[For the Mechanical and Milling News.]

REDUCTION OF MIDDLINGS.

By L. McKinnon, Alton, Ont.

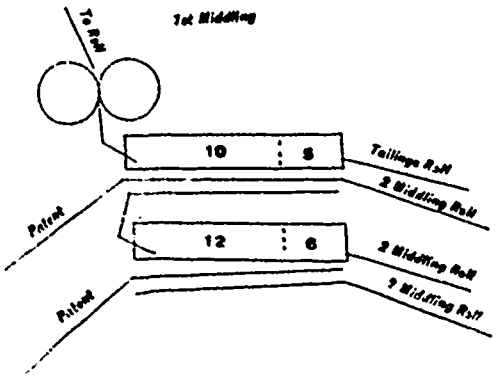
WHAT millers understand particularly in regard to the reduction of the product called middlings, is in many cases somewhat vague. Middlings is a term that denotes a certain product, which is the inside of a grain of wheat, or in other words the flour of the wheat in a certain stage of manufacture, and composed of the finest and purest of the bran's contents. To convert it into flour is a process of vast importance to the milling public. We find various systems placed before us for this purpose—some good, some indifferent, and others useless in the extreme. Take for instance a mill that makes five or six reductions on wheat, we find middlings of all imaginable shapes and sizes—some cut quite fine, some oblong, and some very coarse, as they flow from their respective scalpers, and as indicated by the duster and scalper.

To bring stock as described above to a proper and final termination in reduction, requires one of three systems, or the two combined, viz., the entire roll system, the entire buhr system, or a combination of both ; that is, the buhr to perform the part for which it is best adapted, and the rolls to complete the operation, or *vice versa*, as the mode of procedure may dictate ; and third, the buhr system complete.

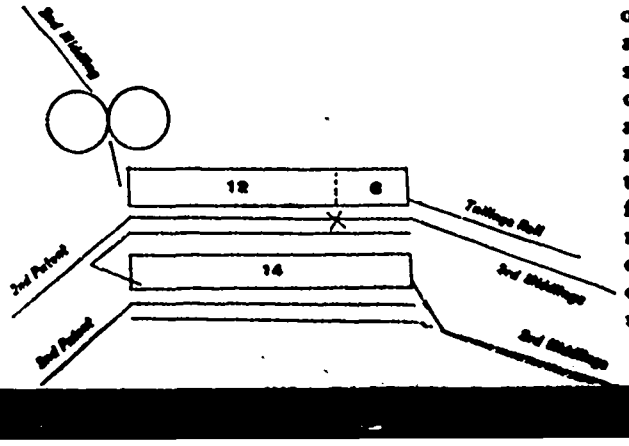
To illustrate, a system that would, in the writer's opinion, accomplish the desired end of a final reduction, would consist of the following arrangement, beginning at the grading department :

As remarked already, the middlings are very irregular in size at this stage of the process. There are middlings at this point that are pure and fine, that will purify through a No. 7 cloth, others through No. 5, 3, 1, 00, 000, and another grade that even tails over the last number. To proceed with the purifying and reduction, we will take the No. 5 middlings, and omit the No. 7, on account of their fitness for the final reduction, excepting their purification, which is done by one repetition in purifying. After being graded and aspirated, the No. 5 middlings are reduced on smooth roll by one reduction, then dusted on a proper reel. The No. 3 middlings are given one reduction also, in connection with the No. 5. The No. 1, 00, 000, are run together through two reductions, and dusted and graded at each step ; and all desirable middlings are sent to the bin for flouring, through their proper routes as designed.

Those reductions, purifications and separations, if properly done as laid down, the middlings will be in a fit condition for final reduction or flouring, as the impurities have been removed, at least so far as any methods of purification known at present. The gradual reducing of the middlings, so that the mesh of a No. 7, 6 and 5 cloth will admit them, will bring them into a practicable state for flouring, and where we will consider them ready for flouring rolls or other arrangement.



The above diagram illustrates the first reduction on rolls, and the dressing of their product, according to the latest ideas. The top reel has No. 10 for a flour cloth, and No. 5 for a tail sheet. Its products flow four directions—the flour to patent, tailings to tailings roll, No. 5 product to 2nd middlings roll, and cut-off to lower reel. The second reel is silked with 14 and 6, the 6 being the tail cloth, and 14 the flour cloth. The product of No. 14 is patent flour ; the tail product of No. 6 is 2nd middlings stock, and its product, along with the cut-off, of No. 12 also.

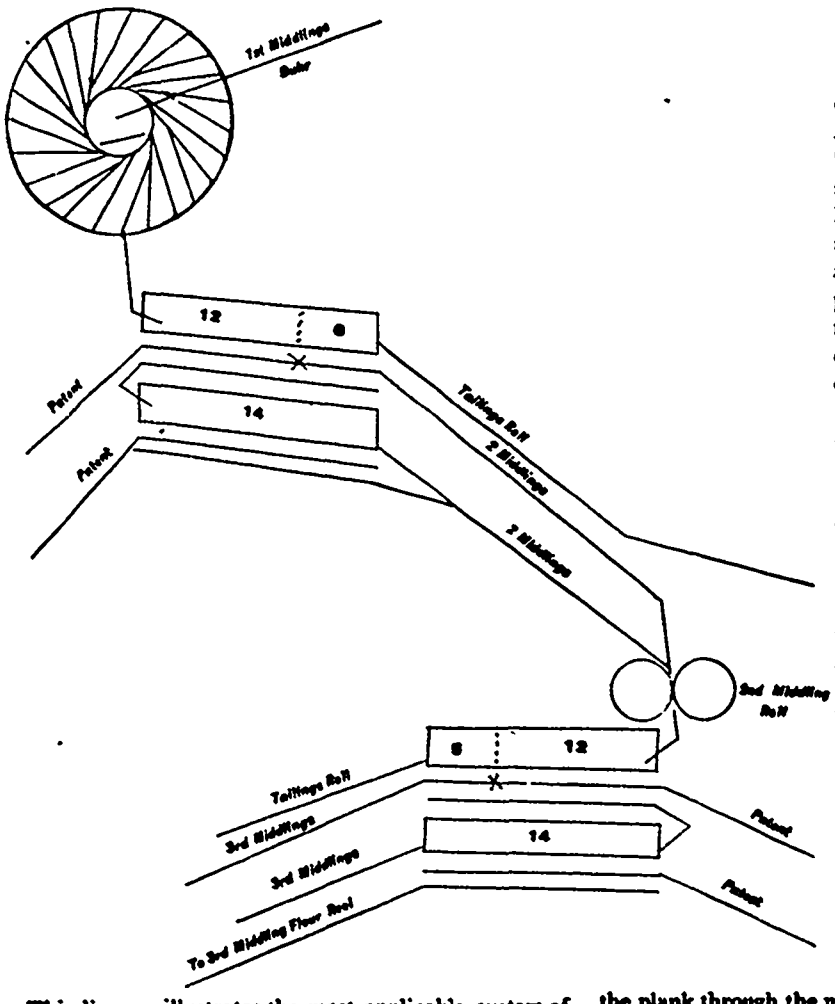


This diagram shows the reduction of the second middlings, a grade of material next in value to the first middlings, in consequence of their character being softer and more specky, but which, nevertheless, with judicious management, can be made into a flour that will in high grade milling pass off as 2nd patent. As shown by the cut, the product of No. 12 is a 2nd patent, and also the product of No. 14 on lower reel. The tail end of the top reel is clothed with No. 6, which produces tailings for tailings roll and No. 3 middlings.

This comprises the 1st and 2nd reduction on the 1st middlings stock, which produces 1st and 2nd patent, and the materials that are to be handled further on, and not illustrated or described at present.

A few remarks in regard to the handling of the arrangement may be of some service, particularly to millers of limited experience, and those just rising in the milling sphere. Experience has taught that attempting to crowd a roll is defeating any progress the operator may suppose he is making, inasmuch as a roll over fed will fail to act as a reduction medium ; and if a roll is run with overdue pressure, it will fail also, as the excessive pressure presses the material into a state of fluffy and flat stock, which, if not disintegrated, cannot be subject to its succeeding separation. Therefore, to avoid any trouble in any of the departments of the gradual reduction mill, we must begin in the proper place and in the proper way. As this point is one out of a number of the starting places, the writer would recommend the reduction of the middlings to be done with as little pressure as is consistent with the successful running of the system. Of course, the differential has to be considered as a disintegrator, and can be used to advantage when properly adjusted.

There are many millers throughout the provinces who still adhere to the time-honoured millstone—who think there is still a place for it in the mill. There is no doubt as to its utility as a rapid reducing implement nor yet as to its impoverishing action on the flour thus made. For those who are favourable to the buhr for the reduction of middlings, the writer will give a scheme for its use. The following will show it.



This diagram illustrates the most applicable system of using the stone in a gradual reduction mill, and if handled to good advantage, will be a reasonably good plan in combination with smooth rolls. But in its operation, the operative will require to handle it to a nicety, on account of its grinding tendency. The following suggestions will require particular attention, viz., the quality and texture ; the fitting of the driving irons and mode of transmission ; the balancing of the runner and leveling of bedstone ; the smoothness of the face and furrow, which are slightly inclined from the eye ; and lastly the reduction of the middlings. The latter need constant attention, as the quality of the flour thus made can be either improved or impaired. Running slowly, with the runner running high, the product will have a lively and granular texture, and at the same time a good colour. On the contrary, by the opposite method the flour will be deficient in colour, granulation and purity. Therefore to use the millstone to advantage, to make it an article of utility, requires judgment, skill and practice, judiciously applied. When these requirements are met the barbarous action of a rough or cracked face, etc., will be considerably lessened, and the buhr considered a tolerably efficient method for the purpose. Equality of face and furrow, according to the writer's experience, would be attained with one and a half inch face and furrow alternately, and a motion of from 1200 to 1400 feet of circumference per minute. For the dressing of its product two flouring reels are clothed with No. 12, 6 and 14, top and bottom respectively. The product of 12 and 14 is a patent flour, and product of No. 6 and tail of 14, is 2nd middlings, and tail of No. 6 is stock for the tailings roll.

The middlings produced by the first reduction are called 2nd middlings, and require a more tender treatment, in order that a flour of fair quality may be obtained. To accomplish this, smooth rolls are used, succeeded by two flouring reels, clothed with Nos. 12, 5 and 14. The product of Nos. 12 and 14 is patent flour, and that of No 5 and the tail of No. 4, 3rd middlings, while the tail of No. 5 goes to tailings roll.

Another arrangement can be designed whereby the entire millstone system can be placed for the first two reductions. But in that case the perfection of the buhr must be observed, and the clothing of the reels. That is smooth surface reduction and bolting of the best, and so adjusted that the automatism of the process will be one continual and regular flow of the various material produced to and from the system. Where combination mills are running, and deficient in reduction rolls, this plan will make a marked improvement as the low grinding is dispensed with, being practical when only one reduction is made.

In the writer's opinion, this idea can be made to work quite successfully in some localities, that is, where roller mill competition is limited, and high standard milling not as yet in the field.

HOW IT IS DONE

James Francis, in a recent communication to the Boston *Manufacturers' Gazette*, says : "I chanced to be in a wood shop not long since, and noticed in particular the frantic efforts made by a planer hand to force a 16-feet 2-inch plank through a pony planer which was designed for planing thin, light panels and cigar box stock. After one end of the plank had passed under the pressure bar, the workman (?) dropped the other end of the plank. The leverage was so great that the planer tipped up on one edge of the base, the front part leaving the floor nearly an inch. A deep cut in the plank told where the cutters were when the pressure bar and feed rolls were sprung upwards by dropping the plank. The feed belt had become so loose that the binder would not strain it sufficiently tight to prevent its slipping. The planer man did not think best to shut down and take out a piece of the feed belt ; instead of that he turned the feed pulley with his hands, starting it every time it stopped, and slowly worrying the plank through the machine. A big pile of shavings lay in front of the planer, and on this pile were half a dozen planks he had already planed. The farther ends of these planks were higher than the top of the planer. Instead of removing the planks, this man kept puzzling at the feed belt. The end of the plank glided up on the finished planks, thereby tipping up the planer again. In fact the planer came down with a jar, after the plank had got out enough to spring up the front feed rolls. That the planer was not broken by this usage was a good recommendation for its maker."

It is reported that one of the heaviest lumber operators on the upper St John River, N. B., is in serious trouble with the American customs' authorities for making alleged false entries at the customs' office, Fort Kent.