the upper ends of the shaft sections are provided with the kerfs 32, and the lower ends of the sections 12b and 12c are provided with tongues 31. In the top walls of the casings and about the upper ends of the shaft sections are recesses or rabbets 33'. Depending from the bottom walls of the middle and topmost casings are bosses 35 adapted to engage in the rabbets 35' of the respective next lower casings, as shown in Fig. 3. Similarly, interengaging bosses 36 and rabbets 36' may be provided between adjacent casings at the points through which the hand screw 19 extends.

The means for selectively rendering all but one of the counting devices inoperative may take any suitable form, but is here illustrated as comprising a sectional shift shaft somewhat similar to that illustrated in the drawings on the primary unit A for setting the shift shaft, and means on the several sections of the shift shaft for operating the several clutches. The shift shaft comprises the sections 40a, 40b, and 40c.
respectively associated with the units A, B and C. These shafts are journaled in the upper and lower walls of the respective casings. The upper end of the shaft 46a, which is flush with the top surface of the lower casing, is provided with a kerf 37, and the lower end of the section 40b is provided with a tongue 38 adapted to engage in that kerf. Similarly, the upper end of the shaft 49a has a kerf 37 which receives a tongue 38 on the lower end of the upper shaft section 40c. Upon each shift shaft section is a cam 41 adapted to cooperate with the flange 27 of the associated clutch sleeve 23. These cams have flats 40, the flats of the several cams being circularly spaced about the axis of the shaft. When the flat of one cam is opposed to the associated flange 27, the clutch sleeve carrying that flange will move to its left-hand position (as shown in connection with the primary unit in Fig. 1) and in which position the notches 25 receive the drive pins 26, and at this time the other cams are holding the clutches associated therewith in off position.

The shift shaft is set in any suitable manner, by a means of a knob 43 through which extends a stub shaft 44 journaled in the cover 16 of the primary unit. To the inner end of the shaft 44 is pinned a bevel gear 45 meshing with a bevel gear 46 also pinned to the shaft section 46a. In order that the shifting mechanism may be held in set position, there is provided in the cover 16 and about the shaft 44 a plurality of recesses 47 in which is adapted to selectively engage a pin 48 projecting from the rear end of the knob 43. In the present instance, there are four such notches respectively corresponding to the three units and a neutral position. The knob 43 is slidably mounted on the shaft 44 in order to permit the pin 48 to be withdrawn from a notch when it is desired to set the shifting mechanism. The knob is keyed to the shaft 44 by a cross-pin 49 which engages in a notch 50 adjacent the inner end of the knob. A spring 51 normally urges the knob towards the casing.

The purpose for indicating the setting of the knob is the same is provided with an arrow 52 and on the casing cover and about the knob are the numerals "1", "2", and "3".

In order to permit each counting device to be individually reset to zero, each shaft 20 is provided at one end with a handle or knob 70 located outside the casing. Each shaft 20 has a longitudinally extending groove 71, and each numeral wheel has a pawl the free end of which is adapted to engage in this groove. From Fig. 5, it will be seen that a wheel, when operated through the driving mechanism, will rotate counterclockwise upon the then stationary shaft 20 and that, when the shaft 20 is manually turned counterclockwise, it will pick up the wheels through the paws and thus the wheels may be reset to zero. In order to prevent tampering with the resetting means by unauthorized persons, means are provided for locking the shafts 20, together with the knobs carried thereby. In the present instance, the locking means includes a lock of suitable sort carried by the primary unit A, and a sectional lock bar, the sections of which are brought into operative relation by merely assembling the units upon one another. Referring to the drawings, the lock bar sections respectively associated with the units A, B, and C are designated by the characters 75a, 75b and 75c. The lowest section 75a has its upper end slidably supported in an open

ing 78 in the top wall of the lowermost casing. The lower end of the bar section 75a rests upon the periphery of a locking disk or cam 71 carried by the inner end of the barrel 18 of the cylinder lock 11. As usual, the lock is so constructed that the key cannot be withdrawn except when the lock is in locked condition. This lock may be carried by a bracket 79 secured within the lowermost casing. Each bar section 75a and 75b has its upper and lower ends radially mounted in openings in the top and bottom walls of the casings in which they are located, the sections having a length corresponding to the heights of the casings. The sections, of course, are correspondingly positioned so that when the units are placed one upon the other, the several sections are in alignment with their ends in abutment. Each section is provided with an upwardly facing locking shoulder 80, and each shaft 20 has fixed to it a collar or disk 81 provided with a flat surface 82 against which the associated stop shoulder 80 is adapted to engage. When the lock 11 is in unlocked position, that is, when the locking disk or cam 71 is at right angles to the position shown in Fig. 1, the shafts 20 may be turned by means of the knobs or handles 70 to reset the counting devices to zero. When the counting devices are all at zero, the flats 82 of the disks 81 are parallel and opposed to the several shoulders 80 on the locking bar. The lock may now be turned to locked position, thereby moving the lock bar sections upwardly so that the shoulders of the lock bar sections will engage the respective flats. The term "lock bar" is used by way of description and not by way of limitation.

In order to prevent cheating by the operator (in the event a key to the lock is secured) by turning a resetting shaft backwardly to pick up a wheel of the lowest order and then turn it forwardly, each of the collars or disks 81 is provided with a flange 83 provided in its periphery with one or more notches 84 and on the inner face of each cover 15 is a spring catch 85 the free end of which is adapted to engage the periphery of the respective flange 83. The notches are of ratchet shape so as to permit the shafts 20 to be rotated in the proper direction without interference by the spring catches. The spring catches, however, prevent rotation of the shafts in the wrong direction. Since the lock is so constructed that it is impossible to remove the key except in the locked position, and it being impossible to cause it to occupy the locked position except when flats of disks 81 are parallel and opposed to shoulder 80 on locking bar, it will be apparent that because the resetting shaft is prevented from being turned backwardly to the locked position, if it is displaced from this position it becomes necessary to turn it forwardly, thereby resetting the counting wheels to zero and losing the registration, the other alternative being loss of key and evidence of attempted tampering because of the impossibility of removing key except in locked position.

The manner in which the units are assembled and the operation of the counting devices will be readily understood from the foregoing description, taken in connection with the accompanying drawings. It will be observed that, when one unit is positioned upon another, the sections of the drive shaft, the sections of the shift shaft, and the sections of the lock bar are automatically
brought into alignment and operative relation relative to one another, and the driving connections between the sections of the drive shaft and the sections of the shift shaft are established.

During the normal operation of the mechanism, each drive shaft section is driven through the power feeding one. By setting the knob 43, the desired counting device is rendered operative and the other two are rendered inoperative. A single lock is employed for locking all of the resetting means against operation. It may be stated here that, while I have shown three units, the number of units may be varied and, if desired, the first and second counting devices may be incorporated in a single casing and the third unit C may be constructed as illustrated and described.

It is quite apparent that the above described means for locking the reset shafts against operation so as to prevent tampering with the resetting by unauthorized persons may be readily modified so as to permit the several units to be assembled in different sequential orders. For example, the arrangement shown in Figs. 7 and 8 may be adopted. Referring to these figures, it will be noted that each of the collars or disks 84 may be secured to its shaft 20 with the flat 82 facing either downwardly or upwardly when the numeral wheels are in zero position. To this end, each cam may be secured to its shaft by a removable pin 100 having a relatively close fit in the holes through which it extends. The lock bar sections 78b and 78c may be reversed end for end in the respective units. The unit A is provided with an auxiliary lock bar section 75b slidingly mounted in a recess 101 in the bottom wall of the casing 15. The section 75b may have, adjacent its upper end, a lug 102 for limiting downward movement of this section. The locking disk or cam 11' of the lock 11 is double-ended; that is, it has at its opposite ends similar camming surfaces 103 adapted to cooperatively rotate with the lower end of the section 75b and the upper end of the section 18b. Obviously, the lower end of the drive shaft section 12a and 12c, and the lower end of the shift shaft section 40a may be extended through the bottom wall of the casing of the unit A and provided with a tongue similar to the top of section 38. With the arrangement shown in Figs. 7 and 8, the units may be assembled in any suitable order. In Fig. 7, the unit A is illustrated as being positioned between the units C and B. When so arranged, the disk or collar 81 of the unit C is secured to its shaft 20 in a position at 90° to that shown in Fig. 2, and the locking bar section 75c is inverted from the position shown in Fig. 2 to the position shown in Fig. 7. The now upper end of the lock bar section 75c is adapted to be engaged by the lower end of the section 75b.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the language used in the following claims is intended to cover all of the generic and specific features of the invention herein described and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

I claim as my invention:

1. In combination, a plurality of separable counter units arranged in abutting relation; each unit including a casing, a counter device within each casing and having numeral members, a sectional drive member journalled in each casing, a breakable connection between the drive member and the counter device therein; means for securing said casings together in abutting relation, and means for selectively shifting said breakable connections into and out of operative engagement and including means for setting the device to any particular number common to all of said breakable connections.

2. A plurality of separable counter units in abutting relation; each unit having a casing, a counter device in each casing and having a plurality of numeral members, a sectional drive member in each casing, and a breakable connection within each casing between the drive member and the counter device therein; means for fastening the casings together in abutting relation, a manually operable member on the outside of said casings having a plurality of selectively settable positions, and means connected between said member and said connections whereby said manually operable member may selectively connect the counters with the respective sectional drive members.

3. In combination, a plurality of separable counter units in abutting relation; each unit having a casing, a counter device in each casing and having a plurality of numeral members, a sectional drive member in each casing, and a breakable connection within each casing between the drive member and the counter device therein; means for fastening the casings together in abutting relation, cover means for said casings, a manually operable member carried by said cover means and having a plurality of selectively settable positions, and means behind, and concealed by, said cover means and between said manually operable member and said breakable connections whereby said manually operable member may selectively connect the counter devices with the respective drive members.

4. In combination, a plurality of separable counter units arranged in abutting relation; each unit including a casing, a counter device within the casing, a sectional drive member journalled in each casing, and a breakable connection between said drive member and the counter device; means for securing said casings together in abutting relation, and means for selectively shifting said breakable connections into and out of operation, said last mentioned means including a sectional shift member with one section located in each casing and a manually operable member for setting said shift member.

5. In combination, a plurality of counter units positioned in abutting relation; each unit having a casing, a counter device located therein and having numeral members, a drive shaft section through which said counter device is operated, a breakable connection between said drive shaft section and counter device, and means for shifting said breakable connection including a shift shaft section journalled in the casing; means for securing said casings together, a quick detachable connection between adjacent ends of adjacent sections of the drive shaft, a quick detachable connection between adjacent ends of adjacent shift shaft sections whereby said sections form a com-
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In combination, a plurality of separable
counter units arranged in abutting relation;
each unit including a casing, a counter device
within the casing and having numeral members, a
drive member in each casing, and a breakable
connection within each casing between the
drive member and the counter device therein;
means for selectively shifting said breakable
connections into and out of operative
relation, each of said counter devices having a re-
setting means, and means for simultaneously
locking said resetting means against operation
and including operatively associated lock
members respectively associated with said resetting
means, and a locking instrumentality adapted to
lock said members in operative position.

9. In combination, a plurality of separable
counter units in abutting relation; each unit hav-
ing a casing, a counter device in each casing
and having a plurality of numeral members, a sec-
tional drive member in each casing, and a break-
able connection within each casing between the
drive member and the counter device therein;
means for selectively shifting said breakable
connections into and out of operative
relation, each of said counter devices having a re-
setting means, means for simultaneously locking said
resetting means against operation and including
an operatively associated lock members
associated with said resetting means, and a locking
instrumentality adapted to lock said lock members
in operative position.

10. In combination, a plurality of separable
counter units in abutting relation; each unit hav-
ing a casing, a counter device in each casing
and having a plurality of numeral members, a sec-
tional drive member in each casing, and a break-
able connection within each casing between the
drive member and the counter device therein;
means for selectively shifting said breakable
connections into and out of operative
relation, each of said counter devices having a re-
setting means, means for simultaneously locking said
resetting means against operation and including
an operatively associated lock members
associated with said resetting means, and a locking
instrumentality adapted to lock said lock members
in operative position.

11. In combination, a plurality of separate
counter units arranged in abutting relation;
each unit including a casing, a counter device
within the casing and having numeral members, and
means for selectively shifting said breakable
connections into and out of operative
relation, each of said counter devices having a re-
setting means, and means for simultaneously locking said
resetting means against operation and including
an operatively associated lock members
associated with said resetting means, and a locking
instrumentality adapted to lock said lock members
in operative position.
the primary counter unit for selectively setting said shift member.

15. In combination, a plurality of counter units positioned in abutting relation; one of said units comprising a primary counter unit and each of said units having a casing, a counter device located within each casing and having numeral members, a drive shaft section journalled within each casing and operatively connected to the counter device in that casing, and a breakable connection between each drive shaft section and its respective counter device; means within the primary counter unit for selectively shifting said breakable connections and including a shift shaft section journalled in the primary unit for selectively positioning said shift shaft, means for securing the abutting casings together, quick detachable connections between adjacent ends of adjacent sections of the drive shaft, and quick detachable connections between adjacent ends of adjacent sections of the shift shaft.

16. In combination, a plurality of separable counter units arranged in abutting relation, each unit including a casing and having a counter device therein provided with numeral members, a drive shaft section journalled in each casing and through which said counter devices are operated, means operatively interconnecting the abutting ends of said drive shaft sections, a clutch between each drive shaft section and its associated counter device, a shift shaft section journalled in each casing, and a cam on each shift shaft section for selectively operating its associated clutch, means for securing said casings together in abutting relation, quick detachable connections between adjacent ends of the shift shaft sections, and means for selectively presetting the positions of said shift shafts whereby any one of said counter units may be selectively operated.

17. In combination, a plurality of separable counter units arranged in abutting relation and each having a casing, a counter device in each unit, a sectioned drive member journalled in each casing, detachable connections between said drive member and the counter devices, means for removably securing said casings together in abutting relation, means for selectively shifting said detachable connections into and out of operation to individually operate said counters, said last mentioned means including a sectional shift member with one section located in each casing and a manually operable control member for setting said shift member; each of said counter devices having a resetting means, and means for simultaneously locking said resetting means against operation and including a plurality of associated lock bar sections respectively associated with said resetting means and a locking instrumentality for locking the lock bar sections in operative position.

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