T. C. NIXON.

ROLL REDUCING MACHINE FOR CEREALS.

APPLICATION FILED MAR. 18, 1911.

1,042,717.

Patented Oct. 29, 1912.

3 SHEETS—SHEET 1.

Fig. 1.

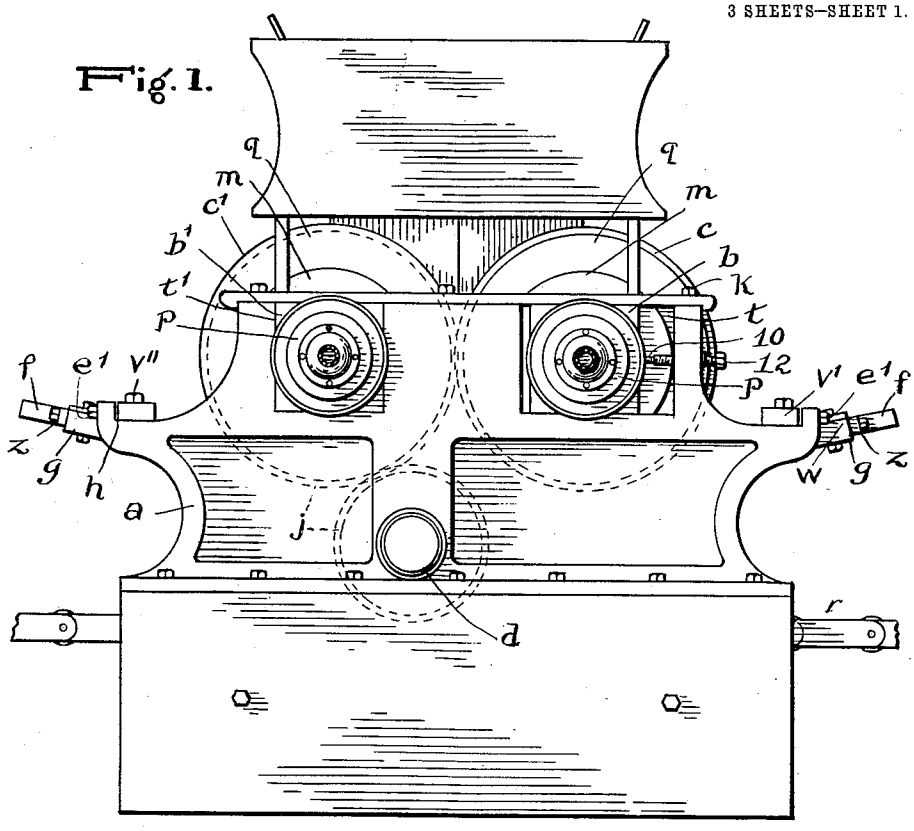
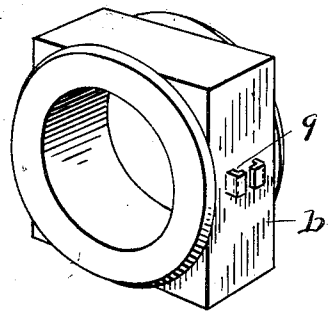


Fig. 4.



Witnesses

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3 SHEETS—SHEET 2.

Fig. 2.

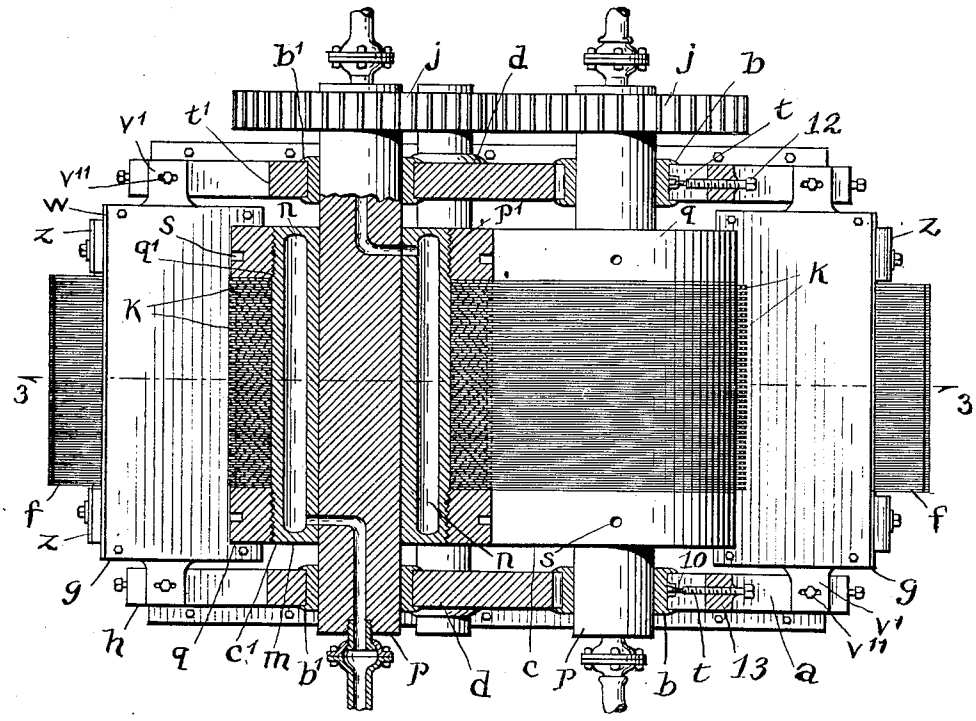
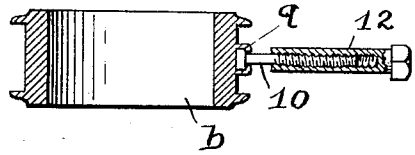


Fig. 5.



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3 SHEETS—SHEET 3.

Fig. 3.

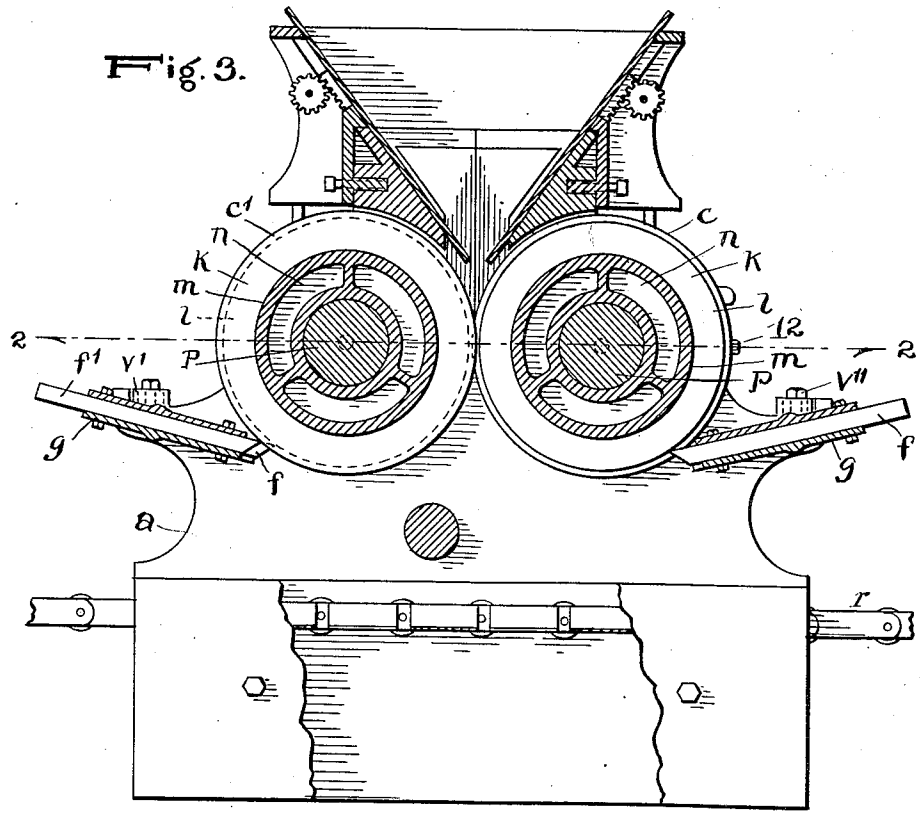


Fig. 6.

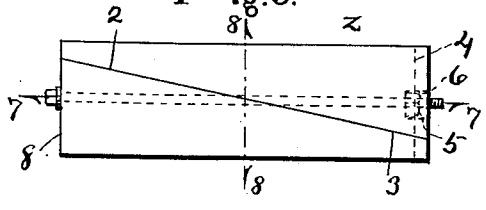


Fig. 7.

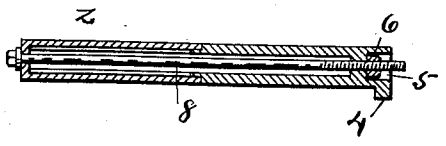
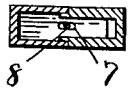


Fig. 8.



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UNITED STATES PATENT OFFICE.

THOMAS C. NIXON, OF CHICAGO, ILLINOIS.

ROLL REDUCING-MACHINE FOR CEREALS.

1,042,717. Specification of Letters Patent. Patented Oct. 29, 1912.

Application filed March 18, 1911. Serial No. 615,342.

To all whom it may concern:

Be it known that I, THOMAS C. NIXON, a citizen of the United States, and resident of Chicago, in the county of Cook and State of Illinois, have made a certain new and useful Invention in Roll Reducing-Machines for Cereals; and I declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it appertains to make and use the invention, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

Figure 1 is a side view illustrating the invention. Fig. 2 is a horizontal sectional view. Fig. 3 is a vertical longitudinal sectional view. Fig. 4 is a perspective view of an adjustable bearing. Fig. 5 is a sectional view of same including the micrometer screws. Figs. 6, 7 and 8 include a plan and sectional details of the compression device.

The invention has relation to composite disk roll machines designed chiefly for the reduction of cereals to fine threads or filaments of continuous character, and the invention consists in the process or method of manufacture, and in the resulting disk roll mechanism.

In the accompanying drawings, the letter *a*, designates a laterally separable sectional frame, wherein are seated in bearings *b*, and *b'*, two parallel shafts *p*, *p*. The bearings *b*, in which the journals of one shaft *p*, are seated are provided with micrometric means of adjustment. The ends of the shafts are designed to be provided with engaging gear wheels *j*, *j*, and they, or sleeves thereon, are also provided with collars *q*, *q''*, which are respectively secured to the shafts, in adjacent position to the bearings. One of these collars, *q*, is slightly larger in diameter than the other, *q''*, the difference being about one-eighth of an inch. On these shafts or sleeves annular disks, alternately of larger and smaller diameter, are placed to complete the rolls, *c*, and *c'*. When in position in the frame these shafts are designed to extend in exact parallel relation to each other, to receive the disks *k*, and *l*, and the ends of the shafts, or the sleeves thereon, are threaded to engage the collars *q*, and *q''*, which are employed to secure the disks together in roll form after they are placed in position.

The major disk is a cutter disk, made of saw steel or sheet tool steel of like character, and about twenty-five thousandths of an inch in thickness for fine threads. And the disk *l*, is of a little less diameter than the cutter disk, the difference in diameter being about one-eighth of an inch. The disk *l*, is of the same thickness as the cutter disk *k*, but is not tempered. In this specification it is termed a bottoming disk or minor disk.

The shafts *p*, *p*, or the sleeves thereon, being provided with the collars *q*, *q''*, are designed to be seated in the bearings *b*, and *b'*, in such wise that said shafts are held firmly in position, at the proper distance apart, to receive the disks, which are designed to be placed thereon. To this end the frame or head *a*, is designed to be made in two parts, or so that one of its sides shall be removable, and in this way the shafts *p*, *p*, can be held secured in the bearings of the other side of the frame, said shafts projecting parallel to each other and having their ends free. Upon these shafts the disks are placed in succession, in such wise that the major disks or cutter disks alternate with the minor or bottoming disks on each shaft, and so that the cutter disks of the two rolls are, at the time of placing them in position, caused to engage each other.

In machines of this class, it is designed to feed the grain in whole form, but softened by soaking, steaming or boiling and afterward partially drying it, if required, so that it is in proper condition.

The filaments or threads, to which the mechanism herein described is designed to reduce the grain, are of substantially rectangular form and may be made of larger or smaller size by varying the distance between the rolls *c*, *c'*, so as to increase or diminish the channel openings between the bottoms thereof and the faces of the cutting disks. This operation requires a very fine or delicate movement of the adjustable bearings *b*, which is designed to be accomplished by means of micrometer screws 10 and 12, seated in the framing. The pitch of these screws should be about 30 to the inch on 10, and 20 to the inch on 12, to secure nicety and precision in the adjustment.

The rolls *c*, and *c'*, are similar, and in building up the rolls with thin sheet metal disks, thin enough to be used in making a

machine whereby cereals are designed to be reduced to threads or filaments and wherein cleanliness and accuracy of adjustment are of vital importance, I find it impracticable to procure the thin tool steel, required for making the disks, of even and uniform thickness throughout. The variation is sometimes as much as one-half a thousandth of an inch in this thickness, and it is one of the objects of this invention to remove such variations and in this way avoid minute repositories for bacteria and other matter which would materially discredit the mechanism in the use for which it is intended. In order to avoid this and other difficulties relating to the manufacture of these composite disk rolls, the following method is employed. Premising that, instead of seating the disks upon solid shafts, I prefer to use sleeves upon the shafts, these sleeves being provided with threaded ends and collars, as hereinbefore explained. Such sleeves are designed to be chambered for the passage of hot or cold air or water. Having first procured a supply of sheet tool steel, preferably of the ribbon form and about one-eighth of an inch wider than the diameter required for the major disks, (circular cutting knives) and of a general thickness of about twenty-four or twenty-five thousandths of an inch for fine threads, I punch out the blank annular disks and, after freeing the eyes from burs, etc., place a number of the disks in a holder fastened upon the face plate of a machine lathe and bore them out and finish them smooth and true. This finishes the work upon the eyes of the disks. These disks are then mounted upon a suitable arbor and turned down and finished smooth and true, so that the outside diameter is of the proper size for the major disks or circular cutting knives. This diameter is designed to be about one hundredth of an inch, more or less, larger than the diameter of the larger compressing collars. These disks should be tempered quite as hard as possible and without forming a scale thereon. Another set of disks of the same thickness is to be prepared, the diameter of each being about one-eighth of an inch smaller than that of the cutting disk above mentioned. These smaller disks are not tempered, as they are designed to form the minor or intermediate disks. Both major and minor disks have, therefore, plane sides extending to their peripheral edges, which are cylindrical and therefore normal to said sides. Under adjustment of the rolls the sides of the peripheral portions of the major disks remain in contact, such adjustment being designed to vary the size of the interval between the edges of the bottoming disks and the sides and edges of the peripheral portions of the major disks.

Having prepared a sufficient number of major and minor disks in the above described manner to constitute the requirement of two reducing rolls, c, c', and having other parts necessary for a complete machine, namely, the framework, bearings, journals, shafts, sleeves and compression collars the parts are ready to be assembled. One side of the framework having been mounted securely upon a bench plate or other suitable fixture, and the bearings b, b, placed in position, the shafts carrying the sleeves m, and one end compression collar on each sleeve, are installed, the last two mentioned parts having first been dipped into a hot solution of concentrated potash, then into clean water kept at boiling point, then into water just moderately warm (after having first been boiled) and finally into alcohol. One of the sleeves carries a compressing collar to engage the first major disk, while the other sleeve is fitted with a collar to engage the first minor disk, and both collars are one hundredth of an inch (more or less) smaller than their respective disks. Through the medium of the journals of the shafts and the bearings and micrometer screws, these collars are brought almost, but not quite, into neat peripheral contact, and when a major disk is placed upon one sleeve and a minor disk upon the other, since the diameter of each of these disks is about one hundredth of an inch (more or less) larger than the diameter of its respective compressing collar, the micrometer adjusting screws are operated to bring the peripheral faces or edges of the two disks into neat contact. If on moving these disks from end to end of the sleeves no variation in distance between the two sleeves is found to exist, and the threaded compression collars above referred to are in proper position to insure sufficient compression upon the disks after all are mounted in place, then said sleeves are ready to receive the disks to make a pair of sectional grooved reducing rolls of my design. I now take a major disk, k, string it upon a piece of copper wire, dip it into a hot solution of concentrated potash, then into clean water kept at boiling point, then into water just moderately warm after having first been boiled, and finally into grain alcohol, and adjust it in position upon the sleeve containing the larger compressing collar. A minor disk l, is then passed through the same cleansing and preparing process, and adjusted in position upon the sleeve containing the minor compressing collar, care being taken to avoid handling the disks with the fingers. Cleansed and sterilized metal pliers should be employed. Also care should be exercised in locating the first disks upon the sleeves so that they coincide in plane

with each other. Proceeding with the remaining disks and cleansing and preparing them as above stated, they are designed to be mounted upon the sleeves in the proper order, that is to say the second disk upon the shaft containing the larger compressing collar is a minor one; and the second disk upon the sleeve containing the lesser compressing collar is a major disk or cutter disk. Thus continuing to alternate the disks of the two sizes upon each sleeve until a sufficient number have been installed, the two remaining screw compressing collars, after being thoroughly cleansed and prepared as above stated, are placed on the other ends of the sleeves, and by carefully turning up all four collars a little, by degrees, all the disks are held in proper position. But just before finally setting up the collars, it is proper to thoroughly rinse the parts with grain alcohol. The power shaft and intermeshing gear wheels may now be assembled; also the remaining parts of the framework, the other journal bearings and the other micrometer screws. All of these parts being adjusted and the compressing collars being screwed up as tightly as possible, the rolls are turned for several revolutions. The compressing collars are then again turned up more tightly, if possible, and the rolls again turned several revolutions. I now rinse all disks and collars thoroughly with alcohol, and while so doing cause the rolls to turn, either by hand or other power, and by gradually increasing the pressure upon the disks by means of the micrometer screws and compressing collars and revolving the rolls under these conditions, the following effects are produced: The working parts of the disk knives, that is to say the peripheral portions thereof, are rendered uniform in thickness, without changing the dense character of their lateral surfaces, by swaging, drawing and moving the surface particles from the thicker to the thinner portions and by compressing the less dense atoms into more compact position, thereby providing the necessary clearance in the channels between the walls of the disk knives. And as the disk knives are tempered and the minor disks forming the bottoms of the channels have received no temper, the latter are the softer and the edge faces of the tempered disk knives being held in compression with the edge faces of the minor disks by means of the micrometer screws, the faces of the latter disks are swaged and rolled and broadened out and compressed into true form, and close up all the irregularities and crevices that may have existed between the walls of the disk knives and the bottoming disks, so as to perfect and finish the reducing rolls with the necessary tempered steel cutting disks.

After the rolls have been turned for a sufficient length of time to produce the desired results herebefore stated, the micrometer adjusting screws may be turned in such a manner as to increase the distance between the sleeves m, until intervals are formed between the edge faces of the disk knives of each roll and the bottoming disks of the opposite roll sufficient to provide for the production of a shred or thread or filament of grain of the desired size. And, as heretofore stated, should a shred or thread or filament of a coarser or larger or finer or smaller size be desired, the rolls may be adjusted for its production by operating the micrometer screw in the proper manner to move the adjustable roll forward or back as the case may require.

For each roll is provided a discharging device, consisting of a series of discharging blades f, and intermediate strips f', which are arranged alternately with the blades f, which are longer than the strips, being designed to work in contact with the peripheral faces of the disk knives, to clear these faces of fragmentary cereal matter and to aid in keeping their cutting edges true and keen. These strips also serve to prevent the ends of the discharging strips from having a grinding pressure against the edges of the intermediate disks which bottom the channels between the cutting disks. The blades and strips are held in bank or comb form by means of an adjustable stock g, end lugs v', of which are seated on and secured to the bearings h, of the frame. These end lugs are slotted for securing screws v''. Set screws e', in the walls of the bearings h, engage the lugs of the stock, and in this way means of adjustment are provided for the bank of discharging blades. The holding stock is designed to be provided with a compression device z, having two inclined plane sections 2 and 3 and an operating screw 8.

Under the rolls a moving receiving band is usually employed, as indicated at r, this band having a rate of motion corresponding to that of the reducing rolls.

Having described the invention, what I claim and desire to secure by Letters Patent is:

1. In composite reducing rolls, rotative shafts and alternate thin larger cylinder-edged cutting disks and smaller disks, mounted on said shafts, means for compressing the disks solidly together on their respective shafts, and means for forcing the rotative rolls together to press the edges of the cutting disks against the edges of the smaller disks to thus upset the edges of the smaller disks against the sides of said larger disks and to finish the sides of the larger disks.

2. A circumferentially-channeled reducing

roll, consisting of a shaft, compression collars thereon, thin cylinder-edged cutting disks having parallel sides swaged to even thickness in their peripheral portions, and smaller cylinder-edged disks of equal thickness to and alternating with said cutting disks and having thin edges upset against the sides of the cutting disks to close up interstices and finish the bottoms of the channels of the rolls.

In testimony whereof I affix my signature, in presence of two witnesses.

THOMAS C. NIXON.

Witnesses:

CHARLES O. SHERVEY,

GEORGE C. OTTO.