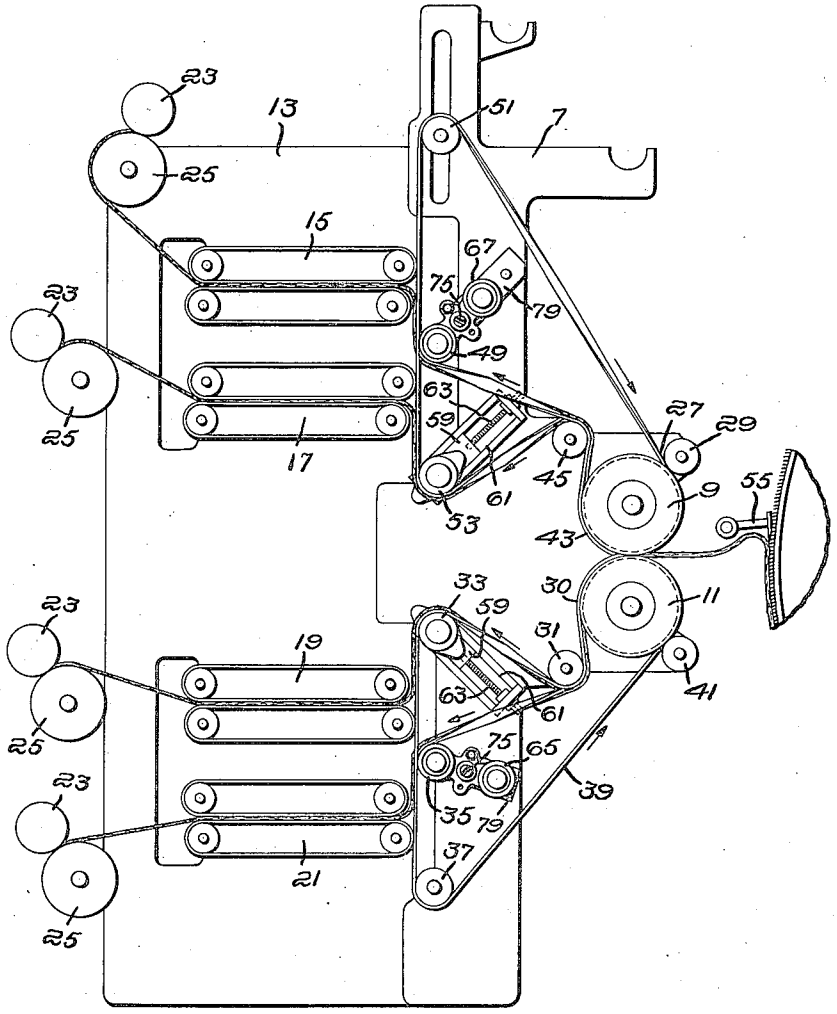
Dec. 7, 1937. H. H. KNIGHT 2,101,370

TAPE CONDENSER

Filed June 1, 1936 3 Sheets-Sheet 1

Fig. 1.



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Fig. 2.

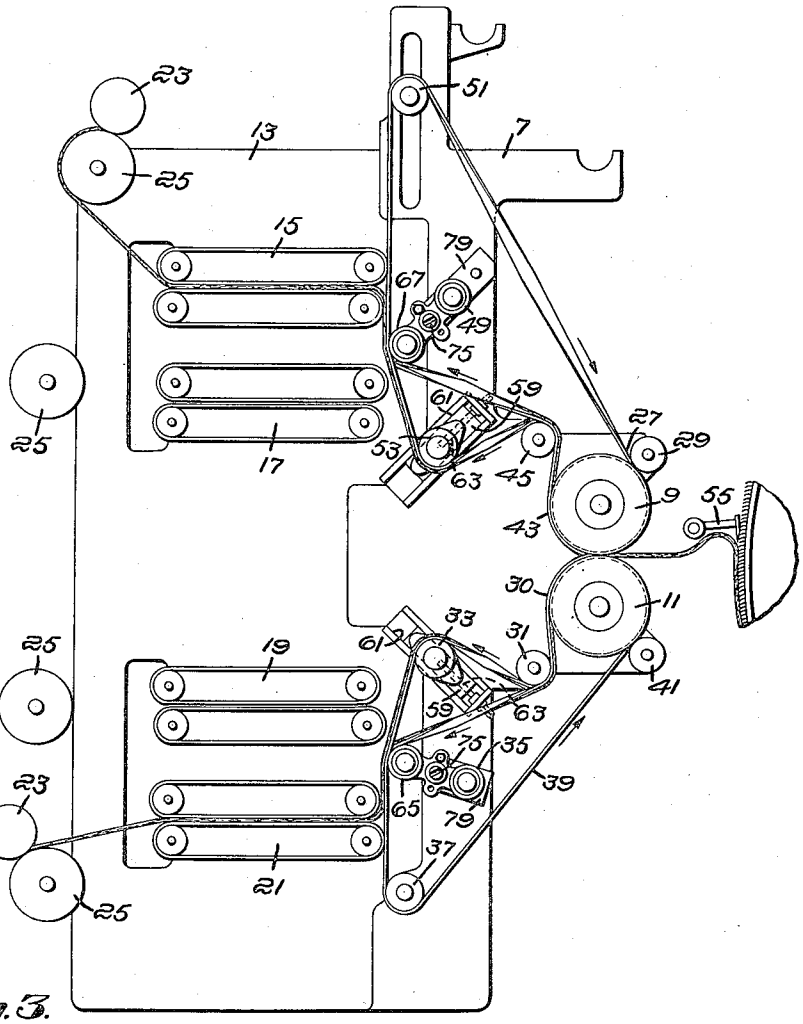


Fig. 3.

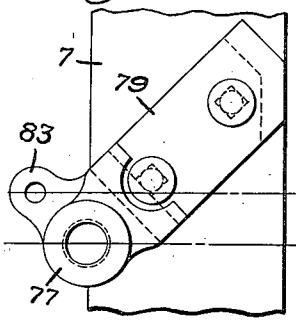
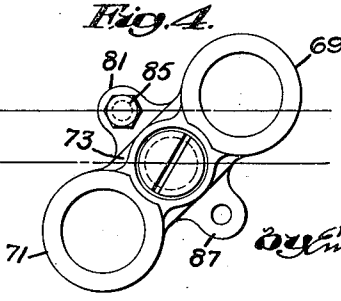


Fig. 4.



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Fig. 6.

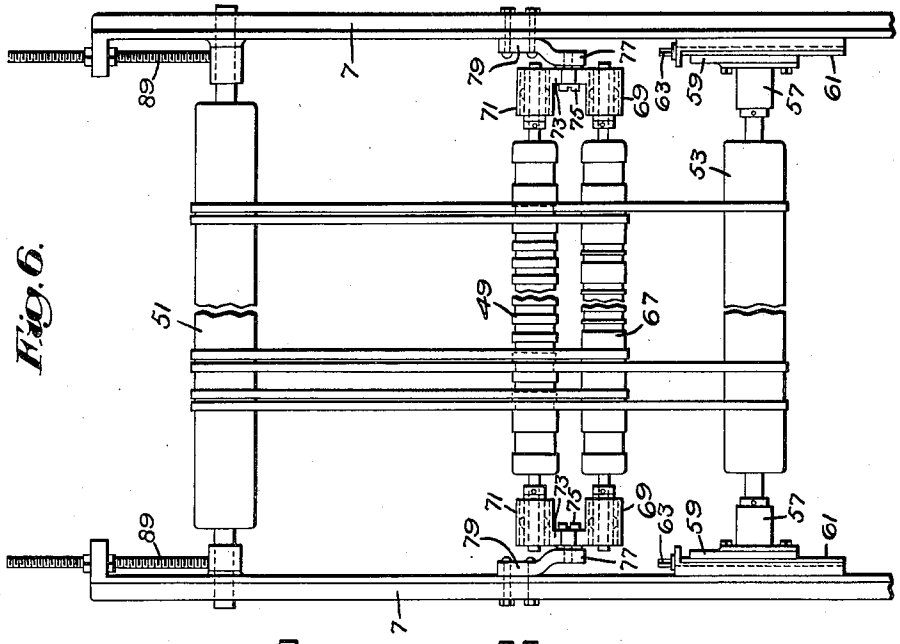
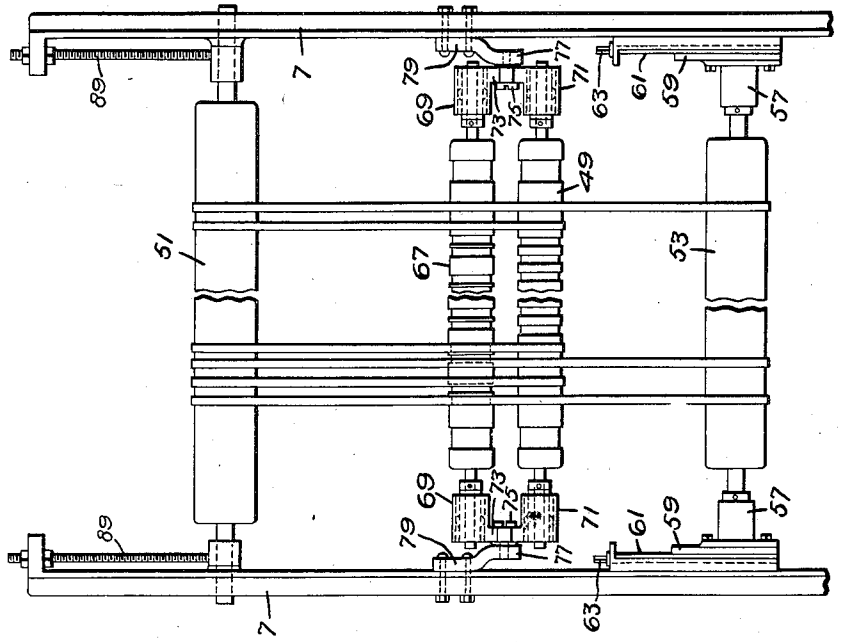


Fig. 5.



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Patented Dec. 7, 1937 2,101,370

UNITED STATES PATENT OFFICE

2,101,370

TAPE CONDENSER

Henry H. Knight, Canton, Mass., assignor, by mesne assignments, to Davis & Furber Machine Company, North Andover, Mass., a corporation of Massachusetts

Application June 1, 1936, Serial No. 82,894

11 Claims. (Cl. 19—151)

This invention relates to tape condensers in which a web of fiber taken from a carding machine is divided into a series of slivers by a series of endless tapes or by a single continuous endless tape passing around dividing rolls and providing a succession of laterally separated tape runs, each sliver being carried by a tape run and delivered between leather aprons which act to condense the sliver to a roving.

Tape condensers are commonly so constructed that the number of roving ends formed from the web may be made to correspond to the number of tape runs with which the machine is equipped at the dividing rolls, or by suitable rearrangement of the machine and the tape runs the number of roving ends may be made to correspond to a number less than the number of tape runs. Such readjustment, for example, may be such that adjoining tape runs, instead of delivering the slivers to separate pairs of condensing aprons, are caused to deliver their separate slivers in such close proximity to the same pair of condensing aprons that the two slivers are condensed into a single roving end by the aprons and there is produced, from a web of a given width, one-half the number of roving ends of a double thickness.

As commonly practised, the conversion of the machine from a condition for producing single roving ends into a condition for producing double roving ends has necessitated adjustments which have been attended with a substantial loss of time and material expense.

One object of the present invention is to simplify the desired conversion of the machine so that by very simple adjustments, quickly made, the machine may be operated to produce either single or double roving ends.

A further object of the invention is to provide means for so laterally spacing the tape runs that under either condition of operation the tapes are maintained with certainty at the desired lateral distance apart.

These and other objects of the invention will be best understood by reference to the following illustration, when taken in connection with the accompanying description, while the scope of the invention will be more particularly pointed out in the appended claims.

In the drawings:

Fig. 1 is a more or less diagrammatic side elevation showing one type of tape condenser, illustrating the relation of the tape runs to the condensing aprons and the dividing rolls when adjusted to form a separate roving end from the sliver delivered by each tape run;

Fig. 2 is a similar view of the same machine adjusted to produce one roving end from the two slivers delivered by adjoining tape runs;

Fig. 3 is a detail showing in side elevation and on an enlarged scale one of the bracket supports for the reversible bearing by which two grooved tape guiding rolls are carried;

Fig. 4 is a detail showing in side elevation the reversible bearing;

Fig. 5 is a rear elevation of the upper part of the tape frame, partly broken away, illustrating the lateral relation of the tapes when the machine is adjusted as shown in Fig. 1; and

Fig. 6 is a similar view illustrating the lateral relation of the tapes when the machine is adjusted as shown in Fig. 2.

Referring to the drawings and to the embodiment of the invention there shown for illustrative purposes, the machine comprises a tape roll frame having frame members 7 in which are mounted the two metal dividing rolls 9 and 11 and the various rolls required for guiding the tapes. The dividing rolls are provided with circumferential grooves each of a width to accommodate a tape, the grooves in each roll being spaced by the width of a tape and the grooves alternating in the two rolls so that a groove in one roll faces the ridge intervening between grooves in the opposite roll.

The side frames 13 form an apron frame supporting two sets of banks of endless leather condensing aprons 15, 17, 19 and 21 which are driven by suitable mechanism so that their opposing runs travel rearward while at the same time they are reciprocated laterally in opposite directions. The banks of aprons 15 and 17 constitute an upper set and the banks of aprons 19 and 21 a lower set. A sliver fed into the front end of each pair of aprons is accordingly rolled and condensed as it is fed between the aprons to produce a roving end. The roving ends on leaving the condensing aprons pass respectively to spools 23 rotated each by a contacting friction roll 25.

The tapes, which separate the web into slivers and are guided over a series of idler rolls, comprise a series of endless tapes arranged in lateral succession, each tape being guided to provide a run in operative relation to one of the upper set of banks and a second run in operative relation to one of the lower set of banks.

Referring to Fig. 1, which shows the machine adjusted to produce a single roving end from each tape run, each alternate tape passes at 27 under the roll 29 into the groove of the dividing roll 9, thence at 30 over the opposed ridge of the

dividing roll 11 around the idler 31. From the idler 31 it is given half a twist and passes over the smooth surfaced idler roll 33, thence downward, being guided vertically downward by the grooved roller 35 and the smooth idler roll 37 in close proximity and operative relation to the two lower pairs of condensing aprons 19 and 21. From the roll 37, the tape returns at 39 to the dividing roll 11, where it passes under the idler 41 into a groove in that dividing roll offset from the groove in the dividing roll 9 where it first entered. From the dividing roll 11, it passes at 43 around the opposed ridge in the dividing roll 9 and then around the idler 45, thence with a half twist diagonally upward and rearward to and around the grooved roll 49, being thence guided vertically upward by the latter and by the smooth roll 51, passing in operative relation to the upper pair 15 of the upper bank of condensing aprons. From the roll 51, with a half twist, the tape returns to the point where it started at 27.

The next adjoining tape follows a similar course, execpt that at the upper part of the machine it passes at 43 from the ridge on the upper dividing roll 9 over the idler 45, thence diagonally downward and to the rear over the smooth idler roll 53, thence upward in close proximity and in operative relation to both pairs 17 and 15 of the upper bank of condensing aprons. At the lower part of the machine such tape passes from the ridge of the dividing roll 11 over the idler 31 with a half twist directly to the grooved roll 35, being guided thereby and by the smooth roll 37 in operative relation only to the lower pair 21 of condensing aprons.

The upper grooved roll 49, as will be best seen from Fig. 5, is provided with a succession of grooves, each of a width sufficient only to accommodate a tape and spaced by a distance substantially equal to the width of a tape. The lower grooved roll 35 (not shown in Fig. 5) is similarly grooved, except that the grooves are offset laterally by a tape width from the grooves in the upper roll to permit the upper and lower runs of the same tape to track properly in laterally offset grooves of the upper and lower dividing rolls. This grooving of the rolls 35 and 49 assures the maintenance of a definite lateral spacing between successive tapes, as is clearly shown in Fig. 5.

In the operation of the machine adjusted to the condition shown in Figs. 1 and 5, the web stripped from the carding machine by the doffer comb 55 enters between the dividing rolls 9 and 11 and is separated into slivers, one being carried by each of the diverging runs 30 and 43 of the first tape, between these runs and the ridges of the dividing rolls, and the other slivers being carried in a similar manner by the diverging runs of the other laterally succeeding tapes.

Each tape run diverging from the upper dividing roll 9 passes up over the idler 45 and thence directly around the grooved roll 49, and delivers its sliver to the upper pair 15 of the upper bank of aprons. Each tape run diverging from the upper dividing roll, passing over the idler 45 and thence directly over the smooth roll 53, has its sliver delivered to the lower pair 17 of the upper bank of aprons before passing upwardly in front of the aprons 15. Similarly each tape run diverging from the lower dividing roll 11, passing over the idler 31 and thence directly over the grooved roll 35, delivers its sliver to the lower pair 21 of the lower bank of aprons, and the tape runs diverging from the lower dividing roll 11, passing over the idler 31 and thence directly over the smooth roll 33, delivers its sliver to the upper pair 19 of the lower bank of aprons.

The two upward runs of adjoining tapes, maintained longitudinally spaced by the grooved roll 49, as indicated in Fig. 5, accordingly deliver their slivers separately, one to the lower pair 17 of aprons and the other to the upper pair 15 of aprons, and the slivers are separately condensed and pass each to its separate winding spool 23. The two downward runs of adjoining tapes, similarly spaced, deliver their slivers separately, one to the upper pair 19 and the other to the lower pair 21 of condensing aprons.

To adjust the machine to produce double roving ends, it is necessary that both upward tape runs of adjoining tape pairs should deliver their respective slivers to the same upper pair of condensing aprons and that both downward tape runs of adjoining tape pairs should deliver their respective slivers to the same lower pair of condensing aprons, and that the adjoining upward and downward runs of successive pairs of tapes should be positively maintained in such close proximity that the two slivers from such adjoining runs should be condensed into a single roving end.

Such conversion of the machine has heretofore required a rearward bodily movement and the disconnection of the gearing for the two pairs of condensing aprons, such as the aprons 17 and 19, which are to be placed out of operative relationship to one each of the upper and lower tape runs of adjoining pairs of tapes. As commonly practised, it has further required the substitution for the grooved tape-spacing roll, such as the roll 49, of a differently grooved roll to maintain adjoining tapes in the required proximity to each other. The substitution of such differently grooved roll requires the laborious and slow separation of the apron frame from the tape frame, the slackening of the tapes, the replacement of one roll for the other, the realignment of the tapes, and the slow reconnection of the apron frame to the tape frame.

It has been proposed, in lieu of the substitution of one grooved roll for another grooved roll, to utilize a single grooved roll at both the upper and lower parts of the tape frame for guiding one or both adjoining tape runs, the roll being axially adjustable in its bearings for the purpose of altering the lateral spacing of such tape runs when it is desired to adjust the machine for producing double roving ends instead of single ends, and vice versa. The use of such a single axially adjustable grooved roll as has been proposed, however, fails to enforce a definite path of travel in the desired lateral relationship on both sets of adjoining tape runs. If such a single roll is employed at the position of the roll 35 and having wide grooves to receive two adjoining tape runs, such runs are subject to lateral displacement from the intended paths, particularly if there is a slackness or unequal tension of the adjustment of the tapes. And if such a single roll is employed at the position of the roll 33 with grooves of a width accommodating the tapes of one set of tape runs, the adjoining tape runs which pass over ungrooved rolls are subject to a similar lateral displacement from their intended paths.

In the present invention, means are provided whereby not only is one pair of each bank of aprons rendered ineffective, without disturbing the position of the aprons or disconnecting their driving mechanism, but by a simple substitution of one grooved roll for another both sets of upper

and lower tape runs are positively guided in either adjusted condition of the machine so that they track in and are guided by grooves of the width substantially only of a tape, so that in one case (as in Fig. 5) both the upper and lower adjoining runs of successive tapes are positively held separated by substantially the width of a tape, and in the other case (as in Fig. 6) they are positively held in close proximity.

For the purpose of rendering the aprons 17 and 19 effective or ineffective at will to receive and act upon a sliver, the guide rolls 33 and 53 are each mounted at each opposite end in bearings 57 carried in a block 59 slidably mounted in guideways 61 which are secured to the frame members 7. The position of the block in its guideways and the position therefore of the roll 33 or the roll 53 may be adjusted by a screw 63. The guideways for the roll 53 extend rearward and downward, and those for the roll 33 diagonally rearward and upward. Accordingly, by means of the screw the guide rolls 53 and 33 may be quickly and readily moved from the position shown in Fig. 1 to the position shown in Fig. 2, where the tape runs previously delivered slivers to aprons 17 and 19, are withdrawn from operative relation thereto, and become effective to deliver their slivers only to the aprons 15 and 21.

For the purpose of bringing the tape runs of successive pairs of tapes into close proximity for the production of double roving ends, the rolls 35 and 49 are each mounted on a similar support by means of which they may be withdrawn from the tape runs, while another suitably and differently grooved roll is moved into position with its grooves in suitable tape receiving relation to the tape runs. Such roll for the lower tape runs is indicated at 65 and for the upper tape runs at 67. For convenience the two rolls 49 and 67 for the upper tape runs are mounted on the same adjustable support, and the two rolls 35 and 65 for the lower tape runs are mounted on a similar support. The description of the support for the upper rolls 49 and 67 will therefore suffice. This support is shown in detail in Figs. 3 and 4, and as supporting the upper pair of rolls in rear elevation in Figs. 5 and 6 and in side elevation in Figs. 1 and 2.

From the drawings it will be seen that the rolls 49 and 67 are mounted at each of their opposite ends in bearings supported in spaced relation by the sleeves 69 and 71 carried by the swiveled bearing block 73. The latter is pivotally mounted by means of the studs 75 on a boss 77 of a supporting piece 79 secured to the frame members 7, the relation being such that by swinging or turning the bearing blocks at each opposite side of the frame about their pivots for one-half revolution the roll 49 having grooves of a tape width substantially spaced from each other may be placed in control of the tape runs (as shown in Figs. 1 and 5), or, on the other hand, the roll 67 with grooves of a tape width spaced closely adjacent each other may be placed in control of the tapes (as shown in Figs. 2 and 6).

To fix the rolls 49 and 67 in either one of the two positions described, the bearing block 73 is provided with an offset ear 81 by which it may be fastened to a similar ear 83 on the support 79 by means of the bolt 85 when the guiding roll 49 is placed in guiding relation to the tape runs. It is also provided with an oppositely disposed ear 87 by which it may be similarly bolted to the ear 83 when the roll 67 is placed in guiding relation to the tape runs.

To convert the machine from a condition for producing single roving ends into a condition for producing double roving ends, or vice versa, the two sets of upper and lower bearing blocks 73 are unfastened by the bolts 85, reversed in position, and again fastened, thereby withdrawing one grooved guide roll from the tapes and applying the other grooved roll thereto. The bearing blocks 59 for the rolls 33 and 53 are then moved by the screws 63 to move the tape runs controlled thereby either away from the aprons 19 and 17, respectively, or into close operative relation thereto, as the case may be, the tapes being tensioned or slackened as may be required by raising or lowering the upper idler roll 51 by the adjusting screws 89 to compensate for the changed position of the rolls 33 and 53. These adjustments require but a fraction of the time previously required for converting the machine from one condition to the other.

With the machine adjusted to the condition shown in Figs. 2 and 6, the slivers are carried from the dividing rolls as previously described, but the upward tape runs passing up from the roll 53 over the grooved roll 67 and the tape runs passing downward from the roll 33 over the grooved roll 65 no longer deliver their slivers to the aprons 17 and 19, respectively, but deliver them to the aprons 15 and 21. They are there delivered to the aprons closely adjacent to the slivers delivered by the adjacent runs of the next succeeding tape and are there rolled and condensed into a double roving end which passes to the winding spools 23.

While I have herein shown and described for the purposes of illustration one specific embodiment of the invention, applied to one specific type of tape condenser, it is to be understood that extensive deviations and changes may be made in the form and relative arrangement of parts and that various other applications of the invention may be made than the one herein disclosed.

I claim:

1. A tape condensing machine comprising a pair of dividing rolls, a first and a second pair of condensing aprons, a series of tape runs acting each to carry a separate sliver from the dividing rolls, means for guiding said tape runs into operative relationship only to said first pair of aprons to deliver each its sliver thereto, a second series of tape runs, members of which alternate with the pairs of said first series, also acting each to carry a separate sliver from said dividing rolls, means for guiding said second series of tape runs into operative relationship to said first pair of aprons, means for adjusting the relative relationship between said second pair of aprons and said second series of tape runs to cause the latter either to deliver each its sliver to said second pair of aprons or to deliver each its sliver to said first pair of aprons, a tape guiding roll supported in the machine provided with separate grooves of a width to accommodate a tape and separated by substantially the width of a tape for engaging both sets of tape runs, a second tape guiding roll supported in the machine for engaging both sets of tape runs, said roll being provided with grooves spaced to bring said tapes into close proximity to each other, and means for moving said rolls either to place said first roll in guiding control of the tape runs when said second series of tape runs is in such relation to said second pair of aprons as to deliver their slivers thereto or to place said second roll in guiding control of the tape runs when said second series

of tape runs is in such relation to said second pair of aprons as to deliver their slivers to said first pair of aprons.

2. A tape condensing machine having a pair of dividing rolls, a first and a second pair of condensing aprons, a series of tape runs adapted each to carry a separate sliver from said dividing rolls and deliver it to said first pair of aprons, a second series of tape runs, the members of which alternate with the members of said first series and acting each to carry a separate sliver from said dividing rolls, said machine being adjustable to cause the members of said second series of tape runs to deliver each its sliver either to said first or to said second pair of aprons, a pair of separate tape guiding rolls each mounted in bearings on the machine and adapted either one or the other to engage with both sets of tape runs and control the lateral separation of the tapes, one roll being grooved to maintain a substantial lateral separation of the adjoining tape runs and the other grooved to maintain the adjoining tape runs in close lateral proximity, and supporting means for said rolls and said bearings whereby they may be moved to place either one in guiding control of said tape runs.

3. A tape condensing machine having a pair of dividing rolls, a first and a second pair of condensing aprons, a series of tape runs adapted each to carry a separate sliver from said dividing rolls and deliver it to said first pair of aprons, a second series of tape runs, the members of which alternate with the members of said first series and acting each to carry a separate sliver from said dividing rolls, said machine being adjustable to cause the members of said second series of tape runs to deliver each its sliver either to said first or to said second pair of aprons, a pair of separate tape guiding rolls each mounted in bearings on the machine and adapted either one or the other to engage with both sets of tape runs and control the lateral separation of the tapes, one roll being grooved to maintain a substantial lateral separation of the adjoining tape runs and the other grooved to maintain the adjoining tape runs in close lateral proximity, and movable supporting means for both said rolls and their bearings, movement of which places either roll in guiding control of said tape runs and withdraws the other from such guiding control.

4. A tape condensing machine having a pair of dividing rolls, a first and a second pair of condensing aprons, a series of tape runs adapted each to carry a separate sliver from said dividing rolls and deliver it to said first pair of aprons, a second series of tape runs, the members of which alternate with the members of said first series and acting each to carry a separate sliver from said dividing rolls, said machine being adjustable to cause the members of said second series of tape runs to deliver each its sliver either to said first or to said second pair of aprons, a pair of separate tape guiding rolls each mounted in bearings on the machine and adapted either one or the other to engage with both sets of tape runs and control the lateral separation of the tapes, one roll being grooved to maintain a substantial lateral separation of the adjoining tape runs and the other grooved to maintain the adjoining tape runs in close lateral proximity, and movable supporting means for both said rolls and their bearings, movement of which places either roll in guiding control of said tape runs and withdraws the other from such guiding control, said supporting means comprising a pivotally mounted support at each side of the machine by which said rolls and their bearings are carried in spaced relation, the turning of which support places one roll in guiding control of the tape runs while withdrawing the other from such guiding control.

5. A tape condensing machine having a pair of dividing rolls, a first and a second pair of condensing aprons, a series of tape runs adapted each to carry a separate sliver from said dividing rolls and deliver it to said first pair of aprons, a second series of tape runs, the members of which alternate with the members of said first series and acting each to carry a separate sliver from said dividing rolls, means for adjustably changing the travel of said second series of tape runs to cause the members thereof to deliver each its sliver either to said first or to said second pair of aprons, a pair of separate tape guiding rolls each mounted in bearings on the machine and adapted either one or the other to engage with both sets of tape runs and control the lateral separation of the tapes, one roll being grooved to maintain a substantial lateral separation of the adjoining tape runs and the other grooved to maintain the adjoining tape runs in close lateral proximity, and supporting means for said rolls and said bearings whereby they may be moved to place either one in guiding control of said tape runs.

6. A tape condensing machine having a pair of dividing rolls, a first and a second pair of condensing aprons, a series of tape runs adapted each to carry a separate sliver from said dividing rolls and deliver it to said first pair of aprons, a second series of tape runs, the members of which alternate with the members of said first series and acting each to carry a separate sliver from said dividing rolls, said machine being adjustable to cause the members of said second series of tape runs to deliver each its sliver either to said first or to said second pair of aprons, a pair of separate, differently grooved, tape guiding rolls each mounted in bearings on the machine and adapted either one or the other to engage with both sets of tape runs and control the lateral separation of the tapes, and supporting means for said rolls and said bearings whereby they may be moved to place either one in guiding control of said tape runs.

7. A tape condensing machine having a pair of dividing rolls, a first and a second pair of condensing aprons, two series of tape runs adapted each to carry a separate sliver from said dividing rolls, a pair of separate, differently grooved, tape guiding rolls each mounted in bearings on the machine and adapted either one to engage with both sets of tape runs and control the lateral separation of the tapes, a support mounted at each side of the machine in which said rolls and their bearings are carried in spaced relation, means pivotally mounting said supports on the machine, and means for fastening each support in either one of two opposite positions on its pivot, in one position of which one guiding roll is placed in guiding control of the tape runs and in the other position of which the opposite roll is placed in such guiding control.

8. A tape condenser comprising a pair of dividing rolls, a first and a second pair of condensing aprons, a series of tape runs adapted each to carry a separate sliver from said dividing rolls, means for guiding said tape runs into operative relationship only to said first pair of aprons to deliver each a sliver thereto, a second

series of tape runs, the members of which alternate with the members of said first series, also acting each to carry a separate sliver from said dividing rolls, means for guiding said second series of tape runs into operative relationship to said first pair of aprons, means for altering the path of said second series of tape runs to guide them either first into operative relationship to said second pair of aprons to deliver each its sliver thereto or to place them out of operative relationship to said second pair of aprons to cause them to deliver each its sliver to said first pair of aprons, a pair of separate differently grooved tape guiding rolls each mounted in bearings on the machine and adapted either one to engage with both sets of tape runs and control the lateral separation of the tapes, and supporting means for said rolls and said bearings whereby they may be moved to place either one in guiding control of said tape runs.

9. A tape condenser comprising a pair of dividing rolls, a first and a second pair of condensing aprons, a series of tape runs adapted each to carry a separate sliver from said dividing rolls, means for guiding said tape runs into operative relationship only to said first pair of aprons to deliver each a sliver thereto, a second series of tape runs, the members of which alternate with the members of said first series, also acting each to carry a separate sliver from said dividing rolls, means for guiding said second series of tape runs into operative relationship to said first pair of aprons, means comprising an adjustable guiding roll for altering the path of said second series of tape runs to guide them either first into operative relationship to said second pair of aprons to deliver each its sliver thereto or to place them out of operative relationship to said second pair of aprons to cause them to deliver each its sliver to said first pair of aprons, a pair of separate differently grooved tape guiding rolls each mounted in bearings on the machine and adapted either one to engage with both sets of tape runs and control the lateral separation of the tapes, and supporting means for said rolls and said bearings whereby they may be moved to place either one in guiding control of said tape runs.

10. A tape condenser comprising a pair of dividing rolls, a first and a second pair of condensing aprons, a series of tape runs acting each to carry a separate sliver from the dividing rolls, means for guiding said tape runs into operative relationship only to said first pair of aprons to deliver each its sliver thereto, a second series of tape runs, members of which alternate with the members of said first series, also acting each to carry a separate sliver from said dividing rolls, means for guiding said second series of tape runs into operative relationship to said first pair of aprons, lateral positioning means to control the lateral relation of adjacent tape runs, and means for altering the path of said second series of tape runs to guide them either first into operative relationship to said second pair of aprons to deliver each its sliver thereto, or to place them out of operative relationship to said second pair of aprons to cause them to deliver each its sliver to said first pair of aprons while leaving said second pair of aprons undisturbed, said last named means comprising a guide roll engaging said second series of tape runs, said roll being adjustably mounted in the machine to advance or retract said tape runs with relation to said second pair of aprons and with relation to said lateral positioning means.

11. A tape condenser comprising a pair of dividing rolls, a first and second pair of condensing aprons, a series of tape runs acting each to carry a separate sliver from the dividing rolls and deliver said sliver to said first pair of aprons, a second series of tape runs, the members of which alternate with the members of said first series, acting each to carry a sliver from said dividing rolls and deliver it to said second pair of aprons, roller guiding means engaging adjacent tape runs of said two series and controlling their position to maintain them either in close lateral proximity or in substantial separation as desired, and means for altering the path of said second series of tape runs to cause them to deliver each its sliver to said first pair of aprons, said means comprising a guide roll engaging said second series of tape runs and movable to retract said tape runs with relation to said second pair of aprons and acting in retracting said tape runs to bind the latter more firmly against said roller guiding means.

HENRY H. KNIGHT.