

June 10, 1924.

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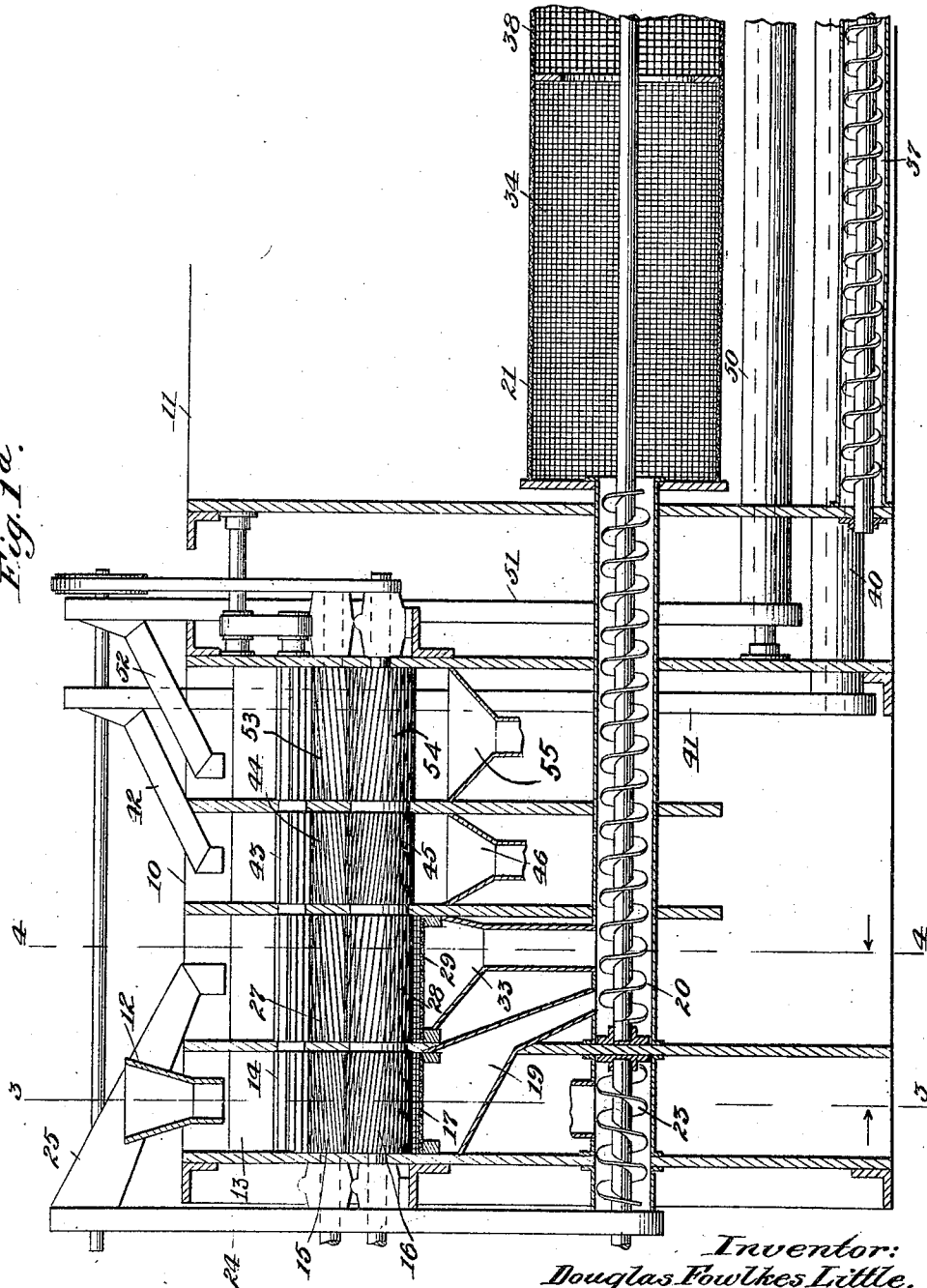
D. F. LITTLE

ROLLER GRINDING MILL

Filed Sept. 15, 1922

6 Sheets-Sheet 1

Fig. 1a.



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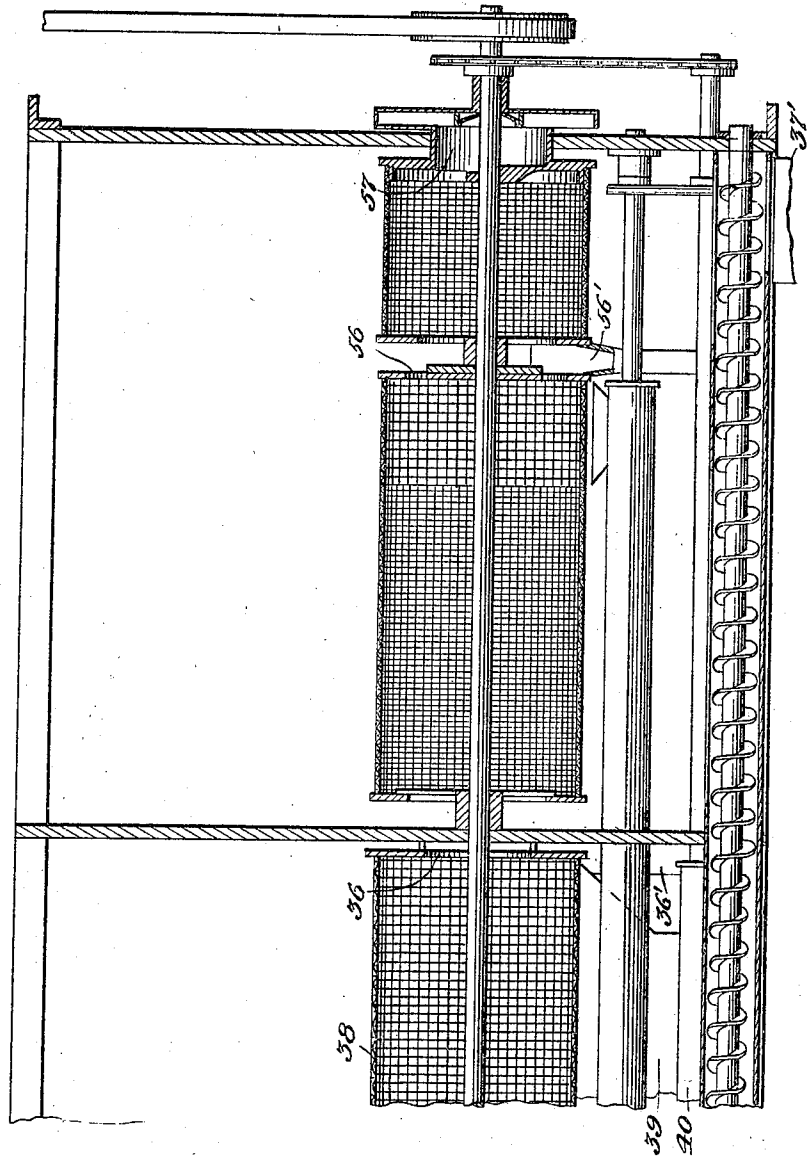
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ROLLER GRINDING MILL

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6 Sheets-Sheet 2

Fig. 10.



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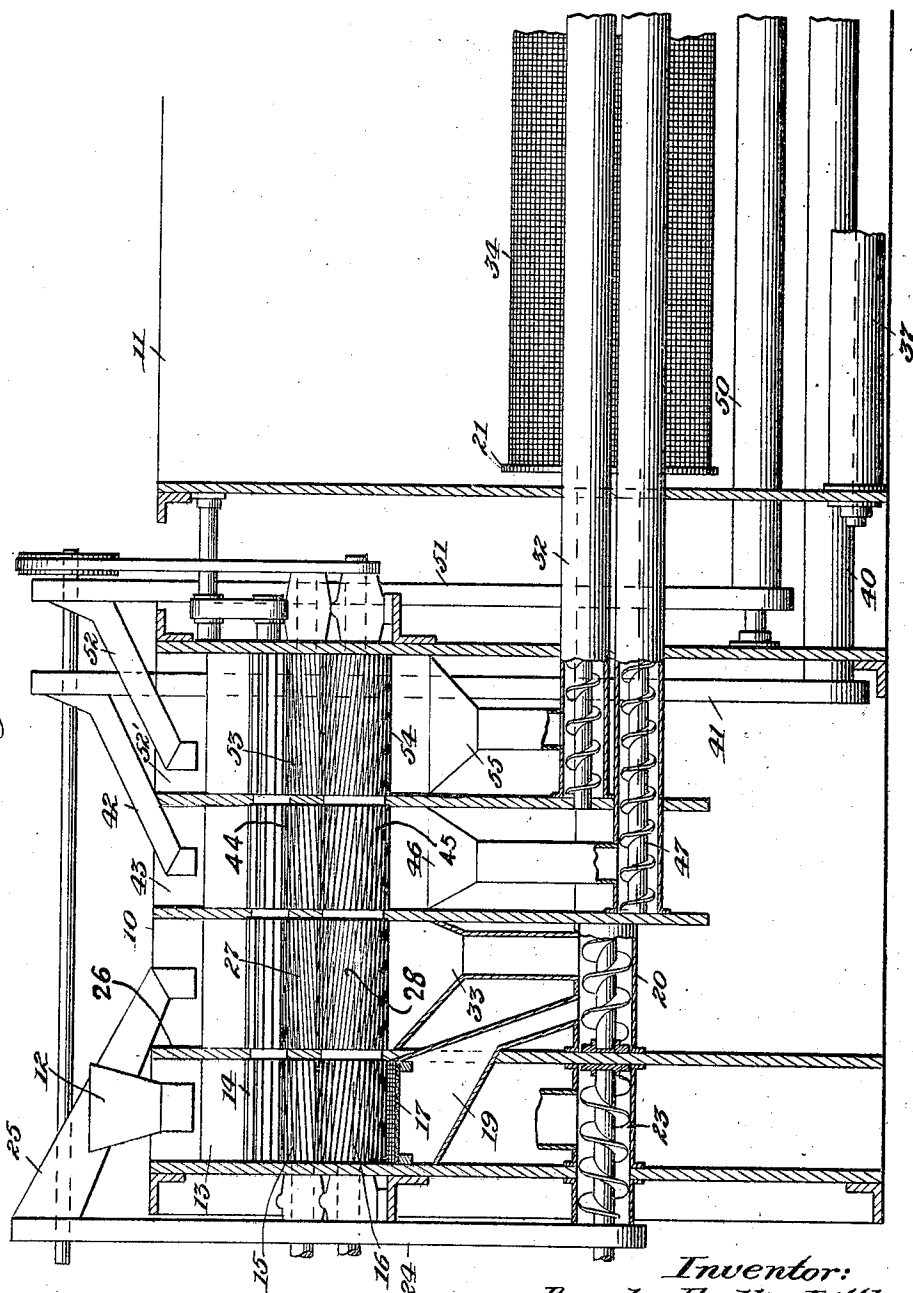
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ROLLER GRINDING MILL

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Fig. 2a.



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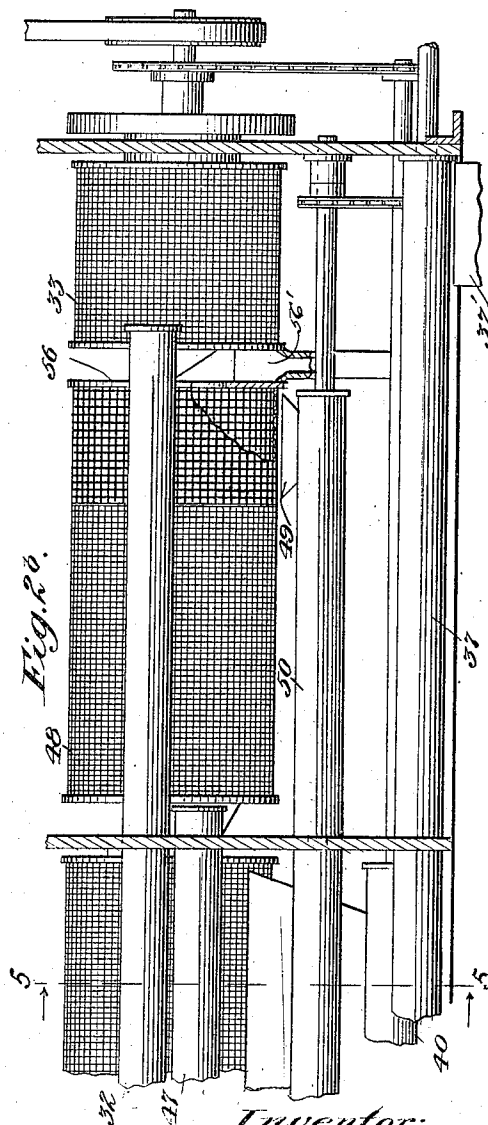
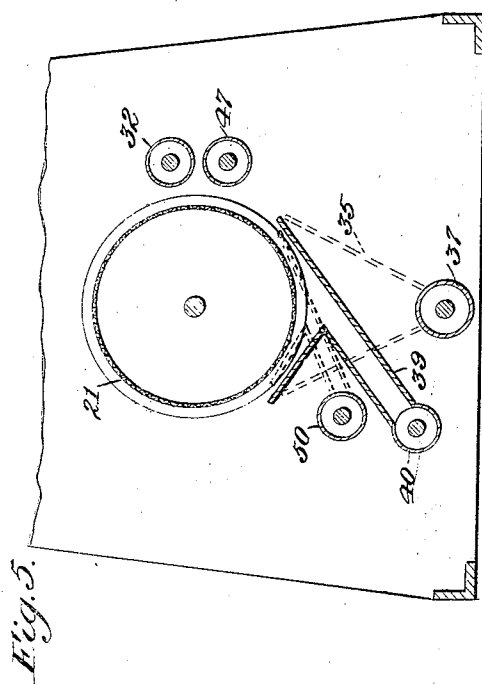
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ROLLER GRINDING MILL

Filed Sept. 15, 1922

6 Sheets-Sheet 4



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1,497,108

ROLLER GRINDING MILL

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Fig. 4.

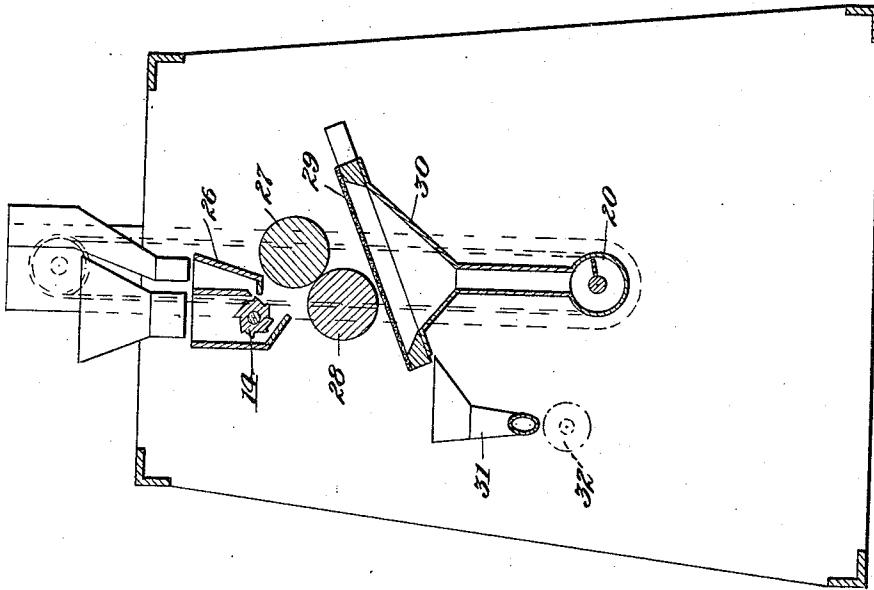
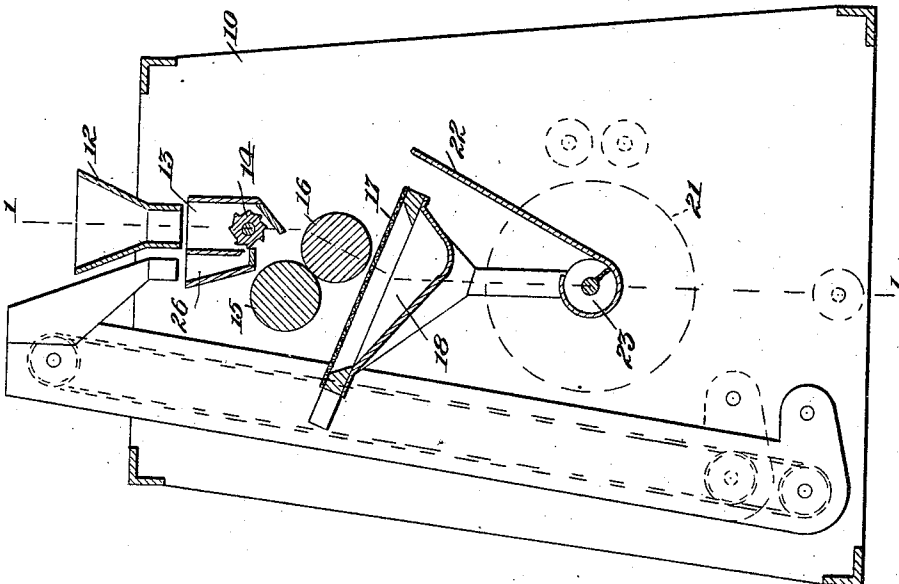


Fig. 3.



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1,497,108

ROLLER GRINDING MILL

Filed Sept. 15, 1922

6 Sheets-Sheet 6

Fig. 6.

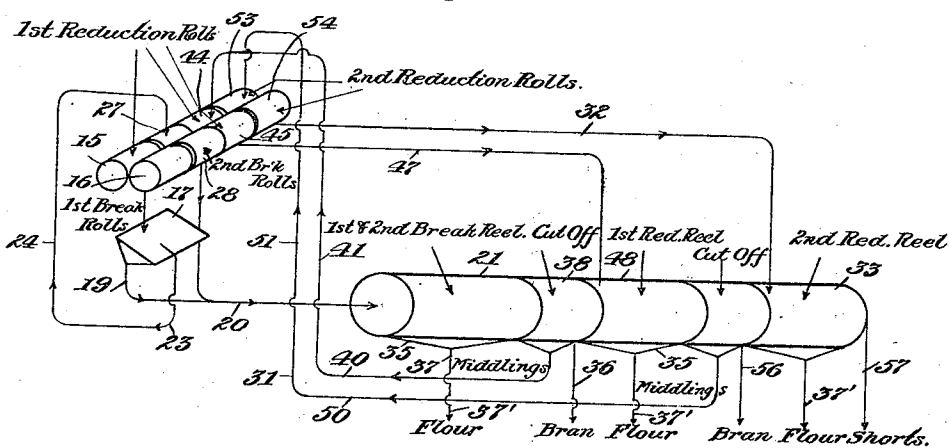
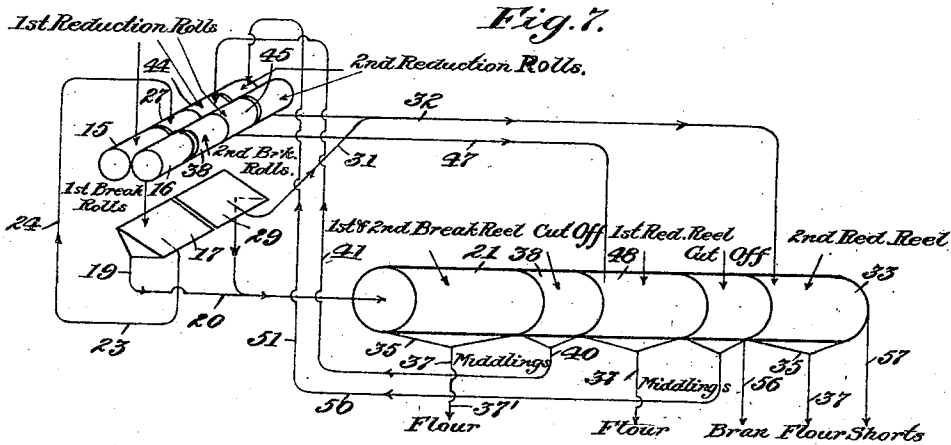


Fig. 7.



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Patented June 10, 1924.

1,497,108

UNITED STATES PATENT OFFICE.

DOUGLAS FOWLKES LITTLE, OF GRANITE CITY, ILLINOIS.

ROLLER GRINDING MILL.

Application filed September 15, 1922. Serial No. 538,403.

To all whom it may concern:

Be it known that I, DOUGLAS FOWLKES LITTLE, a citizen of the United States, residing at Granite City, in the county of Madison and State of Illinois, have invented new and useful Improvements in Roller Grinding Mills, of which the following is a specification.

The present invention, which is a continuation in part of applicant's co-pending application, Serial No. 483,541, filed July 9, 1921, relates to reducing and separating instrumentalities and particularly to flouring mills for crushing and sieving grains, and it is in connection with this type of mill that the invention will be disclosed; although it will be understood that, while primarily designed as a flouring mill, it may be adapted to the crushing and separating of material other than grain.

The object of this invention is to improve the efficiency and reduce the number of parts of mills of this type in order to lessen the cost of production and maintainance, and, furthermore, relates to improved means for routing or carrying the stock through the mill so as to reduce handling and travel of the stock to a minimum, and thereby avoid the objections to long routing and continuous handling of the stock, which results in an inferior flour, for the reason that the attrition of continuous handling of stock will inevitably increase the bran or middlings content of the finished products, and it is highly desirable, in mills of this type, to avoid, so far as possible, repeated shifting of the stock, while, at the same time, preserving the efficiency, so far as crushing and reducing the grains and sieving of the stock is concerned. I accomplish the object aimed at by providing a pair of rolls, as distinguished from a plurality of pairs of rolls, such as are used in mills of this general type, this single pair of rolls being provided with a plurality of breaking and reducing sections or surfaces, which sections are so disposed with relation to one another as to effectively secure the breaking and reducing actions necessary to condition the grains for sieving in the centrifugals or reels.

Heretofore, it has been customary, in some mills of this type, to provide a plurality of centrifugals or reels to which the stock is passed in succession, these reels being usually arranged one above the other in the centrifugal section of the mill. In my improved

mill I have provided a single reel, so divided into sections, and having cut offs and deliveries, as that the stock coming from the several sections of the breaking and reducing rolls will be properly sieved and the separated products either routed back to the rolls for further action, or delivered from the reel to the proper delivery point.

In order that the invention may be clear to those skilled in the art I have shown in the accompanying drawing several embodiments of my invention, but it will be understood that this showing is illustrative and not restrictive of the invention, for various mechanical expedients and changes within the skill of the mechanic may be made and yet be within the range of my invention.

In said drawings:—

Figures 1^a and 1^b are longitudinal sectional views of the mill taken substantially along the line 1—1 of Figure 3.

Figures 2^a and 2^b are views looking at the right side of the mill with the wall partly in section, for the purpose of illustration.

Figure 3 is a cross sectional view taken substantially along the line 3—3 of Figure 1^a looking in the direction of the arrow.

Figure 4 is a cross section view substantially along the line 4—4 of Figure 1^a looking in the direction of the arrow.

Figure 5 is a cross sectional view taken substantially along the line 5—5 of Figure 2^b.

Figure 6 is a diagrammatic view illustrating the routing of the stock when a single scalper is employed.

Figure 7 is a diagrammatic view illustrating the routing of the stock when two scalpings are used.

Referring to the drawings wherein like numerals indicate like parts in the various figures, 10 denotes the roll section and 11 the reel section of a mill which may be of any desired design and construction so as to properly house and support the active instrumentalities mounted therein.

The roll section 10 is provided at its top or any other suitable point with a supply hopper 12 or equivalent feeding instrumentality, which is adapted to conduct the grain to one side of the feed hopper or trough 13, where by means of the roller 14 the grain is delivered to the break rolls 15 and 16, these rolls being mounted in suitable bearings in the sides of the casing as shown, and driven by any suitable drive connections

preferably positioned outside the casing, and of any desired type so as to effectively rotate the rolls in opposite directions.

The break rolls 15 and 16 constitute the first break section of the mill, and are preferably formed with a coarse breaking surface so as to receive the whole grain from the hopper 13.

From the first break rolls 15 and 16, the stock is delivered to a scalper 17, the throughs of which are carried to the trough 18 where it is conducted by the angle spout 19 to the spiral conveyor 20 and carried to the head of the reel 21.

The overtails of the scalper 17 are delivered by the fall board 22 (Figure 3) to the conveyor 23, where by means of the elevator 24 and the spout 25, the overtails are conducted to the feed hopper 13 on the opposite side from that which the grain from the supply hopper 12 is delivered, the feed hopper 13 being suitably provided with a partition member 26 so as to separate the material from the hopper 12 and the spout 25.

The grain from the spout 25 is delivered to the fine break sections 27 and 28 of the rolls, which rolls constitute the second break section of the mill.

In the form of the invention shown in Figure 1^a, a scalper 29 is positioned below the second break rolls 27 and 28, the throughs from this scalper falling to the spout 30, and delivered to the conveyor 20 where the material mixes with the throughs coming from the rolls 15 and 16 of the first break section, and conducted to the head of the centrifugal reel 21. The overtails from the scalper 29 fall into the angle spout 31 and are carried by the spiral conveyor 32, shown in Figures 2^a and 4 to a fine reel section 33, which will subsequently be described.

It will be understood that any other suitable bolting means, such as a vibrating sieve or the like may be substituted for the reel 21 without in any way affecting the scope of the present development.

In the construction shown in Figures 2^a and 2^b the scalper 29 is omitted so that the material from the fine sections 27 and 28 is delivered by the spout 33 to the conveyor 20 and conducted to the reel 21. In this form of the invention as the bran from the second break rolls is not sieved out, the reel section 21 in addition to being provided with a fine section 34 and a coarse section 38, has also a suitable cut off 36, through which the bran is conducted to any bran hopper, such as 36'.

When the scalper 29 is employed it will be obvious that only flour and middlings will be conducted to the reel 21, and that, therefore, the cut off section 36 will be rendered unnecessary, since no bran is conveyed to the reel.

In the operation of the mill as shown in

Figures 1^a and 1^b the throughs from the first break rolls and second break rolls are carried by the conveyor 20 to the reel 21 where the heaviest or best flour sifts through the fine section 34 to the fall boards 35 as shown in Figure 5, and is conducted by the spiral conveyor 37 to a suitable delivery opening 37'.

The middlings which are unable to escape through the coarse section 38 of the reel are conducted by the chute 39 to the spiral conveyor 40, and delivered by the elevator 41 and the spout 42 to the first reduction section 43 of the mill.

The overtails, as previously set forth, are carried by the conveyor 32 to the reel 33. When the scalper 29 is not employed, the operation of the mill is slightly different, as will be obvious from an inspection of Figures 2^a and 2^b.

In this particular form of the invention the throughs from the rolls 27 and 28 deliver directly through the spout 33 and the conveyor 20 to the head of the reel 21, where the flour is sifted through the screens 34 and 38 to the fall board 35 and carried by the conveyor 37 to the spout 37'. The middlings are conducted to the coarse section 38 and empty into the spout 39 where they are treated the same as the middlings shown in the form of the invention where the scalper 29 is used, while the bran passes through the openings 36 in the tail of the reel to the hopper 26'.

In both operations of the mill, the treatment of the material after the grain passes through the reel 21 is the same.

In the first reduction section 43 the stock is passed through the reduction rolls 44 and 45 to the spout 46 and delivered by the conveyor 47 to the head of the reel 48, (Figure 2^b) where the flour is allowed to sift through to the fall board 35, as previously described, and the middlings conducted to the tail of the reel, and carried by the spout 49 to the reel 50 where it is returned by the elevator 51, and the spout 52 to the mill for final grinding.

The section 52' constitutes the second reduction of the mill, and here the middlings are ground by the rolls 53 and 54, and delivered by the spout 55 to the reel 32, where it mixes with the overtails from the scalper 29 when the latter is employed, and conducted to the fine section 33 of the reel.

The bran from reel 48 passes through the opening 56 to a suitable bran spout 56'.

The flour in the reel 33 delivers to the fall boards 35, while the remainder of the stock tails out through the opening 57 to a suitable bin, not shown.

Referring to Figure 6 wherein is diagrammatically disclosed the complete operation of the mill from the initial entrance of the stock until its final delivery as flour or bran when

the scalper 17 only is employed, it will be seen that the stock is preliminarily ground by the first break rolls 15 and 16, the throughs passing through the scalper 17 and delivering through the spout 19 to the conveyor 20 where it is carried to the head of the reel 21, the overtails being conducted by the conveyor 23 and the elevator 24 to the second break rolls 27 and 28 where it is again subjected to further grinding. This grain, together with the throughs from the scalper 17 are delivered to a reel 21, the flour being conducted by the fall boards 35 and conveyor 37 to the delivery spout 37', as shown.

The middlings are carried by the conveyor 40 and elevator 41 to the first reduction rolls 44 and 45 where it is again ground and conducted directly by the conveyor 47 to the reel 48. Here the flour is passed through the fall board and delivered to the spout 37'.

The middlings fall from the coarse section of this reel to the conveyor 50 where they are returned to the roll section by the elevator 51. After being finally ground by the second reduction rolls 53 and 54, the bran is allowed to escape through the opening 56 to the hopper 56' and carried to any suitable point of delivery.

The middlings being finally ground by the second reduction rolls 53 and 54 are delivered to the second reduction reel 33 by the conveyor 32. The flour from the reel 33 sifts to the fall boards 35, while the shorts or broad bran pass through the opening 57 to any suitable receptacle.

In Figure 7, wherein is disclosed the operation of the mill when the scalper 29 is brought into use, it will be noticed that the stock is first reduced by the rolls 15 and 16, the throughs from the scalper 17 being delivered by the angle spout to the conveyor 20, while the overtails are conducted by the conveyor 23 and the elevator 24 to the rolls 27 and 28, the throughs of the scalper 29 mixing with the throughs of the scalper 19 and carried by the conveyor to the reel 21. The overtails, however, of the scalper 29 are conducted by the angle spout 31 to the conveyor 32 and delivered, together with the material from the second reduction rolls to the reel 33.

The flour from the reel 21 is carried by the fall boards 35 to the conveyor 37 to the delivery opening 37', while the middlings fall into the conveyor 40 and are returned by the elevator 41 to the first reduction rolls 44 and 45 where, after being ground, are conducted by the conveyor 47 to the reel 48, the flour being delivered to the supply spout 37', as previously described, and the middlings being returned to the roll section of the mill by the conveyor 50 and the elevator 51.

The bran from the first reduction reel drops through the opening 56 to any suitable spout, such as 56'.

From the second reduction rolls the mid-

dlings are carried by the conveyor 32 to the second reduction reel, and are again finally reduced, together with the overtails from the scalper 29, the flour being delivered to the fall board 35, and delivery spout 37', while the bran is carried through the opening 57 to any suitable bin.

The fall boards 35 which are shown in dotted lines in Figure 5 extend the entire length of the reel section 11 of the mill, so as to conduct the flour to the conveyor 37.

With this arrangement of breaking and reducing instrumentalities and reels, made up and combined with the conveying means described, the handling of the material is reduced to a minimum. It will be seen that the flour is taken out of the stock at each breaking and reducing operation so that any flour content ready for separation is delivered to the flour delivery point at each stage, and not sent through the several crushing, reducing and sieving instrumentalities successively, as has heretofore been the case with mills of this character.

By arranging the crushing surfaces, as shown, on the single pair of rolls, a closer assemblage and greater ease in handling stock is secured, and with the single reel, made having a plurality of sieving sections and having the independent deliveries for the several sections, a much more compact construction of reel section is possible, and the necessity of continuously handling the stock and passing it through the mill several times is done away with, resulting in a better flour and a flour from which the bran particles, incident to several breaks, reductions, and sieving upon the same material, is eliminated.

It will be understood that the form of the invention herein shown and described, while taken as a preferred embodiment of the same, may be altered as to minor details of construction and operation without departing from the spirit of the invention and the scope of what is claimed.

I claim:

1. In a machine of the class described, the combination of a pair of break and a pair of reduction instrumentalities, a single reel, means for delivering stock from said break instrumentalities to the head of said reel, means for delivering stock from the reduction instrumentalities to an intermediate portion of the reel, and means for delivering stock from said reduction instrumentalities to the tail of said reel.

2. In a machine of the class described, the combination of a pair of sectional rolls comprising a pair of break sections and a pair of reduction sections, of bolting means, and plural conveying means delivering stock from said roll sections simultaneously to different points of the bolting means.

3. In a machine of the class described, the

combination of a pair of sectional rolls comprising a pair of break sections and a pair of reduction sections, of bolting means, plural conveying means delivering stock from
 5 said roll sections simultaneously to different points of the bolting means, and means for returning stock from said bolting means to said rolls.

4. In a machine of the class described, the
 10 combination of a pair of sectional rolls comprising a pair of break sections and a pair of reduction sections, of a single reel, plural conveying means delivering stock from said
 15 roll sections simultaneously to different points of the reel, and means for returning stock from said reel to said rolls.

5. In a machine of the class described, the combination of a pair of sectional break
 20 rolls, a reel associated with said rolls, a scalper beneath one section of said rolls, means delivering the throughs from said scalper and the stock from said other section to the
 25 head of said reel, and means conveying the overtails of said scalper to the other break section of the rolls.

6. In a machine of the class described, the combination of a pair of rolls having break
 30 sections and reduction sections, a single reel, a scalper between a section of said roll and said reel, means for conveying the throughs of said scalper to said reel, means
 35 for returning the overtails of said scalper to said rolls, means for conveying stock from other sections of said rolls to said reel, and means for returning stock from said reel to said rolls.

7. In a machine of the class described, the combination of a pair of rolls having a plu-
 40 rality of break sections and a plurality of reducing sections, a single reel, a scalper

for at least one of said break sections, means for conveying the stock from another break section to said reel, means for conveying the overtails of said scalper to another
 45 break section, and means for returning stock from said reel to both of said reduction sections.

8. In a machine of the class described, the combination of two rolls having two break
 50 sections and two reducing sections, a single reel, a scalper for the first break section, means for delivering the throughs from said scalper to said reel, means for conveying the overtails of said scalper to the second
 55 break section, means for conveying stock from the second break section and the first reduction section to said reel, means for returning stock from said reel to the first reduction section, and means for conveying the stock from the second reduction
 60 section to said reel.

9. In a machine of the class described, the combination of two rolls having two break
 65 sections and two reducing sections, a single reel, a scalper for the first break section, means for delivering the throughs from said scalper to said reel, means for conveying the overtails of said scalper to the second
 70 break section, means for conveying stock from the second break section and the first reduction section to said reel, means for returning stock from said reel to the first reduction section, means for conveying the stock from the second reduction section to
 75 said reel, and means for returning the stock from said reel to said second reduction section.

In testimony whereof I have hereunto set my hand.

DOUGLAS FOWLKES LITTLE.