Jan. 6, 1953 E. G. RICE 2,624,573

WEB HANDLING MECHANISM

Filed June 29, 1949 2 SHEETS—SHEET 1

Fig. 1

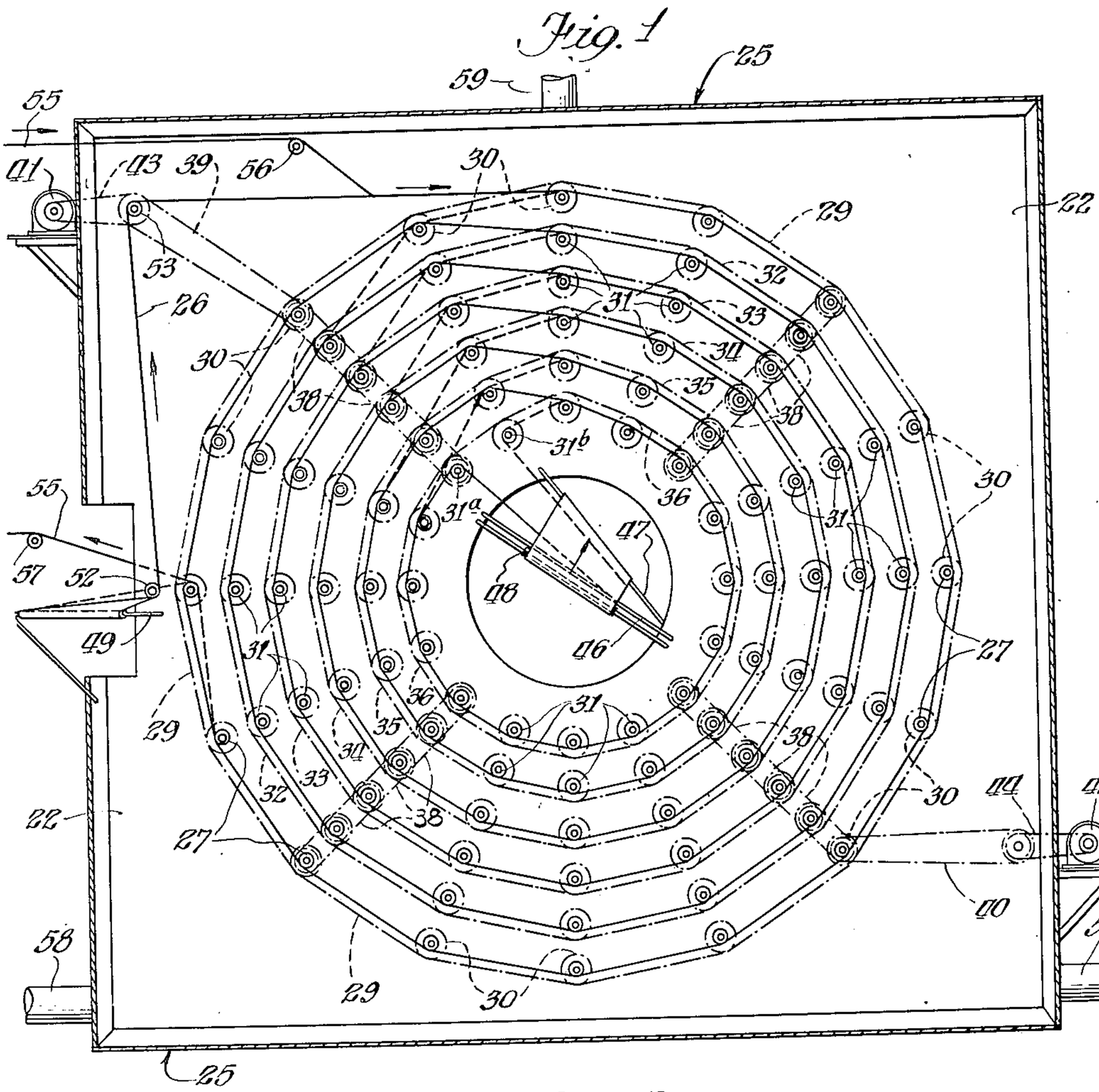
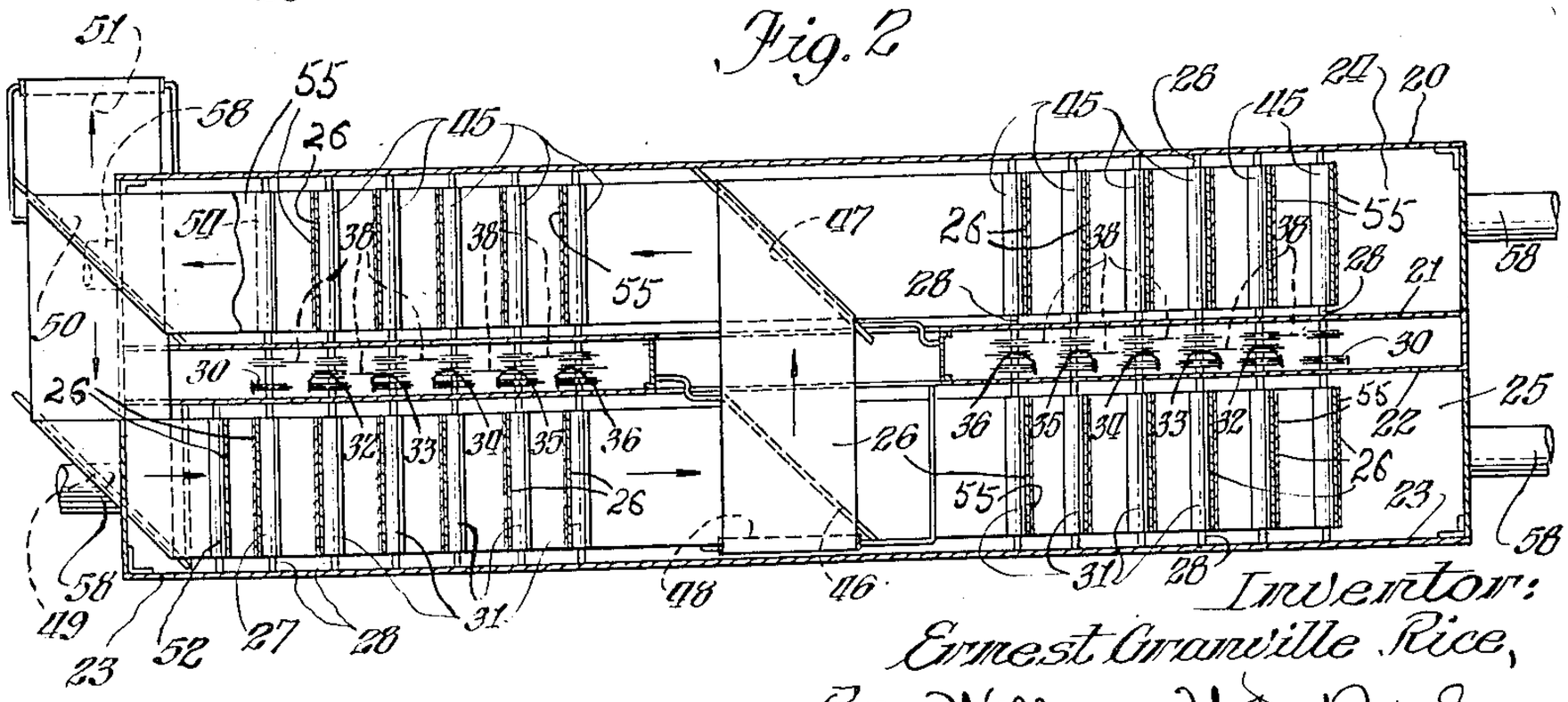


Fig. 2



Inventor:
Ernest Granville Rice,
By: William H. DeBusk,
Attorney.

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Filed June 29, 1949 2 SHEETS—SHEET 2

Fig. 3

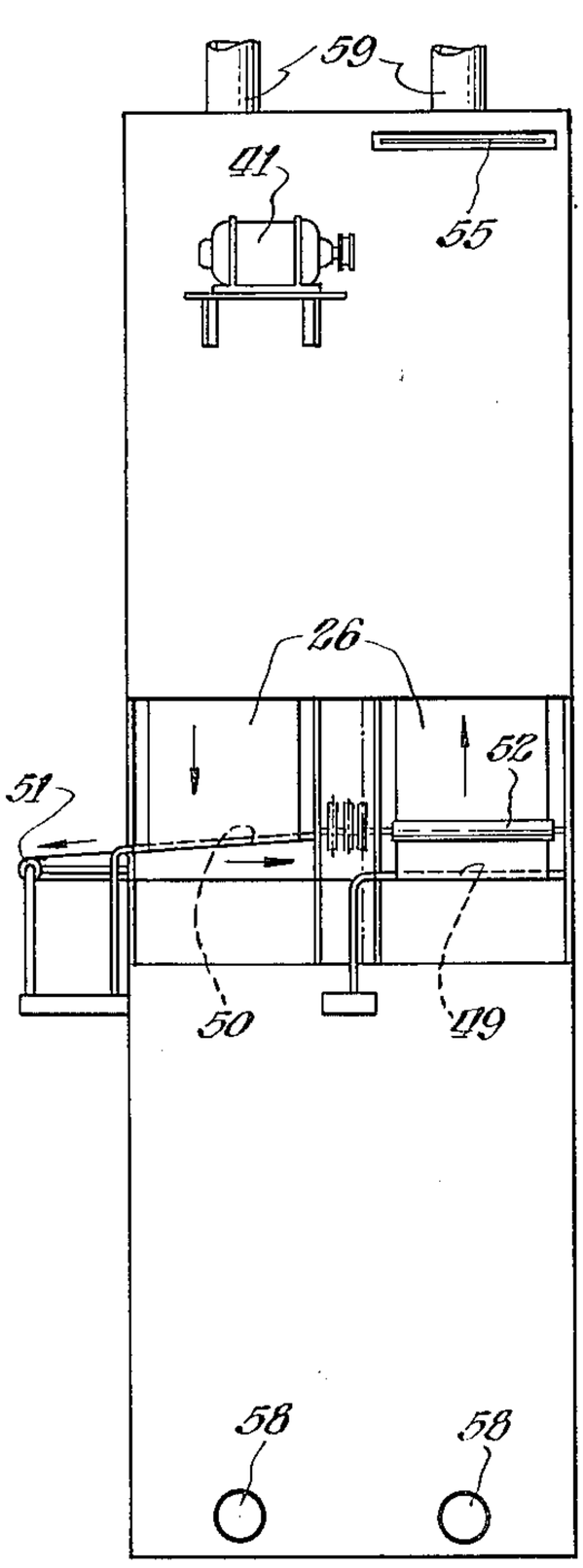


Fig. 5

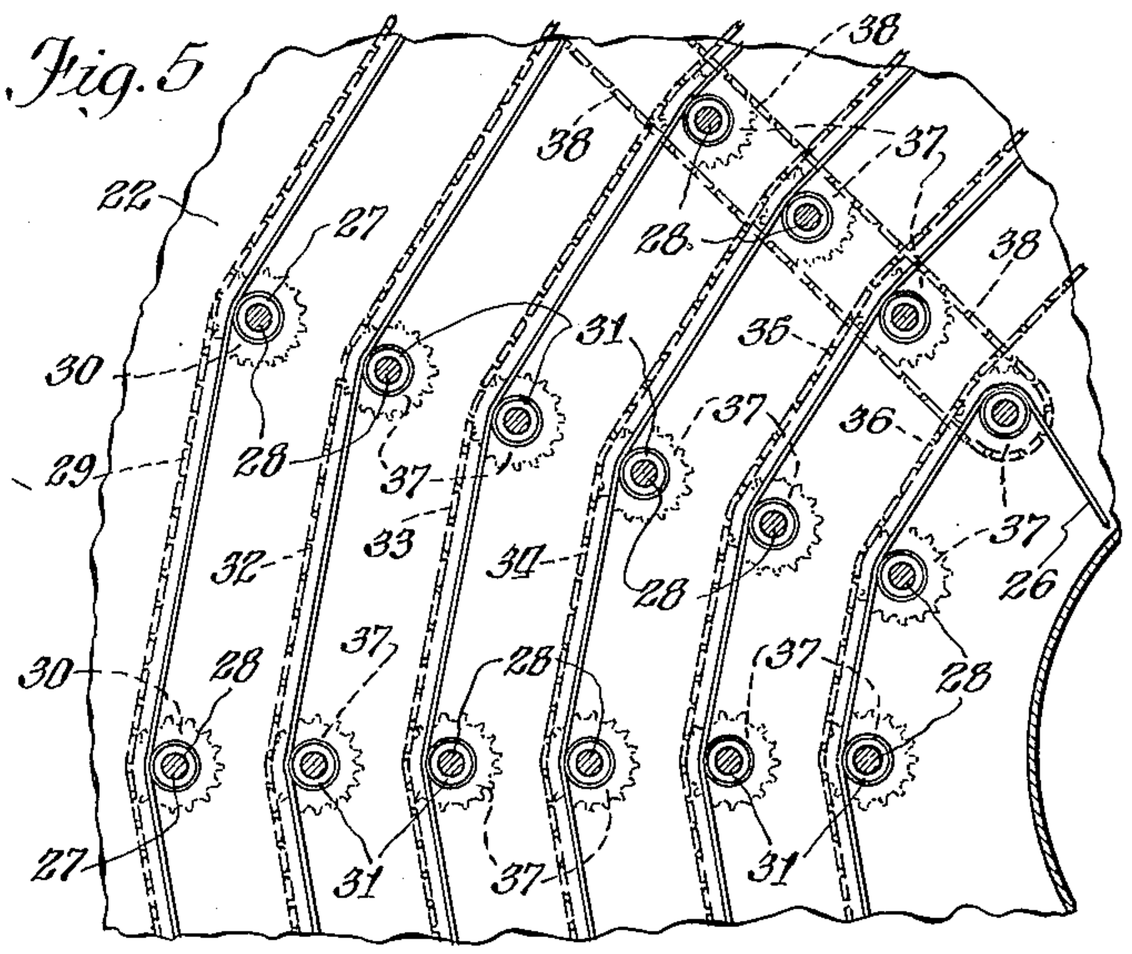


Fig. 6

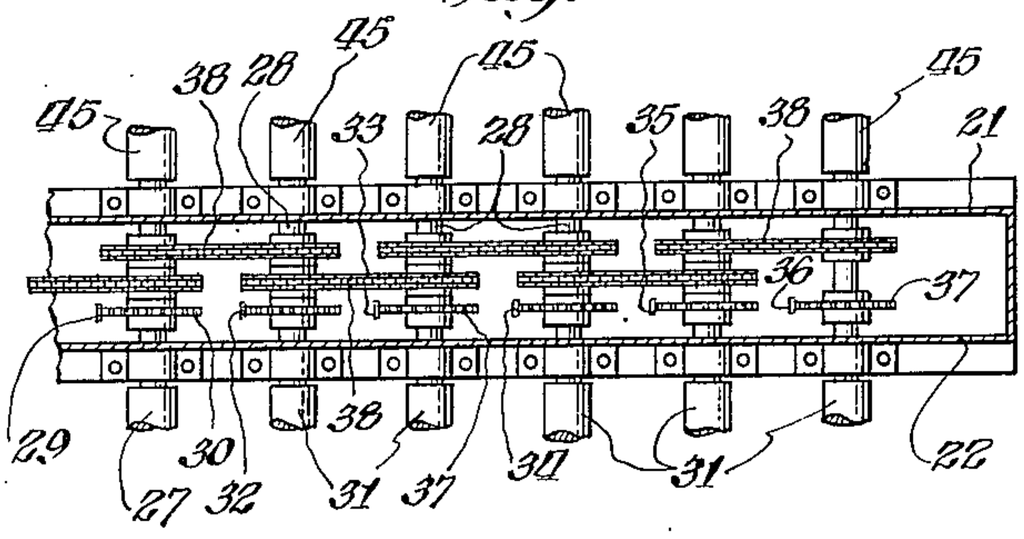


Fig. 4

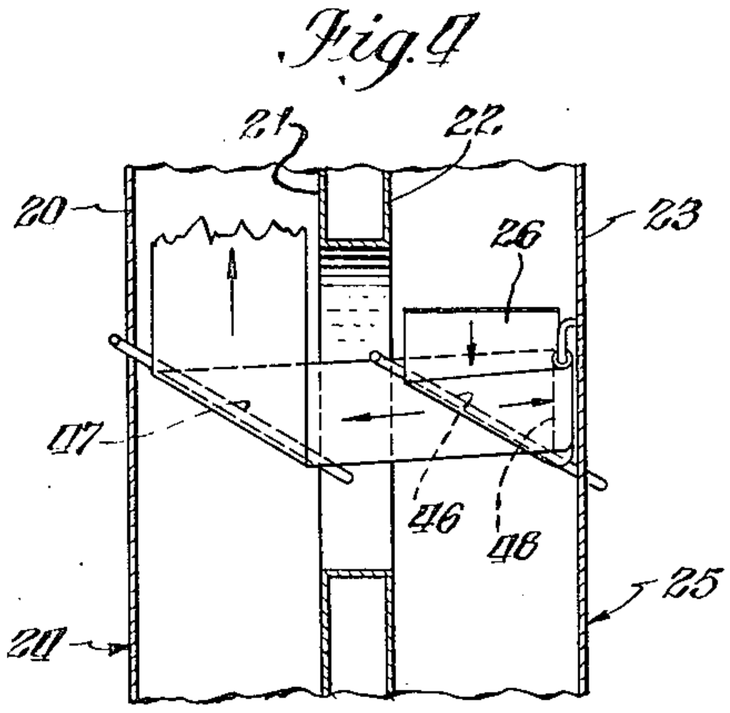
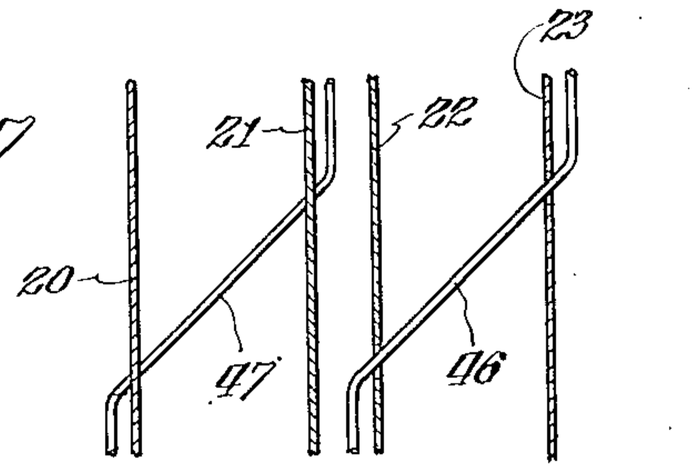


Fig. 7



Inventor:
Ernest Granville Rice,
By: William H. DeBusk,
Attorney.

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WEB HANDLING MECHANISM

Ernest Granville Rice, Chicago, Ill.

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4 Claims. (Cl. 271—2.18)

1

This invention relates to web handling mechanism of a type adapted to support a great length of web moving at high speed in connection with a printing press or the like, and it has for its object the provision of a new and improved arrangement by which a web may be led through a circuitous path of very great length within a housing through which heated air is forced so as to permit a plastic coating or the like to dry on one face of the web while running at high speed through the housing, with the device as a whole arranged compactly so as to take up a minimum of room, and with the web supported at substantially all points by means engaging only one face of the web, whereby the web is put into condition to be printed without danger of any smudging effect.

For accomplishing this purpose, I have provided a novel construction comprising a great number of rollers positioned for supporting an endless belt in helical form comprising two or more helical portions arranged so that when a web of paper is attached to the face of the belt at any point therealong such web is carried through a long circuitous path within the housing corresponding to the pattern of the helical form of the belt. In my improved arrangement, the shafts for the rollers supporting one helical belt portion are prolonged so as to support also a second set of rollers adapted to receive a second helical belt portion, angle-bars being provided for transferring the belt from one set of rollers to the other set so that a single endless belt is effective for carrying a web a plurality of times about the helical pattern.

It is one of the objects of my invention to improve devices of this type in sundry details hereinafter pointed out. The preferred means by which I have accomplished my several objects are illustrated in the drawings, in which

Fig. 1 is a side face view of my improved construction and arrangement, with the face of the housing removed for clearness of illustration.

Fig. 2 is a horizontal sectional view through the arrangement of Fig. 1.

Fig. 3 is a view of the device as seen from the left in Fig. 1.

Fig. 4 is a view of the angle-bar means at about the middle of the device as seen from the left in Fig. 1.

Fig. 5 is an enlarged detail view showing the arrangement of the means for driving the belt supporting rollers of the device.

Fig. 6 is another view showing the arrangement of the driving means; and

2

Fig. 7 is a plan view showing diagrammatically the arrangement of the angle bars at the middle portion of the device.

Referring to the several figures of the drawings, in which corresponding parts are indicated by the same reference characters, 20, 21, 22 and 23 indicate spaced side walls of the housings or chambers 24 and 25, within which an endless belt 26 is mounted so as to carry a web of paper or the like through a circuitous path of great length for enabling the web to be subjected to a drying operation while moving at high speed through the housing. I have provided my improved arrangement particularly for drying a plastic coating applied to one face of a web, but the arrangement may of course be used for any purpose for which it is adapted. For drying purposes, I prefer to employ heat so as to have a maximum drying effect and thus cut down the length of the path through which the web must be carried for a predetermined drying effect. For some types of plastic coating, I prefer to apply a temperature of about 250 degrees F. for about 40 seconds, followed by the application of a temperature of about 350 degrees F. for about 20 seconds, as nearly as these conditions can be effected readily without too much trouble and expense, the precise timing being in at least some cases non-critical.

In my preferred device, I employ a great number of rollers for supporting and driving the belt which is arranged in two or more portions, with each portion in the form of a helix, and with the several helical portions connected in series with each other by portions of the belt led transversely about angle-bars. In the arrangement I employ, the supporting rollers for the several helical portions of the endless belt are mounted on the same supporting shafts and are all driven in the same direction, this being possible by reason of the fact that one helical portion of the belt is arranged with successive loops of decreased size inwardly, while the helical portion of the belt connected directly therewith is arranged with successive loops of increased size inwardly.

In the arrangement shown, I have provided sixteen rollers 27 rotatably mounted in position in the housing 25 by means of shafts 28 and arranged for supporting the outside loop of the endless belt 26, such sixteen rollers being connected for rotation in unison with each other by means of an endless chain 29 operating on sprocket gears 30 carried by said shafts 28. Other rollers 31 also rotatably mounted in position by

means of said shafts **28** are arranged for supporting the belt **26** in successively smaller loops, with the rollers of successive loops connected by means of endless chains **32, 33, 34, 35** and **36** operating on sprocket gears **37** carried by said shafts **28**. The several loops of the endless belt as just described are connected for rotation in unison with each other by means of endless sprocket chains **38** (see Fig. 6) operating with suitable sprocket gears carried by certain of the shafts **28**. In the arrangement shown, several sets of the sprocket chains **38** are provided at circumferentially spaced points about the housings, four sets of such sprocket chains being employed with the chains arranged in radial position. By the use of this arrangement, comprising six chains in the form of loops and four sets of radially positioned connecting chains, the great number of supporting shafts for the belt are driven all in the same direction and all completely in unison with each other.

Power is applied to the system of chains and rollers by means of endless chains **39** and **40** driven by co-operating electric motors **41** and **42**, through intermediate endless chains **43** and **44**, said motors **41** and **42** being adapted to run in synchronism with each other so as to apply the power evenly and smoothly at a plurality of points.

Within the chamber or housing **25**, the endless belt **26** is driven in clockwise direction as seen in Fig. 1, with each succeeding loop of the belt of decreased size as compared with the loop ahead of it. Within the housing **24**, the belt is arranged in reverse order, being driven in clock-wise direction, with each succeeding loop of the belt of increased size, supported by rollers **45** carried and driven by the shafts **28**. As is best shown in Figs. 1 and 4, the connection between the inner end of the portion of the belt positioned in chamber or housing **25** and the inner end of the portion of the belt positioned in chamber **24** is effected by the use of angle bars **46** and **47** and a roller **48**. The connection between the outer end of the portion of the belt positioned in chamber **25** and the outer end of the portion of the belt positioned in chamber **24** is effected in turn by the use of angle-bars **48** and **50** and a roller **51** (see Fig. 3).

In tracing the course of the belt **26** through its two circuitous paths through the chamber or housing **24** and the chamber or housing **25**, it will be noted that the belt moves upwardly from a loosely mounted roller **52** (see Fig. 1) to a driven roller **53**, whence it moves toward the right in Fig. 1 through a plurality of loops supported by rollers **27** and **31** to the innermost one of the rollers **31** at **31***a*. The belt passes inwardly from said roller **31** over and sidewise about the angle-bar **46**, upwardly and sidewise in the opposite direction about the roller **48**, then over and toward the left in Fig. 4 about the angle-bar **47**, from which it moves upwardly in an oblique direction over the adjacent roller **31** at **31***b*. From this roller **31** the belt moves through a plurality of loops supported by the rollers **31** and **27** to a roller **54** loosely supported by one of the shafts **28** (at the left in Fig. 2), whence the belt moves toward the left in Fig. 3 over and sidewise about the angle-bar **50**, thence downwardly about the roller **51** and sidewise in the opposite direction from said roller **51**, and then under and about the angle-bar **49**, from which it moves again to the roller **52**.

In Fig. 1, I have shown a web **55** of paper passing over a loosely mounted roller **56** and thence

downwardly and toward the right into effective engagement with the belt **26** so as to be carried about the complete circuitous path of said belt **26**. When the web has been carried about the entire length of the belt for a preparatory threading operation, its leading end is detached from the belt and carried from the housing **24** over a roller **57**, after which it may be wound into a roll or otherwise used as may be desired. After the web has been threaded through its path and disconnected from the belt at the leading end of the web, the web continues to move forwardly with the belt by its frictional engagement with the belt, as will be readily understood.

In my preferred arrangement as shown, I have provided a plurality of ducts **58** for introducing heated air into the chambers or housings **24** and **25** at their lowermost portions, and have provided ducts **59** for withdrawing the air from the housings. The air thus introduced into the housings is to be heated to the desired temperature, and is to be forced into and through the chambers at the desired pressure for bringing about the desired drying effect.

While I prefer to employ the form and arrangement of parts as shown by the drawings and as above described, the invention is not to be limited to such form and arrangement except as the same may be specifically claimed, it being understood that changes might well be made without departing from the invention.

I claim:

1. In a device of the type described, the combination of a framework, a plurality of shafts rotatably mounted in transverse position on said framework, an endless belt, a plurality of rollers fixedly mounted on said shafts with the shafts and rollers so positioned as to support a portion of the belt in helical form comprising a series of loops, a plurality of other rollers fixedly mounted on said shafts in spaced relationship to said first-named rollers for supporting another portion of said belt in helical form comprising a second series of loops alongside of said first-named portion, means including angle-bars for leading the belt sidewise from one of said sets of rollers to the other set, means including angle-bars for leading the belt sidewise from said other set of rollers to said one set, and means for driving all of said shafts at the same surface speed of rotation.

2. A device of the type described as specified in claim 1, in which the means for leading the belt sidewise comprises one set of such means connecting together the outer loops of the two helical portions and another set of such means connecting together the inner loops of said two helical portions of the belt.

3. In a device of the type described, the combination of two housings in spaced relationship alongside of each other, a plurality of shafts rotatably mounted in transverse position in said housings, an endless belt, a plurality of rollers fixedly mounted on said shafts in one of said housings with the shafts and rollers so positioned as to support a portion of said endless belt in helical form, a plurality of other rollers fixedly mounted on said shafts in the other of said housings for supporting another portion of said endless belt in helical form alongside of said first-named portion, means including angle-bars for leading the belt sidewise from each of said sets of rollers to the other set so as to provide portions of the belt in both of said housings, and means engaging said shafts at points between

said housings for driving all of said shafts at the same surface speed.

4. In a device of the type described, the combination of a framework, a plurality of shafts rotatably mounted in transverse position on said framework, an endless belt, a plurality of rollers fixedly mounted on said shafts with the shafts and rollers so positioned as to support a portion of the belt in helical form comprising a series of loops, a plurality of other rollers fixedly mounted on said shafts in spaced relationship to said first-named rollers for supporting another portion of said belt in helical form comprising a second series of loops alongside of said first-named portion, means including angle-bars for leading the belt sidewise from each of said sets of rollers to the other set, means for driving the shafts of each of said different loops at the same surface speed, and means for driving the shafts of the different loops of the belt at the same surface speed.

ERNEST GRANVILLE RICE.

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