Dec. 10, 1946. E. B. ROBINSON 2,412,357

DRAWING FRAME STRUCTURE

Filed Dec. 17, 1943 4 Sheets-Sheet 1

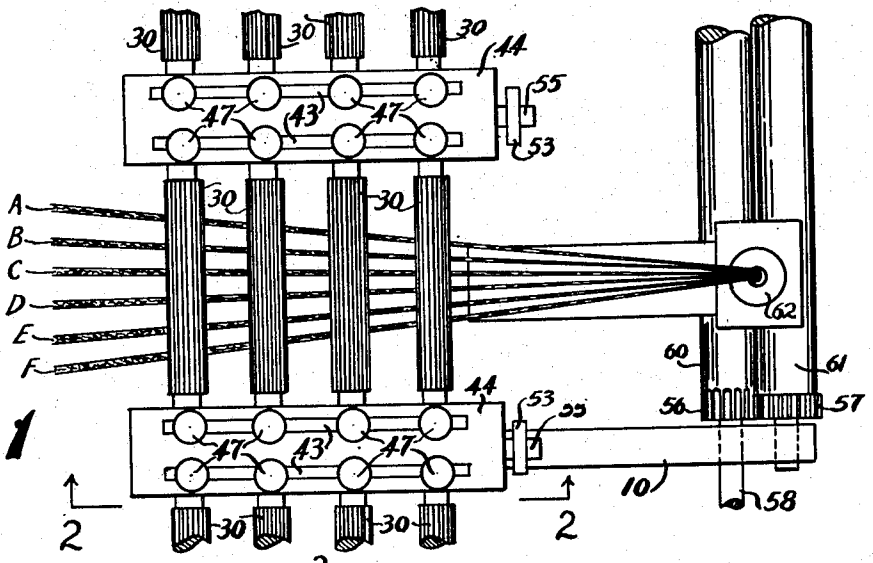


Fig-1

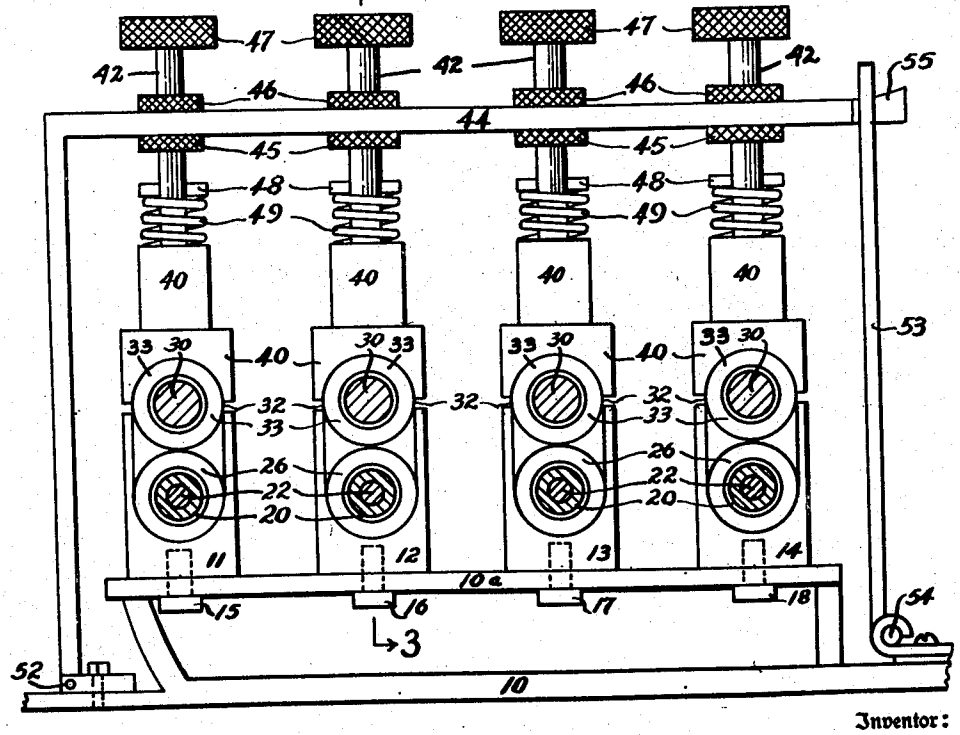


Fig-2

Inventor:

ELVIN B. ROBINSON

By

Attorney

Dec. 10, 1946. E. B. ROBINSON 2,412,357

DRAWING FRAME STRUCTURE

Filed Dec. 17, 1943 4 Sheets-Sheet 2

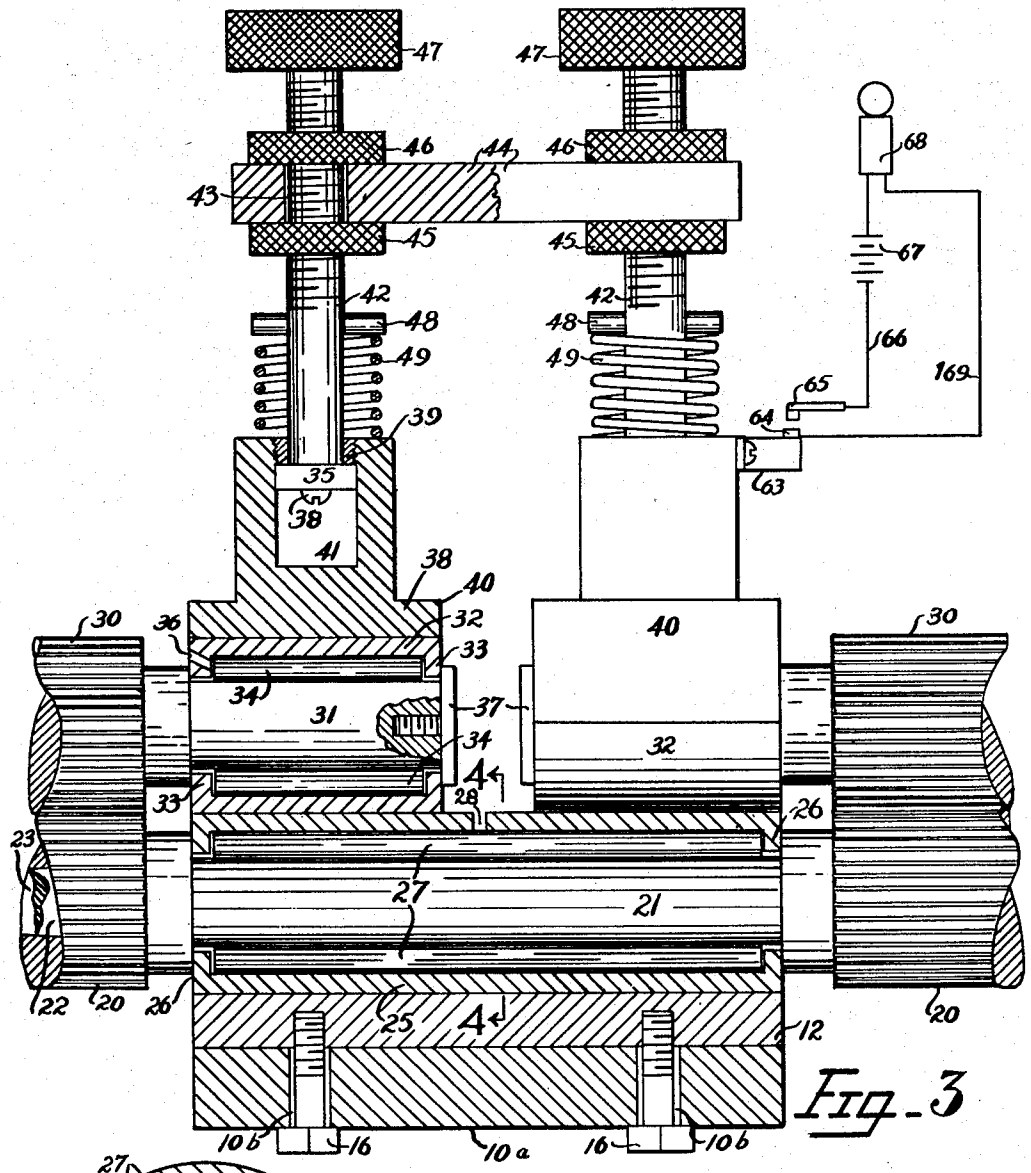


Fig. 3

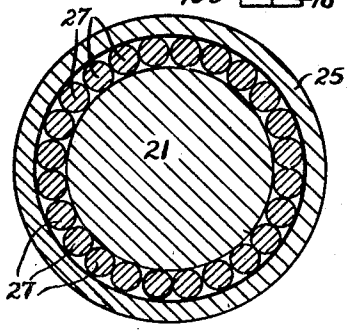


Fig. 4

Elvin B. Robinson
Inventor

By

Attorney

Dec. 10, 1946. E. B. ROBINSON 2,412,357

DRAWING FRAME STRUCTURE

Filed Dec. 17, 1943 4 Sheets-Sheet 3

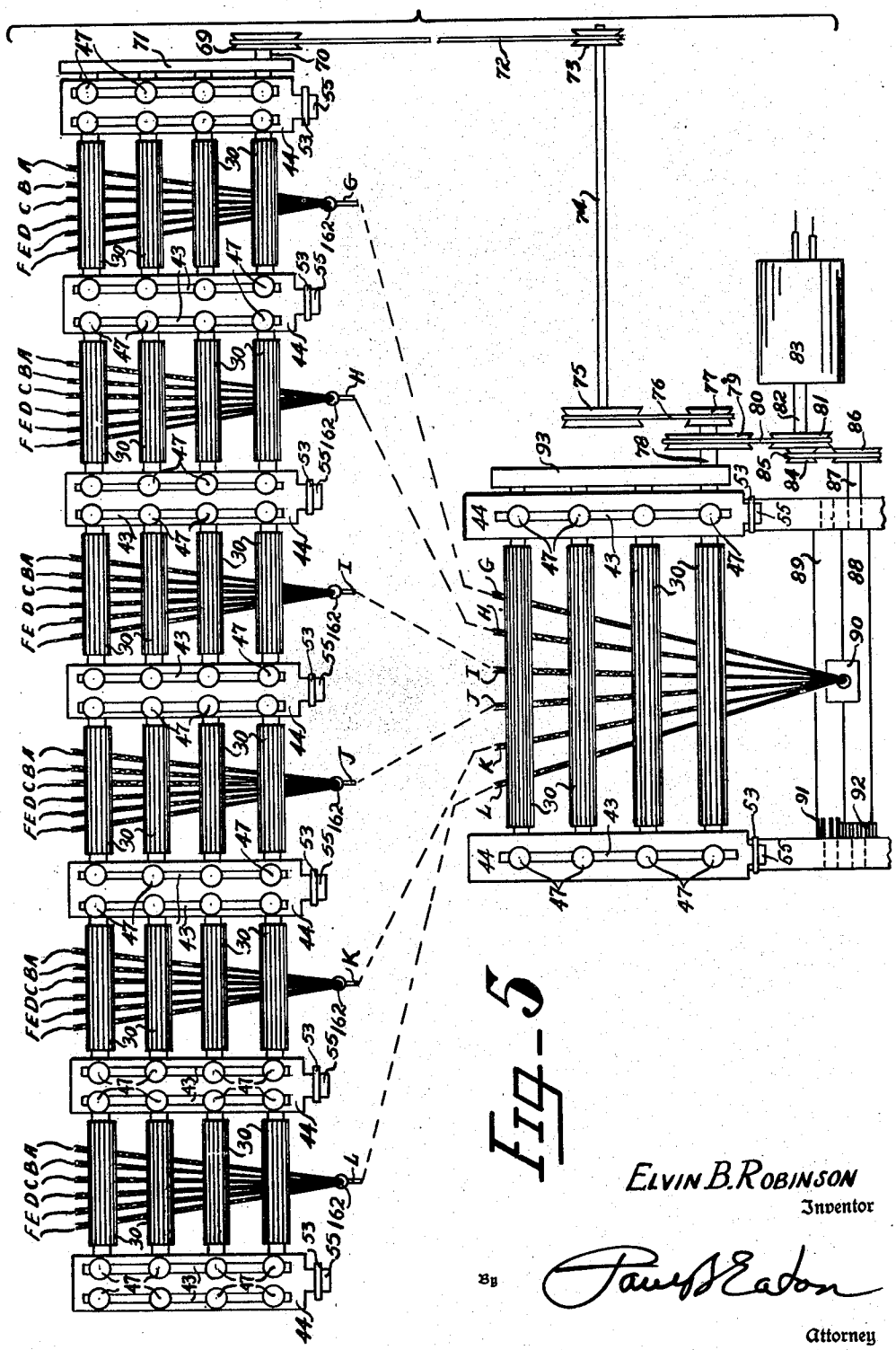


FIG-5

ELVIN B. ROBINSON
Inventor

By Paul J. Eaton

Attorney

Dec. 10, 1946. E. B. ROBINSON 2,412,357

DRAWING FRAME STRUCTURE

Filed Dec. 17, 1943 4 Sheets-Sheet 4

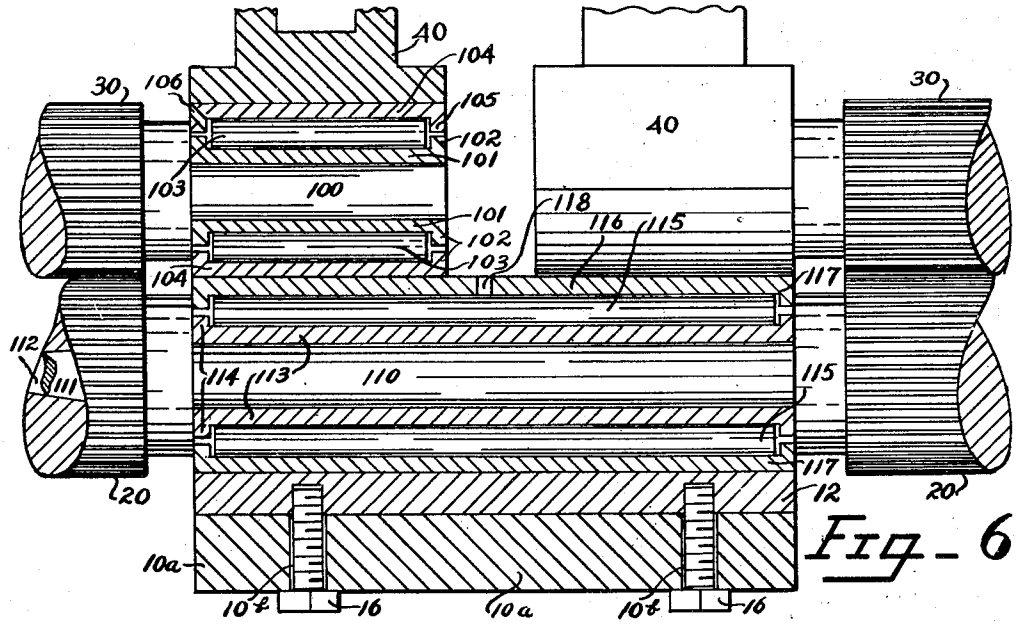


Fig. 6

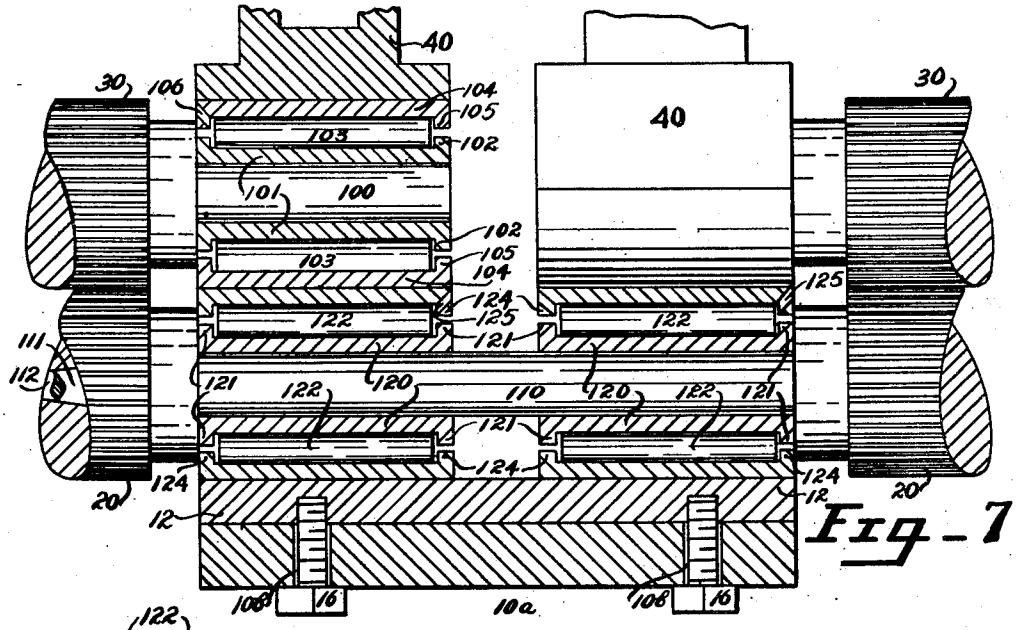


Fig. 7

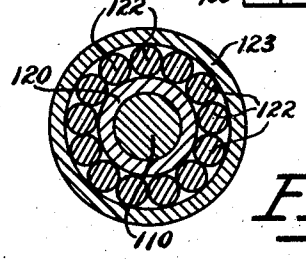


Fig. 8

ELVIN B. ROBINSON
Inventor

By Paul S. Eaton
Attorney

Patented Dec. 10, 1946

2,412,357

UNITED STATES PATENT OFFICE

2,412,357

DRAWING FRAME STRUCTURE

Elvin B. Robinson, Gastonia, N. C., assignor of one-third to Clarence J. Costner and one-third to Arnold W. Kincaid, both of Bessemer City, N. C.

Application December 17, 1943, Serial No. 514,605

4 Claims. (Cl. 19—130)

1

This invention relates to an improved type of drawing frame and more especially to an improved method for mounting the ends of the top rolls and for mounting the roller necks joining the sections of the bottom rolls together, so as to prevent undue wear of the bearings supporting the fluted rolls of the drawing frame, and thus providing a drawing frame which will turn out very much better work than a drawing frame equipped with the conventional type of bearings which wear out rather rapidly, and when so worn, results in imperfect work.

It is an object of this invention to provide an improved drawing frame having an improved type of bearing for the ends of the top rolls and an improved bearing for the roller necks joining the sections of the bottom rolls together, so as to provide bearings between the bottom and top rolls which are not subject to rapid wear such as the conventional type of rolls in drawing frames heretofore used.

It is another object of this invention to provide an improved type of drawing frame, wherein needle bearings are provided for the bearing portions of the fluted rolls, and also means are provided which are quickly detachable from the bearings of the top rolls to allow quick dismantling of the top rolls from their operating position when it is desired to do so.

It is another object of this invention to provide an improved type of drawing frame wherein a plurality of slivers are passed through a plurality of sections of a drawing frame simultaneously, and instead of being coiled into a can to be later fed through another drawing frame having fluted rollers thereon, the slivers after passing through the sections of the first drawing frame are led directly into a second drawing frame where a plurality of slivers emanating from the sections of the first drawing frame are passed through a section of another drawing frame, and joined into one sliver or roving, thus dispensing with the many operations heretofore required in transferring cans of slivers from one drawing frame to the intake end of another drawing frame.

A drawing frame is usually composed of four to six sections of top and bottom rolls, and they take the slivers from cans which have received the slivers from the card. Usually from four to six slivers are run through each of the four to six sections of the first drawing frame, and these are combined, and passed through a trumpet or coiling mechanism, and are deposited as a single sliver into cans. In the second operation, the slivers from four to six cans are passed through

2

a single section of a second drawing frame. The first drawing frame is called the breaker drawing, and the second step is the finished drawing. From the finished drawing frame the slivers are passed through slubbers. In fine work, after passing through the finished drawing frame, the slivers are passed through the slubbers, and deposited on bobbins, which slubbers can also be called a roving frame. These slivers are usually passed single through the slubber or roving frame. Then, if desired, they may be again passed through a second slubber or intermediate which is another drawing frame where they are deposited on bobbins again. In both of these last-named steps, there is some twisting imparted to the slivers as both of them employ a flyer. After these four steps, the product is passed over the spinning frame where it is twisted into a thread, and then it is usually passed through twisters for twisting a number of the threads together to make the finished yarn.

One important advantage of a needle or roller bearing is that the outer shell turns very little, if at all, and this prevents wear between the contacting surfaces of the outer shells, thus spacing the top and bottom rolls at a definite distance all the time; whereas, in the old type of drawing frames, there were bosses on both the top and bottom rolls contacting each other, and due to the fact that there is a lot of grit and other abrasive substances in cotton, this is deposited on these bosses, resulting in rapid wear, and also creating a considerable amount of friction. When these bosses become worn, it results in imperfect products by allowing the flutes of the two rolls to be too close together, and thus become too deeply enmeshed with each other, resulting in damage and often breaking of the fibers, and disrupting the whole purpose of drawing, which is the parallelization and attenuation of the fibers.

Due to the fact that in the old style drawing frames, there is considerable friction and drag, these drawing frames could not be speeded up in the same manner that a drawing frame with ball bearings, because in the old style frames, when they were attempted to be speeded up, a great amount of vibration occurs, due to friction and drag on the moving parts.

As above-stated, the bosses or collars on the bottom and top rolls which hold these rolls a definite distance apart, some become worn which requires that these bosses be ground away, and suitable collars of proper diameter be swaged thereon, so as to hold the top and bottom rolls

a proper distance apart, but, of course, these collars soon become worn, and due to the fact that for each set of bottom and top rolls, there are four collars, and since it is impossible to provide four collars which will present the same wearing qualities, these collars wear to different diameters, and thus result in improper driving of the top roll. In drawing frames, the top roll is driven by the bottom roll since the fibers passing between the top and bottom rolls presents the proper amount of friction, and this drives the top roll in timed relation to the bottom roll. In the old style drawing frame, due to the great amount of friction between the collars on the rolls, since the top rolls are under tremendous pressure by suitable weights or spring means, there results three driving points for each of the top rolls, namely, the driving by the flutes of the bottom roll engaging the slivers, and moving the slivers and top rolls along at the same speed as the bottom roll, and also each of the collars on the lower roll exert a driving effect on the collars on the top rolls, and it is evident that when these bosses or collars wear to different diameters, that probably one end of one of the top rolls will be driven at a greater rate than the other, or at a lesser rate that the other, depending upon the wear between the collars at the end of the rolls. This results in biting and cutting of the fibers, and affecting the staple length of the fibers by shortening the staples. It is evident that in a drawing frame equipped with anti-friction bearings, such as roller bearings or ball bearings, as shown in the drawings, the sole driving means for the top rolls is through the medium of the fibers passing between the top and bottom rolls. Since the ends of the rolls do not contact each other at all, but run free in their anti-friction bearings, because it is evident that a tremendous pressure which was formerly exerted on the collar is now exerted on the shells **32** and **25**, thus making it impossible for any driving action to be imparted to the ends of the top rolls.

Another important advantage of the structure shown in the drawings is that in the old type drawing frame, the tremendous pressure exerted on the ends of the top rolls was transmitted through the collars directly to the roller necks of the bottom rolls, and the bearings in the roll stands supporting the roller necks. This meant that the bottom rolls had tremendous pressure exerted on their bearing points, namely the roller necks where the roller necks contacted the bearings, this resulting in rapid wear of the bearings for the roller necks, and also requiring a greatly increased amount of power to drive the drawing frame, since the roller necks were pressed against their bearings with tremendous pressure exerted on the top rolls. By means of the anti-friction bearings on the top and bottom rolls, it is evident that both top and bottom rolls rotate freely in their bearings without this tremendous pressure heretofore exerted on the old type frames on the bottom roll bearings.

Another important advantage of the construction shown in the drawings is that the rapid wear heretofore present in the old style drawing frames is eliminated since abrasive substances cannot enter the anti-friction bearings.

Some of the objects of the invention having been stated, other objects will appear as the description proceeds, when taken in connection with the accompanying drawings, in which—

Figure 1 is a top plan view of one section of a drawing frame constructed in accordance with my invention;

Figure 2 is an elevation of the right-hand end of the lower portion of Figure 1, and being shown partly in section, and being along the line 2—2 in Figure 1;

Figure 3 is a view partly in elevation and partly in vertical section and taken along the line 3—3 in Figure 2;

Figure 4 is a vertical sectional view through one of the needle bearings, and being taken substantially along the line 4—4 in Figure 3;

Figure 5 is a top plan view, partly schematic, of an improved system of handling slivers by passing them from one frame to another frame without the intermediate step of coiling into a can;

Figure 6 is a view similar to Figure 3 showing another embodiment of the invention;

Figure 7 is a view similar to Figure 6 showing the bottom bearing as two separate bearings;

Figure 8 is a vertical sectional view through the lower bearings in Figures 6 and 7.

Referring more specifically to the drawings, the numeral **10** indicates a drawing frame roll stand having a plurality of bearings **11**, **12**, **13**, and **14**, which bearings are held in place and in adjusted relation along slots **10***b* extending from near one end to the other of the upper portion **10***a* of the roll stand **10** by means of bolts **15**, **16**, **17**, and **18**. The lower rolls **20** of the drawing frame are joined together by a suitable roller neck **21** which usually has tapered ends **22** fitting into tapered cavities **23** and locked in position by any suitable means. Surrounding the roller neck **21** is a needle bearing comprising a shell **25** having downturned ends **26** which loosely confine a plurality of pins or rollers **27**, and an oil hole **28** is provided, by means of which lubricant can be introduced into the interior of the bearing shell **25**.

The top fluted rolls **30** have a bearing portion **31** which is usually integral with the rolls **30**, and a needle bearing shell **32** surrounds this bearing portion **31** in spaced relation thereto, and has downturned ends **33** which loosely confine a plurality of rollers **34** to provide a needle bearing around the bearing portion **31**. A suitable lubricating hole **36** is provided in one of the downturned flanged portions **33** for the introduction of lubricant to the interior of the needle bearing shell **32**. A large headed screw **37** is threadably embedded in the outer end of the bearing portion **31** for loosely confining the shell **32** on the end of the roller bearing portion **31** of top roll **30**. The needle bearing shells **32** and **25** provide bearing surfaces of predetermined diameter to hold the rolls **20** and **30** in proper spaced relation, because heretofore instead of these needle bearings, there were provided enlargements on the rolls which held the rolls a definite distance apart from each other, and allowed the flutes thereon to properly engage each other the desired amount, and when these enlargements became worn, which they did quite frequently, the fluted rollers **20** and **30** would be allowed to ride too close together, thus damaging the slivers and producing imperfect work. By having the needle bearings on the top and bottom rolls, this excessive wear is eliminated, and more perfect work is the result. Also much greater speed is obtained.

The top rolls are held in proper position by means of a bearing block **40** having a well **41** therein adapted to slidably receive a rod **42** which is adjustably secured along a slot **43** in a bar **44**, by means of the rod **42** being threaded and

having knurled nuts 45 and 46 threadably secured thereon, and said rods at their upper ends having a knurled portion 47 so that the rod or bolt or screw 42 can be held while it is being adjusted vertically. The rod or screw 42 is penetrated by a pin 48 and between pin 48 and the upper surface of the bearing member 40, there is disposed a compression spring 49 for urging the bearing member 40 downwardly against the bearing sleeve 32. The lower end of screw 42 has a plate 35 secured thereon by means of a screw 38, and a sleeve 39 loosely mounted around screw 42 is threadably secured in the upper end of cavity 41 to prevent separation of screw 42 and bearing member 40 except when the sleeve 39 is removed. The member 44 is pivoted as at 52 to the portion 10 of the roll stand, and is L-shaped and its forward free end is held in the position shown by means of a link 53 pivoted as at 54 to the roll stand 10, and having a slot in its upper end adapted to fit over the free end of the member 44. It will be noted that member 44 has an upwardly sloping surface 55 which prevents the link 53 from jarring off the end of member 44, but when it is desired to release pressure on all of the top rolls, the member 44 can be pressed downwardly at its free end to allow the link 53 to be released and after which the entire member 44 can be pivoted as at 52 to remove the entire assembly 40 to 49 inclusive from engagement with the sleeve bearings 32.

The roll stands 10 project outwardly, and have mounted therein a pair of rollers 60 and 61 with a suitable trumpet 62 through which the slivers are coiled after being attenuated by passing through the drawing frame section. The slivers are indicated by reference characters A, B, C, D, E, and F. The rollers 60 and 61 have their contacting surfaces driven in the same direction by means of the driven roller 60 having cavities 56 which are engaged by the teeth of pinion 57 on roller 61, the power to these rollers being transmitted through a driven shaft 58.

It sometimes happens that the top rolls lap up, that is, the fibers adhere to the flutes instead of the fibers being passed on through between the bottom and top rolls. A portion at least of the slivers wind up around a top roll which means that the machine must be stopped, and this lap up removed. I have provided suitable stop motion or alarm means shown schematically in Figure 3 as being associated with each of the bearing members 40, and although I have shown it in association with only one bearing member, it is evident that each bearing member 40 in the machine would be connected up in parallel in a stop motion or alarm system. This stop motion or alarm system comprises an insulation block 63 secured to each bearing block and having a contact point 64 thereon. Suitably secured in fixed or resilient position above the contact point 64 is a contact point 65 from which a wire 66 leads to a source of electrical energy 67, and then to a buzzer 68, and this buzzer 68 could be a suitable stop motion mechanism. From the buzzer or stop motion mechanism 68, a wire 169 leads back to contact point 64. It is thus seen that when a lap up occurs, the bearing 40 will be raised, which will elevate contact point 64 into engagement with contact point 65 which will stop the machine, or give a suitable alarm.

As is well known in the art, the bottom rolls of a drawing frame are driven by any suitable means such as power being applied through a shaft 70 into a housing 71 which drives various rollers at different speeds, the back roller being driven at a given speed, and the next to the back roller has a greater speed, and the next to the front roller has still a greater speed, and the front roller has the greatest speed which results in a gradual attenuation of the fibers. Figure 5 shows in plan and partially schematically how the single slivers resulting from a combined drawing of slivers A to F inclusive are combined into single slivers such as G, H, I, J, K, and L. Heretofore, these slivers have been deposited into suitable containers, and these containers are then moved to the intake end of another drawing frame where they are introduced into the rear roller of such drawing frame. In Figure 5, I show a section of six sets of top and bottom rollers of a drawing frame in combination with an additional set of rollers forming a second drawing frame. The shaft 70 has a pulley 69 mounted thereon which is connected by any suitable means such as belt 72 to a pulley 73 disposed on a shaft 74 which has a pulley 75 thereon on which a belt 76 is mounted which leads to a pulley 77 mounted on shaft 78, and shaft 78 has another pulley 79 with a belt 80 thereon, which belt is also mounted on a pulley 81 on motor shaft 82 extending from motor 83. The shaft 82 also has a pulley 84 thereon on which a belt 85 is mounted, which belt also is mounted on a pulley 86 disposed on a shaft 87 which drives a pair of rollers 88 and 89 for coiling the slivers G to L inclusive through a trumpet 90 and depositing the sliver passing through the trumpet 90 into a suitable container, not shown. The contacting surfaces of rollers 88 and 89 are driven in the same direction by means of a gear 92 on roller 88 meshing with cavities 91 in the end of the roller 89. The shaft 78 leads into a suitable gear housing 93 which drives the rollers in the same manner as previously described, and the same reference characters will apply to these rollers as to the rollers previously described, and the structure is approximately the same.

It is thus seen that six sets of six slivers each are incorporated into six slivers, and these slivers instead of being deposited in cans, and then transferred manually and fed into another drawing frame, are led directly from the first drawing frame to a second drawing frame, thus resulting in a single sliver or roving resulting from thirty-six slivers in the original drawing frame without the necessity of manual transfer, and thus greatly speeding up operation.

It is also seen that very much greater speed can be obtained on account of the roller bearings, as friction is reduced to thus eliminate vibration at high speeds. It has long been recognized that the slow speed at which the slivers are passed through a drawing frame was unnecessary as far as the drawing process is concerned, but such slow speed resulted from the fact that on account of the great amount of friction in the bearings of the drawing rolls vibration set in and interfered with proper drawing of the slivers. By a mechanism as shown and described, the speed at which the slivers can be passed through the drawing frames can be very greatly increased, thus resulting in a large increase in output from a given number of machines.

In employing the method and apparatus as shown in Figure 5, instead of having a trumpet 62 and rollers 60 and 61, the slivers are guided through a suitable eye 162 and then by means of suitable troughs, not shown, to back rollers 30 of the second drawing frame.

In Figures 6, 7, and 8, there is shown a type of bearing for the lower rolls and for the ends of the top rolls similar to the structure shown in Figures 3 and 4 except that the bearings have inner races as well as outer races. In these figures, the same reference characters 20 indicate the lower rolls, 30 the top rolls, 40 the bearings pressing down on the top rolls, portion 10a of the roll stand, bearing 12, slots 10b, and bolts 16 which have been previously described. In Figures 6, 7, and 8, the bearings are shown as having inner and outer races, so that they can be attached by swaging or otherwise affixing the inner race onto the roll. The top rolls 30 have a roller neck 100 onto which an inner race 101 is fixedly secured by any suitable means such as swaging, and this inner race has upturned flanges 102 at each end for confining rollers 103. Rotatably mounted over the rollers 103 is an outer race 104 having inwardly turned flanges 105 at its ends for assisting in the confining of the rollers 103. A suitable oil hole 106 is provided for introducing lubricant into the space between the inner and outer races. In Figure 6, I show an elongated bearing for the roller neck 110 joining the ends of the lower rolls 20 together. This roller neck has tapered portions 111 fitting into tapered cavities 112 in the proximate ends of the lower rolls 20 which are suitably confined such as by keys, not shown, so that power delivered to one end of the bottom rolls will rotate all sections of the bottom rolls. Fixedly secured on the roller neck 110 by swaging or otherwise, is an inner race 113 having outwardly projecting circular flanges 114 for assisting in confining rollers 115. Loosely mounted around the rollers 115 is an outer race 116 having inwardly turned ends 117 for assisting the outwardly turned ends 114 of the inner race in loosely confining the rollers 115. The outer race 117 rests in a rotatable manner in one of the semi-circular bearings 11 to 14 inclusive on the portion 10a of the roll stand. Outer race 116 has an oil hole 118 for introducing lubricant into the space between the inner and outer races.

In Figure 7, the bearings for the ends of the top rolls are identical to the bearings for the ends of the top rolls shown in Figure 6, and like reference characters will apply, and the roller necks 110 are identical as well as the tapered ends 111 going into cavities 112 in the lower rolls 20; however, in Figure 7 instead of having an elongated anti-friction bearing for the entire roller neck 110, I provide a separate bearing at each end of the roller neck which is identical to the bearing disposed on the ends of the upper rolls 30. Each of these bearings on the roller neck 110 comprises an inner race 120 having outturned flanges 121 on each end thereof for loosely confining rollers 122, and loosely fitting around rollers 122 is an outer race having inturned end flanges 124 for assisting the flange 121 in loosely confining the rollers 122. One flange 124 has an oil hole 125 for introduction of lubricant to the space between the inner and outer races.

It is thus seen that in the form of the invention shown in Figures 6, 7, and 8, the tremendous downward pressure exerted by upper bearings 40 is applied to the outer race 104 on the end of the top rolls, which pressure is transmitted directly to the outer race 116 in Figure 6, and the outer races having inturned flanges 124 in Figure 7, which pressure is transmitted directly to the roll stand bearings 11 to 14 inclusive. This means that in all probability, the said outer races will not rotate at all, and consequently, no wear will be present in the bearings 40 and 11 to 14 inclusive. Also, it is evident that the tremendous pressure exerted by upper bearings 40 will not be exerted on the necks 100 and 110, because the outer races will not change their shape under pressure, and therefore, the top and bottom rolls will run freely without having to carry this pressure load.

In the drawings and specification, there has been set forth a preferred embodiment of the invention, and although specific terms are employed, they are used in a generic and descriptive sense only and not for purposes of limitation, the scope of the invention being defined in the claims.

I claim:

1. In a drawing frame having top and bottom rolls, roller necks joining the bottom rolls in an end to end relation, anti-friction bearings disposed around the roller necks and a plurality of adjustable bearing members in which the outer peripheries of the anti-friction bearings rest, the top rolls having anti-friction bearings mounted on their outer ends, downwardly urged means for engaging and applying pressure on the upper portions of the anti-friction bearings on the ends of the top rolls to hold the periphery of the anti-friction bearings on the roller necks and those on the ends of the top rolls in contact with each other, the diameters of the anti-friction bearings being such as to hold the top and bottom rolls in a definite interengaging relation to each other, and to serve as spacing bosses for the top and bottom rolls, the downwardly urged means also preventing the rotation of the anti-friction bearings relative to each other.

2. In a drawing frame having top and bottom rolls, roller necks joining the bottom rolls in an end to end relation, anti-friction bearings disposed around the roller necks and a plurality of adjustable bearing members in which the outer peripheries of the anti-friction bearings rest, the top rolls having anti-friction bearings mounted on their outer ends, downwardly urged means for engaging the upper portions of the anti-friction bearings on the ends of the top rolls to hold the periphery of the anti-friction bearings on the roller necks and those in the ends of the top rolls in contact with each other, common means for mounting all of the downwardly urged means, and detachable means for holding the downwardly urged means in contact position with the anti-friction bearings on the ends of the top rolls, the common means for holding the downwardly urged means in contact with the anti-friction bearings on the ends of the top rolls being pivotally mounted at one side of the frame and the detachable means engaging the other end of the pivoted member being located at the other side of the frame, so that when the free end of the said common means is detached, all of the downwardly urged means can be swung as a unit from out of contact with the anti-friction bearings on the ends of the top rolls, the bearings on the top and bottom rolls serving as spacing bosses for the top and bottom rolls.

3. In a drawing frame having top and bottom rolls, between which slivers are passed in a drawing operation, the bottom rolls being joined together in end to end relation by a roller neck, which roller neck is adapted to rotate in a suitable bearing, the ends of the top rolls having

anti-friction bearings thereon, comprising inner and outer races with rotatable bearing members disposed between the inner and outer races, the roller neck having thereon an anti-friction bearing having inner and outer races, rollers loosely confined between the last-named inner and outer races, the bearings on the roller neck and on the ends of the top rolls serving as spacing bosses for the top and bottom rolls, pressure applying means adapted to engage the upper portion of the outer race on the outer ends of the top rolls and the outer race on the roller neck being adapted to fit into a suitable bearing in a drawing frame roll stand, the outer race on the end of a top roll being adapted to fit directly onto the uppermost portion of the outer race on the roller neck whereby downward pressure applied onto the outer races on the ends of the top rolls will be transmitted directly to the outer race of the bearing disposed on the roller neck.

4. In a drawing frame having top and bottom rolls, the bottom rolls being joined together by a roller neck, anti-friction bearings disposed on the roller neck and adapted to rest in a suitable bearing in a roll stand, anti-friction bearings disposed on the ends of the top rolls, and being adapted to rest on the top of the anti-friction bearing on the roller neck, and pressure applying means for applying downward pressure onto the anti-friction bearings disposed on the ends of the top rolls to hold the bearings on the ends of the top rolls in intimate contact with the bearings disposed on the roller neck, the anti-friction bearings on the roller neck and on the ends of the top rolls serving as spacing bosses for the top and bottom rolls.

ELVIN B. ROBINSON.