

THE AIR CLASSIFIER MAKES IT Many Find Permanent Home

By Austin T. Drake

WHEN FIRST CONCEIVED, like the answer to an alchemist's prayer, air classification of flour promised the production of all types of quality flours from the inferior wheats being produced in embarrassing quantities by America's Hard Winter wheat growers. The fact that it did perform that function is a matter of record. The fact that the function was uneconomical for most millers is also now a matter of record. The problem the air classifier corrected was attacked from other angles, such as improved wheat strains, and the intervening years have seen a reversal back to historical uses for Hard Winter, Soft Winter, and Spring wheats.

Many of the multi-unit installations of classifiers in mills of the hard winter area have been abandoned. The large amount of machinery needed for multiple passes through classifiers and grinders, in order to produce competitive flours from inferior wheats, proved much too costly an operation. One has only to peruse some of the many patent applications for the "protein shift" process to arrive at the same conclusion.

Too Much Protein

At approximately the same time that many Hard Winter wheat millers were experiencing lower protein levels in their wheats, the millers of Pennsylvania and other soft wheat states discovered an undesirable increase in protein occurring in their Soft Winters. Most millers consulted blamed the increase in wheat protein on the increase of chemicals used by the growers to obtain larger acreage yields. Whatever the cause, its effect was to force the miller to go outside his area for lower protein wheats, at higher cost, that could be blended in

when low protein cookie or cake flours were to be produced on the mill. This situation called for their consideration of the air classifier, and its processing system, as a method to be used to compensate for varying chemical composition of an otherwise quality-type wheat.

Two Categories

The flours produced from soft wheat are used mainly for two different categories of low-medium flour uses. Cake flours and cookie flours with some other very low protein flours would constitute one group, while another group would be in the medium protein range of flours used by pretzel and cracker manufacturers.

In former times, the soft wheat miller could produce from his local wheats very good cookie and cake flours and usually at a percentage of the total mill stream approaching 100%. When slightly greater strength was required, he would switch from a mixture of red and white local wheats to a 100% red wheat mixture and produce flours for pretzels and crackers.

With the gradual increase in protein in the local wheat crops, the miller was forced to bring in higher priced white wheats from other areas and either blend in a substantial portion of the white with his local wheats or grind the white wheats separately to produce the required low-protein flours.

ABOUT THE AUTHOR

Mr. Drake is manager of the grain processing division of the Sturtevant Mill Co., Fostoria, Ohio, and over the years has been much in demand as a speaker at millers' meetings around the country. Often he's referred to as "Mr. Air Classification," though his talents are by no means confined to this one facet of milling technology. He is rated as an expert on the subject because his firm's classifiers are processing about 1,000 cwt. flour per hour in six states and equipment is in operation overseas, some as far away as Hong Kong.



He represents the third generation of the Drake family to be associated with milling. His grandfather, Stuart Drake, owned a small mill in Bowling Green, Ind., as part of extensive land holdings there. His father, Ernest Drake, was an operative miller, and an inventor of milling machines. Ernest finished his active milling career at the age of 80 as the mill superintendent of Hayden Flour Mills, Tecumseh, Mich. Austin himself was engaged in milling for 17 years, moving in right from high school — and the midst of the Great Depression. In 1950, he left Nappanee Milling Co., Nappanee, Ind., where he had become mill superintendent, for employment with Entoleter, serving as laboratory director. In 1959 he joined Sturtevant in his present position.

Some of the medium size mills in the soft wheat area are able to take the entire flour stream of their mill and, without regrinding, send it all through a classifier with the very happy results illustrated by Figure 1. This diagram is taken from an operation which has been very successful and is operating on an everyday, year-round schedule. This further illustrates a very unusual case where the percentages of pretzel and cookie flour required by this miller's customers are almost identical to the cut point of the classifier, and the cookie flour is sold on approximately a 3 to 1 basis over the pretzel flour.

Figure 2 illustrates, again, a soft red winter flour mill operation, but differs only in that the miller had, by stream analysis and selection, divided his flours into two different streams of varying protein and viscosity levels. However, due to changes in wheat proteins, and the difficulty in obtaining different types of Soft Winter wheats to blend, he was unable to further improve the two streams simply by stream selection. A classifier was placed on the larger of the two streams and set to pull out at approximately a 15% fines cut. The 15% of fines from the classifier were consigned, on the run, to the other higher protein flour stream and served to enhance this particular stream. The coarse product from the classifier, while less in quantity than the original stream, had been lowered in protein and viscosity so as to increase its value as a pie or cookie flour.

Due to the characteristics of soft wheat flour, nearly all the soft wheat flour millers are able to reclassify their flours, causing substantial changes in analyses, without having to regrind the flour. This is certainly not true of the Hard Winter or Spring flours. They require considerable regrinding so as to free protein particles which can be removed by the classifier.

Savings Cited

By elimination of the grinding step, the soft wheat miller has a distinct advantage over millers in the Hard Winter area and there is no question in regard to the economics of the system. By installing the classifier the miller, in nearly all cases, can produce the needed flours from wheat grown in his own area. This results in savings which are more than adequate for amortization of the classifier installation.

Some of the largest of the soft wheat mills, in order to hold down equipment costs, make further use of stream analyses and carefully select from their many patent flour streams only those streams from which the greatest degree of protein can be re-

moved without serious alteration to their cookie or cake grades. This is illustrated by Figure 3 and shows their procedure where a strengthening of the cracker flour portion of the mill product is desired without the necessity of blending in either higher pro-

tein flours or grinding higher protein wheats.

In the process of removing the 13% of small micron-size fines a slight coarsening of the final cookie flour product may result. However, this is usually desired as it promotes

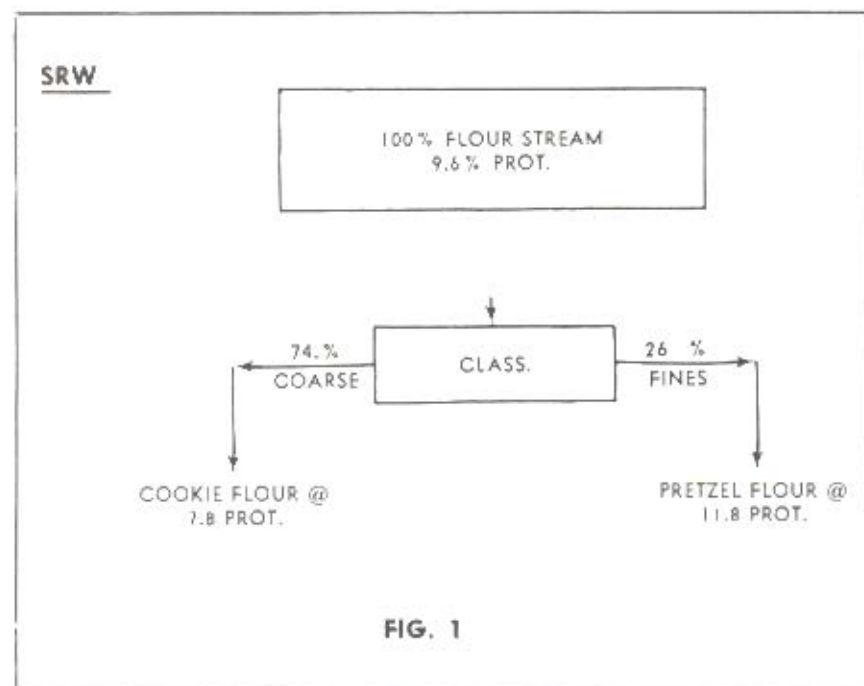


FIG. 1

FIGURE 1—Entire flour stream from Soft Wheat mill sent to classifier without prior stream analysis. Classifier split is variable so as to compensate for minor protein changes in wheat to mill.

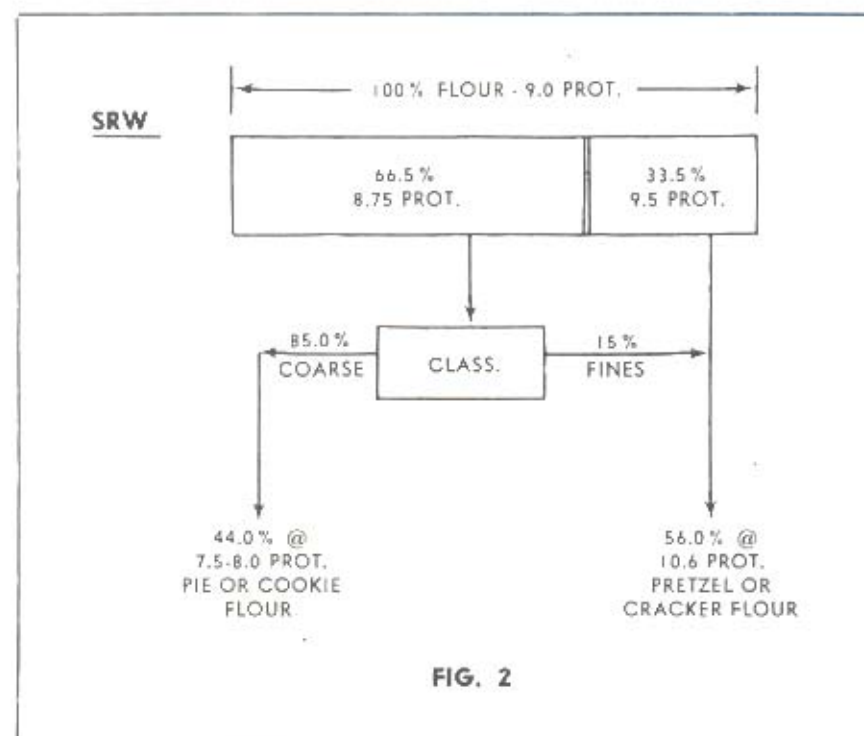


FIG. 2

FIGURE 2—Soft wheat flour, divided into two streams by prior chemical analysis, is partially operated on via classifier to produce higher and lower protein products when desired.

better cookie spread. The removal of the fines from the head-end middlings flour streams has further served to reduce the ash content of these streams and, after a regrinding operation, the total patent flour stream be-

comes an improved cake flour. Therefore, the process has allowed the miller to strengthen his cracker flour, improve his cookie flour, and make it possible to produce a better cake flour. The Hard Winter flour classification

process, discussed in the opening paragraphs of this article, is still utilized by some mills but in the less expensive and much abbreviated form shown by Figure 4. In this operation the miller has utilized stream selection to split his 100% flour into proportions of 74% and 26%. The 26% shown on the diagram is made up of streams of lower protein quality but is not to be confused with normal "clears" flour. This 26%, because it is derived from hard wheat, is sent to a grinder which serves to free and reduce some of the protein matrix material. Running this to a classifier and cutting at a 13.5% level, a stream of flour is produced which analyzes at least one percentage point less protein than the parent flour and places it in a different category.

Clears Problem Noted

In the case illustrated, the miller uses the coarse stream from the classifier as his "sweet goods" flour which he formerly could not produce by any type of stream analysis and separation. The benefits derived from the system are slightly offset because a percentage of "clears" has been produced in the amount of 3.5%, and will have to be disposed of in a not always profitable manner. However, this operation has been in effect for many years and, obviously, must have proved to be economical over the long haul.

One-pass operations, such as illustrated by the four figures, have found rather wide acceptance by flour millers and have allowed the air separator to find its niche within the wheat milling industry. The present "niche" occupied by the air classifier is perhaps far different than that envisioned by many innovators when air classification of flour was proposed as a means of producing the long sought for "silk purse." Rather than being used to produce "super products" from "nothing" materials, it has settled into the milling industry as a valuable piece of machinery which can be used to further enhance the qualities of a good basic material and to extend the scope of its usage.

Where, at one time, the air classifier was looked upon with trepidation and skepticism by the soft wheat miller, it has now become the servant of this miller while helping him to maintain the quality of the many products produced from his own particular wheat strain.

In conclusion, it appears that the air classifier and its process have not been consigned to an unmarked grave on some Kansas plain, but are now "alive and kicking" in soft wheat flour mills wherever they exist.

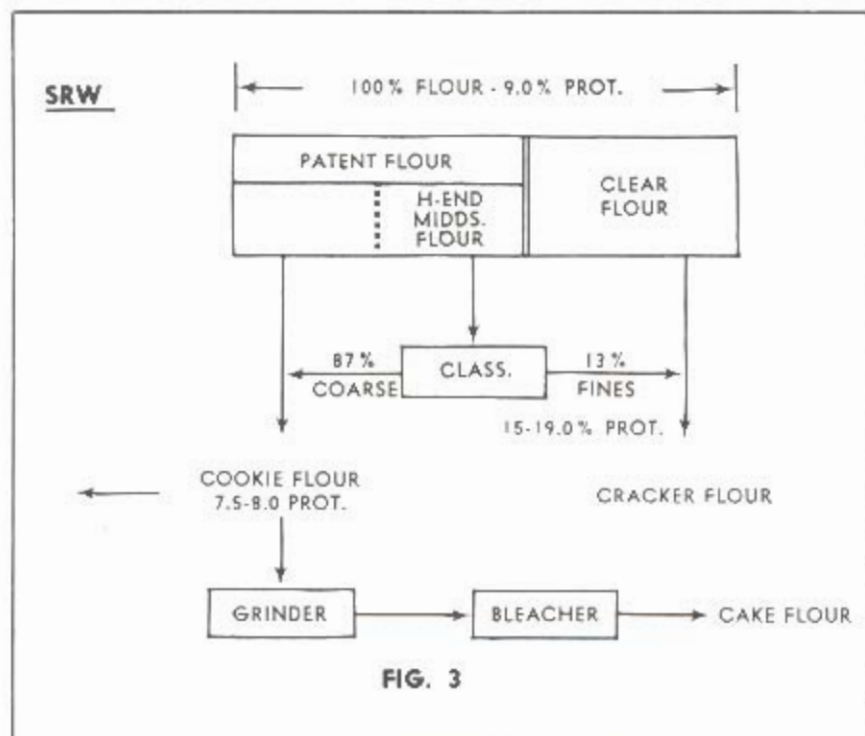


FIG. 3

FIGURE 3—Soft wheat patent flour stream sub-divided to isolate special head-middlings streams for further classification. Produces three specialty flours from one wheat source.

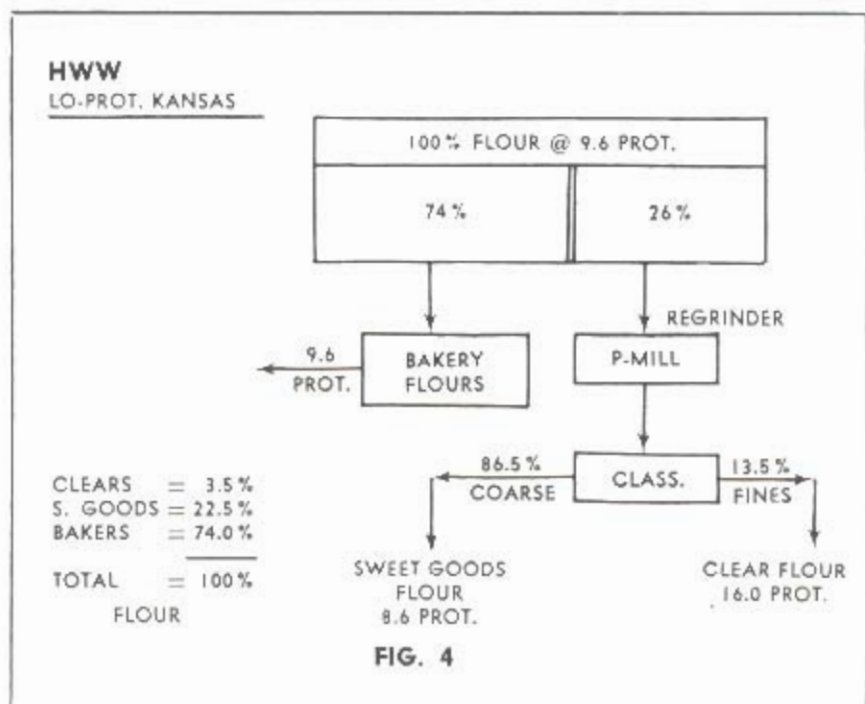
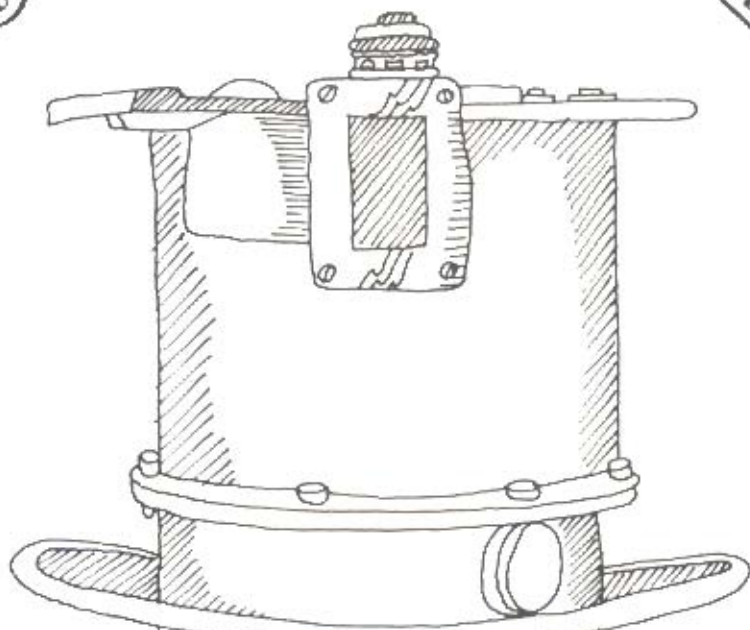


FIG. 4

FIGURE 4—Classifier used to produce a low-protein flour suitable for "sweet goods" while utilizing the greater amount of the mill run for "bakers." Hard Winter wheat used entirely.

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