Feb. 26, 1924. 1,484,724

W. F. LENT

PROCESS OF AND APPARATUS FOR SPINNING

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Fig. 1.

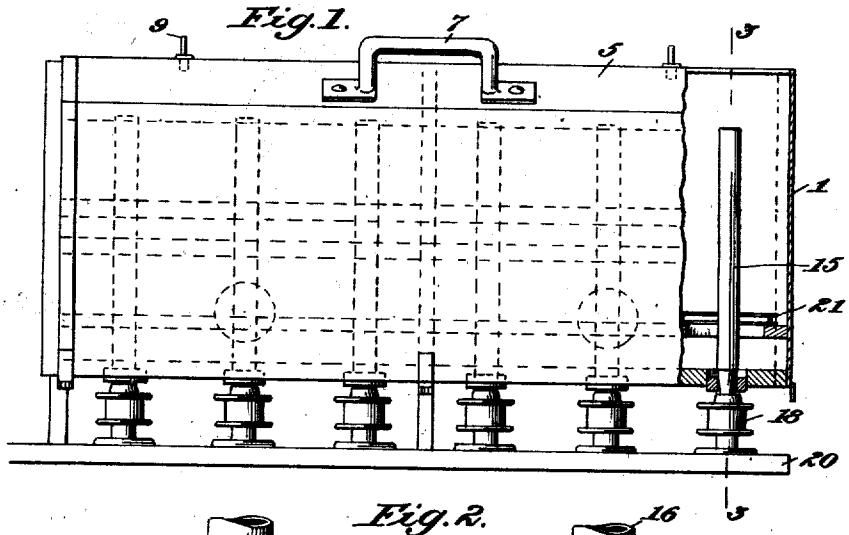


Fig. 2.

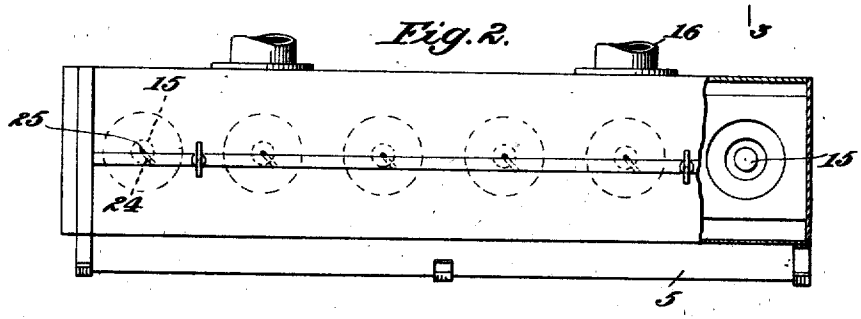
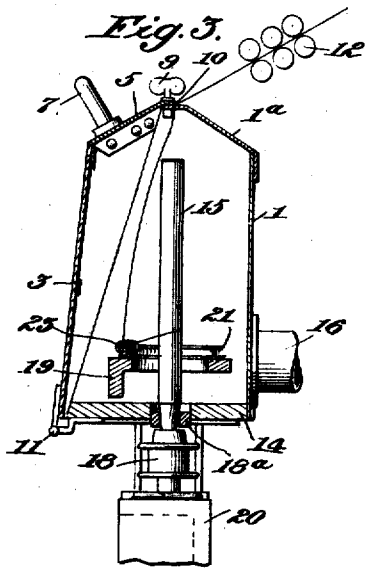


Fig. 3.



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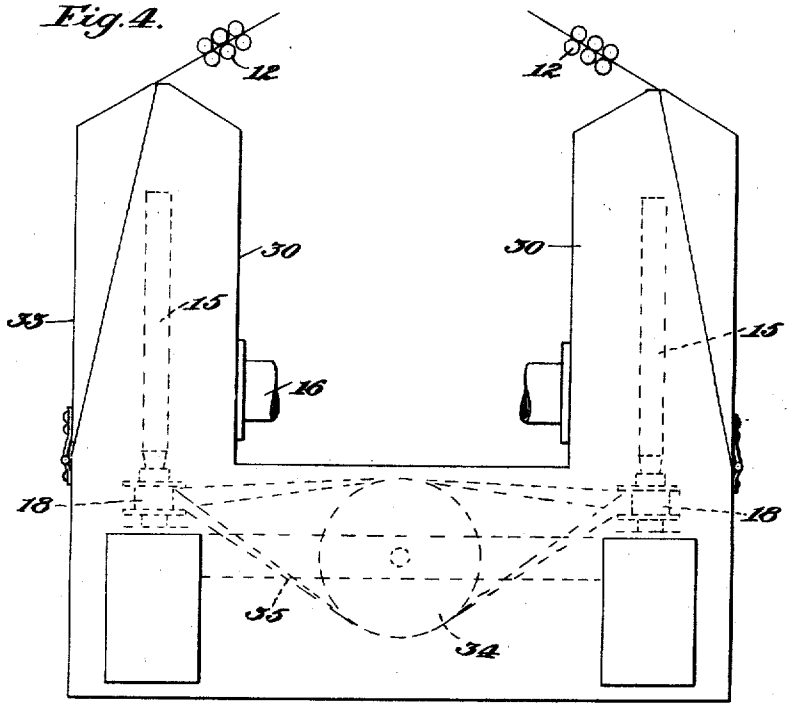
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PROCESS OF AND APPARATUS FOR SPINNING

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Fig. 4.



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PROCESS OF AND APPARATUS FOR SPINNING

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Fig. 5.

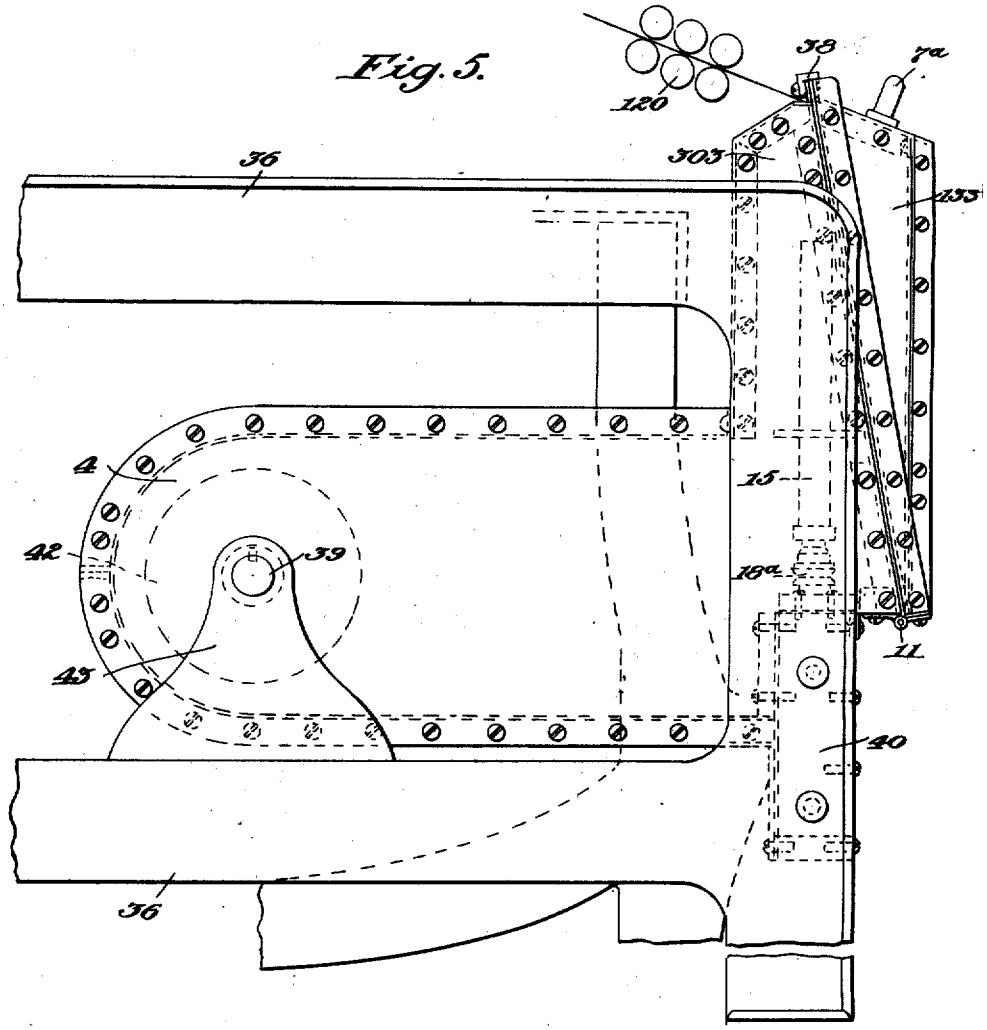
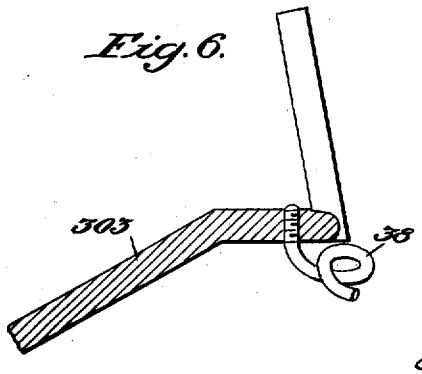


Fig. 6.



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Feb. 26, 1924. 1,484,724

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PROCESS OF AND APPARATUS FOR SPINNING

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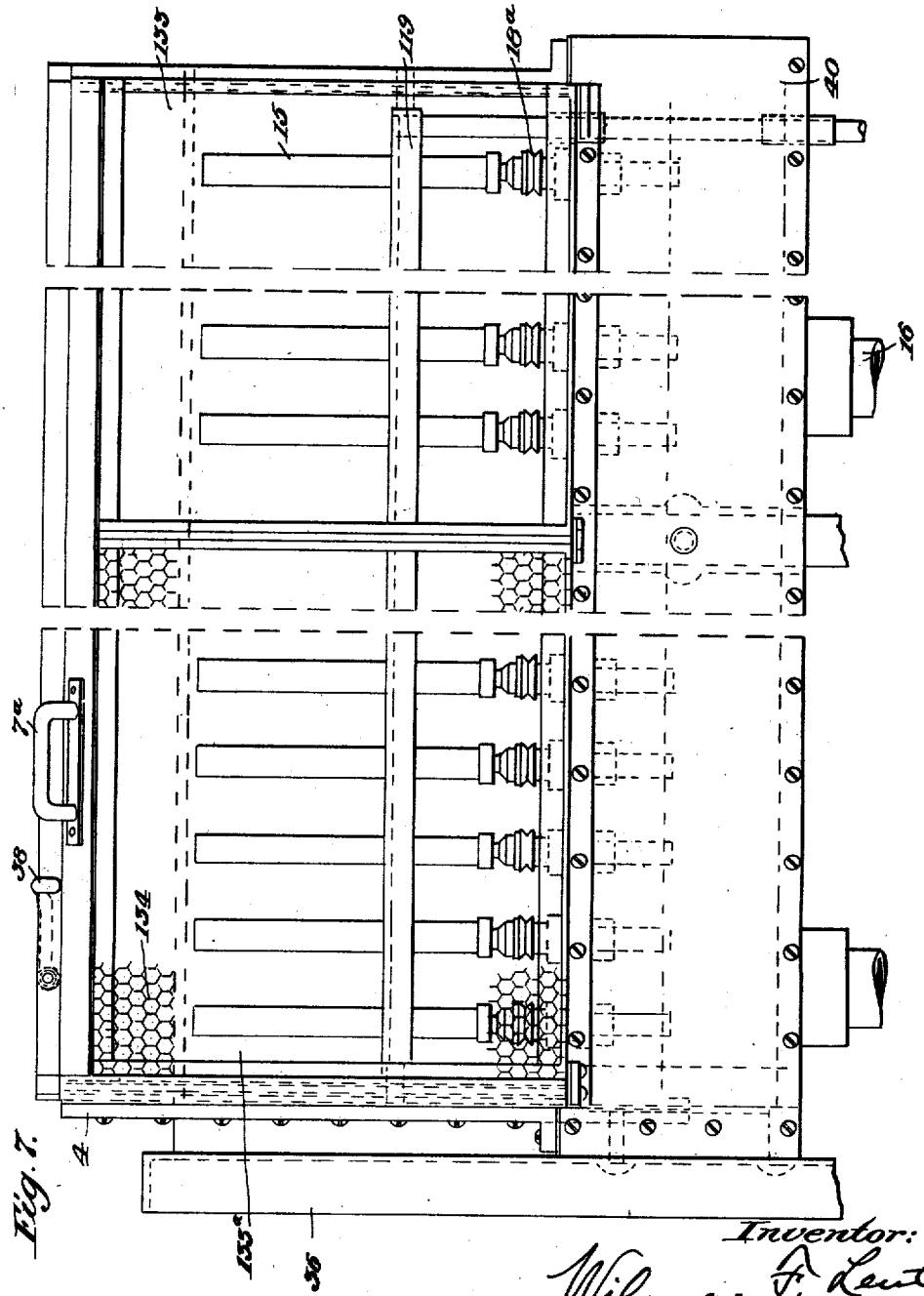


Fig. 7.

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Patented Feb. 26, 1924. 1,484,724

UNITED STATES PATENT OFFICE.

WILMAR F. LENT, OF NEW HAVEN, CONNECTICUT, ASSIGNOR TO THE GREIST MANUFACTURING COMPANY, OF NEW HAVEN, CONNECTICUT, A CORPORATION OF CONNECTICUT.

PROCESS OF AND APPARATUS FOR SPINNING.

Application filed October 28, 1920. Serial No. 420,121,

To all whom it may concern:

Be it known that I, WILMAR F. LENT, a citizen of the United States of America, residing at New Haven, in the county of New Haven and State of Connecticut, have invented a certain new and useful Improvement in Processes of and Apparatus for Spinning, of which the following is a full, clear, and exact description.

This invention relates to the art of spinning, and more particularly to a process of and apparatus for spinning which results in such reduction of air friction on the traveler and yarn as to increase materially the spindle speed, and improve the quality of the yarn, thereby resulting in an increase of production.

In the art of spinning it is well known that the speed of operation is retarded materially by the friction between the ring and traveler, and that the less friction produced between these parts the greater the speed obtainable. It has been an object of all mill operators to run the spindle at as high a speed as possible as production depends directly upon this speed. From all the data which appears to be obtainable on this subject, at the present time, it appears that the highest limit of speed so far obtainable is from 8,000 to 10,000 R. P. M. At higher speeds, with the same weight of traveler, the tension on the yarn becomes so great as to cause excessive breakage. This tension is due to friction as well as to centrifugal force. With a given weight of traveler the centrifugal force and ring friction are constant at a given speed; however, the total friction is composed of ring friction and of air friction—not only air friction on the traveler itself, but also on the yarn which rotates in the air. This air friction is known to constitute a very important item, as the traveler velocity and the circular velocity of the yarn as it moves about the spindle is in the neighborhood of a mile a minute.

The principal objects of this invention are to remove or decrease materially the effect of air friction due to the rapid movements of the traveler and yarn about the spindle, and improve the quality of the yarn, and I accomplish these important results by running the traveler and yarn in a vacuum, or a partial vacuum, which may be established by suitable means within a casing which surrounds the spindle, including the traveler and the rotating yarn which is being spun. While I have shown the invention as applied to ring and traveller spinning, it may also be applied to mule and cap spinning. By this expedient I have been able to attain a great increase of spindle speed, with the resultant augmentation of production.

The invention, in its broadest aspect, accordingly, consists in providing by any suitable apparatus an enclosure for the spinning instrumentalities, whether they are those employed in mule or cap spinning, or the spindle traveler and rotating yarn as it is being spun and laid upon the spindle in ring and traveller spinning, and the production of a rarefication of the atmosphere surrounding these parts, whereby the friction engendered by their high speed of movement is reduced materially.

Under the embodiment of the broad invention as above described, a suitable form of apparatus may comprise an enclosure surrounding the spindle just above the driving belt, and enclosing the spinning ring, traveller, and yarn as the latter is being laid about the spindle during the spinning operation. The spindle may pass through a hole in the box or enclosure, the fit between these parts being sufficiently snug to avoid any direct contact between the spindle and enclosure, so that very little air leakage will occur. The enclosure may be provided with a glass-faced door which may be swung open for removing the bobbins and for piecing up the ends, and the yarn will enter the enclosure through a small aperture at the top.

Another suitable form of apparatus may comprise an enclosure for the spindle which includes its base portion and driving pulley, and also encloses the driving belt and main power pulley of the spinning frame.

Other suitable forms of apparatus may be devised, as will be found to be most expedient for carrying into effect the prin-

ciples of the process, which is not limited to any special apparatus, but may be embodied in numerous and varied constructions.

Referring to the accompanying drawings:

Figure 1 represents in side elevation, partly sectional, a spinning frame having a single row of spindles, together with enclosing means therefor;

Figure 2 is a plan view;

Figure 3 is a sectional view on the line 3—3, Figure 1;

Figure 4 is a diagrammatic representation of a spinning frame including two rows of spindles, driving means for the spindles and a modified construction of enclosure;

Figure 5 is an end elevation of another modification of the frame and enclosure for the spinning devices;

Figure 6 is an enlarged, sectional detail view;

Figure 7 is a front elevation of the apparatus shown in Figure 5.

Referring first to Figures 1, 2 and 3, the base 20 supports a plurality of spindles 15, provided with pulleys 18 which are driven, through a belt, from a main driving pulley, as is usual. The ring rail is indicated at 19, and supports spinning rings 21, of any suitable design. The spindles, ring rails, rings, travelers, and yarn are all within a suitable enclosure 1, which is herein shown as having an upper inclined portion 1^a, and on the front side a door 3, secured to the base 14 of the enclosure by suitable hinges 11. The top portion 5 of the door is also inclined, and is provided with a flange 10 which overlaps a portion of the inclined rear top 1^a of the enclosure. The inclined front portion of the door has a handle 7, whereby the door may be swung open for the purpose of inspection or for piecing up the yarn. The yarn passes through the usual draft rolls 12, and thence through apertures 25 which are at the inward termination of inclined slits 24 formed in the horizontal portion at the top 1^a of the enclosure 1. When the door is closed the yarn passes through these small apertures 25 which are of just sufficient size to permit the yarn to run freely, but are not large enough to permit much air to enter the enclosure. One or more conduits 16 communicate at the rear, or at any other suitable point leading into the interior of the enclosure 1, such conduits having connection with suitable suction apparatus, as an air pump, in order to maintain the air within the enclosure in a rarefied condition which may be either a substantially perfect vacuum, or a partial vacuum. In any event such rarefication of the air within the enclosure so reduces the air friction produced by the rapid movements of the traveler and yarn rotating about the spindles, as to permit a highly increased running speed of these parts, with the resultant improvement in the quality of the yarn, and increased production.

The spindles 15 are shown as passing through rings 18^a located in openings in the base 14 of the enclosure and the apertures in these rings through which the spindles pass are not sufficiently large to permit the introduction of any considerable amount of air. A suitable suction apparatus which will be maintained in operation during the spinning will readily remove the air which enters the apertures 25, and space between the base portion of the spindles and the rings 18, so as to maintain the air in a sufficiently rarefied condition within the enclosure.

Referring to Figure 4, in this modification of the apparatus it will be seen that the box or casing 30 encloses two rows of spindles in a spinning frame, and also the base portion and pulleys carried by said spindles, the driving pulley 34, and the belts 35 extending from the latter to the pulleys 18. This dispenses with any joint between the lower part of the spindles and the base of the enclosure, as shown in the construction illustrated in Figures 1, 2 and 3. In the apparatus shown in Figure 4, there is also employed the usual draft rolls 12, and the front portions of the casing 30 enclosing the spindles 15 are provided with doors 33, which may and preferably will be of the same or a similar construction to the door shown and described in Figures 1, 2 and 3. These doors are usually provided with glass fronts which permit inspection of the spindles at all times by the operatives and the piecing up of the yarn may be readily accomplished by opening the doors when desired.

In the construction illustrated in Figures 5, 6 and 7, a metal frame 36 carries and suitably supports the enclosure 303 to the front portion of which is hinged the door 133 by hinges 11. Said door is provided with a handle 7^a, and a swinging latch 38 may be moved into position to engage the upper edge of the door and hold it tightly closed against the casing or enclosure 33, a suitable gasket or packing ring being placed between the edges of the casing and door in order to make a hermetically sealed joint. The spindles 15 are suitably supported within the enclosure 303, said spindles having pulleys 18^a which are belt driven from a driving pulley 42 mounted on a shaft 39 which is enclosed in a casing 4, supported by the frame 36. The shaft 39 runs in bearings carried by suitable brackets 43, which rest upon the main frame 36 and stuffing boxes are provided where the shaft passes through the casing. The front portion 134 of the door 133 is composed, as herein shown, of wire glass, or any other suitable trans-

parent material. With this construction suitable trusses or braces may be employed for strengthening the enclosure 303 so as to resist the external atmospheric pressure when a partial vacuum is established by a suitable suction or vacuum apparatus which may be connected with one or more of the conduits 16 leading to the interior of the enclosure 303. The external atmospheric pressure tends to keep the door 133 closed and the latch 38 merely insures such closure but has very little, if any, effect upon maintaining a tight joint between the door and casing 303, as this is accomplished mainly by the rubber gasket between the door and the enclosure. In this apparatus, as will be seen from Figure 7, the usual ring rail 119 is supported by lifter rods, passing through stuffing boxes, and reciprocated by appropriate mechanism. The enclosure is provided at the top portion with apertures to receive the yarn, similar to those illustrated in Figure 2, and additionally a pigtail 38, constructed to act as a kink-catcher, and operating to prevent a break down of the yarn on one spindle to cause further breakages on adjacent spindles, as illustrated in Figure 6, may be located within the top of the enclosure to receive each yarn as it is fed from the draw rolls to the bobbins.

One of the chief advantages of spinning in a vacuum is that the strength of the yarn is increased, as compared with that of the yarn which is spun under conditions of ordinary atmospheric pressure. This is believed to be due to the fact that when spun in a vacuum the fibers of the yarn are made to lie together more compactly, and do not fray out in the usual manner, that is, when spinning is being done under ordinary atmospheric pressure.

What is claimed is:

1. That improvement in the art of spinning which consists in enclosing the traveler, yarn and spindle of a spinning frame in a suitable casing, and reducing below normal the pressure of the air surrounding said parts to thereby reduce the air friction of said parts during the spinning operation.

2. That improvement in the art of spinning which consists in enclosing the traveler, yarn and spindle of a spinning frame in a suitable casing, establishing a rarefied atmospheric condition surrounding these parts which reduce the air friction of said parts while they are running, and then operating the spindle to spin the yarn while said yarn is being fed to the traveler.

3. That improvement in the art of spinning which consists in enclosing a ring, traveler, and the yarn to be spun in a suitable casing and rarefying the air in said casing surrounding said parts.

4. That improvement in the art of spinning which consists in enclosing the ring, traveler, spindle, and yarn to be spun in a suitable casing rotating the spindle at a suitable speed, effecting a rarefication of the air within the enclosure, and thereafter increasing the speed of the spindle.

5. That improvement in the art of spinning which consists in enclosing the ring, traveler, yarn, spindle and its pulley in a suitable box or casing, withdrawing the air from said casing, and rotating said spindle in the usual manner to perform the spinning operation.

6. In an apparatus of the class described, the combination of a spindle, spinning ring and traveler, of an enclosure for said parts constructed to have a substantially air-tight fit about the spindle, an aperture for feeding yarn to said enclosure, and means for exhausting air from within the enclosure.

7. In an apparatus of the class described, the combination with a spindle, ring and traveler, of an enclosure for said parts, a door movably connected with said enclosure, apertures between said door and enclosure for permitting the yarn to be fed to the spindle, and means for exhausting the air from within the enclosure.

8. In an apparatus of the class described, the combination with a spinning frame including a plurality of rows of spindles, having suitable pulleys thereon, a main driving pulley, and connections therefrom to the first-named pulleys, an enclosure for all of said parts, said enclosure provided with suitable apertures for receiving the yarn fed to the spindles, and means for exhausting the air from said enclosure.

9. An apparatus of the class described comprising, in combination, a plurality of rows of spindles, each provided with a suitable pulley, a main driving pulley therefor, belts extending from the driving pulley to the spindle pulleys, an enclosure for all of said parts provided with suitable openings opposite said rows of spindles, doors for closing said openings, said enclosure and doors being provided with apertures for receiving the yarn fed to the spindles, and means for exhausting the air from said enclosure.

10. An apparatus of the class described, comprising, in combination, a suitable frame, spindles rotatably mounted on said frame, an enclosure for the spindles supported by the frame and provided with a suitable opening, a door having a transparent front hinged to the enclosure and arranged to close said openings, means for maintaining a tight joint between the door and enclosure, apertures for conducting yarn to the spindles within the enclosure, and means for exhausting the air from said enclosure.

11. An apparatus of the class described comprising, in combination a frame, a plurality of spindles rotatably supported on the

frame, an enclosure for said spindles provided with an opening, a door hinged to the enclosure and arranged to hermetically close said opening, a driving pulley, and a belt on said pulley arranged for driving said spindles, enclosing means for said driving pulley and belt, and means for exhausting the air from the enclosures for said spindles and said driving pulley and belt.

12. That improvement in the art of spinning which consists in enclosing the spinning instrumentalities in a suitable casing, and exhausting the air from said casing during the spinning operation.

In testimony whereof I have hereunto set my hand this 5th day of October, A. D. 1920.

WILMAR F. LENT.