AMERICAN INDUSTRIES, No. 38.

THE MANUFACTURE OF PRINTING INKS.

On the first page of this paper we illustrate the leading processes of the printing ink manufacture, as conducted by one of the oldest houses in that branch of business. In the early history of printing it was common for printers to make their own inks; but with the more varied requirements of modern printing offices, it has been found that greater economy and generally better results could be obtained by making of this department a separate trade.

The making of first quality printing inks is a nice operation; it requires a high degree of skill and a nicety of judgment obtained only by long experience, although the general methods employed have shown but little change in many years. All practical manufacturers have, however, certain trade secrets, the value of which would be recognized only by an expert, but which they carefully guard, touching details of grinding the color, making the varnish and lampblack, and the various pigments they employ in colored inks.

In our illustrations the view at the upper right hand corner shows the furnaces in which the lampblack is made. This is the color basis of most of the black inks, although finely divided charcoal and occasionally other blacks are also used to some extent. The making of the black is a simple and well understood process, but on the materials employed therefor and the quantity of black used depends much of the success of the ink manufacturer.

The picture to the left at the top, showing the varnish making, presents a part of the business on which, quite as much as the color, depend the distinctness and brilliancy of all first class inks. Linseed oil is largely used for this purpose, though other oils are likewise employed, and resin oil has been extensively used in the cheaper inks. By boiling the fatty constituents of the oil—glycerine, palmitine, etc.—are volatilized. For the best inks, the oil is clarified by digesting for some hours with dilute sulphuric acid at a temperature of 212 degrees, then washing with hot water, when it will dry quickly and thoroughly; the oil is then boiled, and the inflammable vapors that rise are ignited, which, after burning for some time, are extinguished by a cover placed over the vessel. In order to promote quick drying, manganese in its different states and other driers are sometimes added. The view entitled "color plant" shows the department where the various pigments for colored inks are prepared. These are made of almost everything which can be practically worked to give the different shades desired, either mineral, animal, or vegetable, the pigments being prepared so as to be as little liable to change as possible, and then kept on hand to make the basis of the different colors, by taking exact quantities or proportions by weight of each. The coal tar or aniline colors have been very fashionable for some years, and, although they give great brilliancy at first, it has been found they are not lasting.

The black ink making room at the right of the general view shows where the lampblack or other carbonaceous blacks employed are mixed with the hot compound of burnt oil and resin. The mixing is effected in a cylindrical vessel by a revolving shaft with fingers.

The color grinding, as shown in the large view at the bottom of the page, is done by powerful iron or stone mills, in which rollers of great strength, driven by steam power, reduce the mixture to so fine a state that no coarse particles can possibly pass.

Besides the ingredients mentioned above, soap is sometimes used in order to prevent smearing, assist in obtaining sharpness of impression, and help to make the ink leave the types readily when the paper receives the impression. Yellow resin soap, thoroughly dried in slices and reduced to powder, has been considered the best for this purpose.

The qualities which good ink must possess are as various as the widely different uses for which it is employed. Some ink is made to print on dry paper, and some with the sheets wet; highly finished stock requires an ink of different body from that which is to be used on soft paper. All fast printing must have an ink especially adapted for that purpose, and in printing on tinted papers, either with black or colored inks, the best results are only obtained where the ink is made especially for the particular work in hand. The rollers with which the ink is spread over the types must not be injured by any substance in the ink, but the ingredients of the latter should rather be such as will preserve and keep the rollers in good working order. Copper and steel plate printing, and also printing on stone, each require different kinds of ink, and it has been customary with plate printers and lithographers, until within a few years past, to make their own inks. To this department of the business, the firm, since the introduction of steam presses, have given great attention, and their efforts have been attended with conspicuous success, both in black and colored ink.

The making of fine printing inks was first commenced in this country by Mr. George Mather, in 1816. Previous to that time the finer qualities of ink were imported from England and France. This led Mr. Mather, who was a practical printer, to turn his attention to ink making, and after a long series of experiments, he succeeded in making black inks equal to those which had previously been imported. Mr. Mather died in 1861, but the business which he had established and so long conducted was, four years before his death, turned over to two of his sons and his son-in-law, Ralph N. Perlee, who continued it under the firm name of Geo. Mather's Sons. In 1878, Mr. D. W. C. Mather retired from the business, and the present members of the firm consist of S. Talmage Mather and Ralph N. Perlee.

About the time of the retirement of Mr. George Mather from business, color printing was being developed. Mr. Mather had produced, for many years, such colored inks as printers needed for special and immediate use, as shown in the title pages of "Harper's Pictorial Bible," printed in 1847, and other illuminated works, but now a call had risen for stocks of ready-made colored inks, to be kept in store. Consequently, a thorough course of experiments were made chiefly under the directions and personal tests of Mr. Perlee, which were attended with such marked success that the firm obtained the orders for almost the entire amount of letterpress colored inks used during the war for printing the government "greenbacks" and bonds. At this period also, the issue of pictorial papers became a large business, and an entire change in the ink manufacture was necessitated for the production of an article which would be best adapted for the work, and here also Mr. Perlee's efforts were eminently successful. The Picturesque Europe and America the Picturesque World, the Art Journal, and many other works of this character, have been printed with the fine woodcut inks of this firm.

The ink works, as shown in our engraving, are located at Jersey City, and the large establishment now required for the manufacture forms a striking comparison with the limited premises and primitive conveniences which sufficed for the business of the house when it was first established. It is always pleasant, however, in making this record of the development of our leading industries, to note the progress of a long established branch of manufacture, as is shown in the history of ink making by this firm, their factory being the only one which has been in continuous operation for so long a period as sixty-four years.

The New York office of Messrs. John Mather's Sons is located at No. 60 John street.

Safeguards to Human Life.

Mr. T. Blake, M.P., recently addressed a meeting of the electors, in which he took severely to task the administration and the war policy of England in sending an invading army into Zululand. Among other remarks he said: "I regard human life as the most sacred thing. How it is guarded in England! Even if a man has to be put to death, look at the many safeguards there are that his condemnation shall be just, and that the sentence shall be as humanely as possibly carried out. He is first tried, an advocate being provided for him; and if he be condemned there is a minister of religion in the person of the jail chaplain to attend him to give him spiritual counsel and comfort. Everything is done to prepare him for his end, and then on the dread day when he is to suffer the last penalty of the law, the high sheriff—who is a bigger man altogether than the Lord Lieutenant—is there, or some one to represent him, to see that the sentence is carried into effect. What, however, do we do with a man who, instead of having killed only *one* other fellow creature, comes home from the field of battle, having killed *many* men with his own hand or helped in the slaughter of many hundreds or thousands of his fellow creatures? To such men we give titles and distinctions, and we present them with swords of honor. Calcraft, that late public hangman, exercised his office for the government for a number of years. He took the lives of persons condemned to die, and he strove to do his task as expeditiously as possible, so that the suffering should be as short as might be. He did this work of his for many years. But Calcraft received no pension at the end of his official career; he was never presented at court; he was not made privy councillor; they did not even give him a new rope. They give an army officer, whose hand is also red with blood, a new sword. Calcraft, and his successor, Marwood, did their dread work in the name of the law, in the name of the Queen, and in the nation's own appointed way. Why do we hold them in such abhorrence, and yet applaud the man who cruelly takes the lives of his fellowmen, if they are of a different color, who have done no wrong? A man who kills his fellowman is justly regarded as a murderer, while the man who kills 1,000 men, or is the cause of their being killed, is lauded and honored, and is regarded as a great hero. There are some of those officers who have returned from Zululand who exult over the number of Zulus they put to death with their own hands. The men who fight the wars are, it is to be remembered, not the men who make the quarrels. If those who make the quarrels were but to fight them out themselves we should have, I think, but few wars. Everything that adds to the war spirit of the country—as our immense outlay in armaments does—is a national curse. However, I must not dwell too much upon this war policy; but I feel strongly about the sanctity of human life, and that war should be entered upon only as a very last resort. For what, after all, does war determine? Not which part to the quarrel is in the right, but simply which is the stronger. I, therefore," concluded the speaker, "advocate arbitration between nations and the settlement of their quarrels in much the same way that individuals are obliged to settle theirs."

Catching a Cannon Ball.

Recently, at Leeds, John Holtum, a gymnast, was charged before Mr. Bruce, the stipendiary magistrate, with unlawfully wounding Elijah Fenton, a market porter, in the Princess Concert Hall, in that town. Holtum had, during the week, been giving performances showing extraordinary strength in the handling of heavy clubs, cannon balls, etc., and on Friday night he offered a prize of £50 to any person who could catch a ball fired from a cannon as he (Holtum) had done on several consecutive nights. The challenge had been accepted by three men, and a cannon having been placed in position on the stage, a suitable cartridge and a ball weighing seven pounds were rammed home. When Holtum called upon those who had accepted his challenge, Elijah Fenton presented himself, stripped off his coat and waistcoat, and, standing about six yards away from the cannon's mouth, declared that he was ready, and placed his hands in a position to secure the projectile. An attendant fired the cannon, when, to the horror of all present, the ball struck Fenton in the forehead and knocked him down. He managed to crawl off the stage, and at first it was thought that he was not much hurt. Shortly afterward, however, the case assumed a much more serious appearance, and Fenton was removed to the Leeds General Infirmary, where it was found that he had received a compound fracture of the skull, and that his recovery was almost hopeless. The stipendiary magistrate remanded Holtum until Tuesday. Mr. Hobson, the proprietor of the Princess Concert Hall, promised that the performance in question should not be repeated on his premises, but stated that Holtum had been performing on the Continent in this way for five or six years, and never had an accident of this kind before.—*London Times.*

Blistering of Paint and Varnish.

BY FRANK FIELDING.

Many are the opinions expressed regarding blistering, and although some very sensible theories are advanced, we are inclined to believe that the bottom of the subject has never been reached. We hold an opinion of the cause of this trouble, and it may be that this opinion has been forestalled by others, but as we have never seen the points laid down in print, we present them here.

Blistering of a varnished surface after the varnish has had proper time to harden is due to the evaporation of moisture which lies confined under the shell of varnish. This evaporation is caused by heat, and it is seldom, if ever, a blister will rise upon a varnished surface without the temperature is raised to an extreme degree, near to that which the varnish received in its manufacture.

The accumulation of moisture *under* the varnish may be brought about in several ways; the most particular one being in the closing in of moisture in the rough stuff. During the rubbing of the rough stuff the water used is partly absorbed, and unless due care is taken to give ample time for "drying out" before the application of subsequent coats, a great amount of moisture will be confined within the cells of the rough stuff.

Boiled oil contains moisture, as of water, and in cases where steam is used to express the oil from the seed this percentage is increased. Turpentine, an extremely volatile liquid, also forms an evaporating substance which is rendered active by a slight heat, and in its haste to reach the air it disturbs the outer surface, either lifting an elastic coating into bubbles or blisters, or bursting open a hard and inelastic one into cracks.

The primary cause, then, of blistering is moisture either in the form of wet moisture or of evaporating liquids, such as turpentine. The wood may be unseasoned, or it may have been wetted in the course of preparation, such as steaming to bend, etc. The rough stuff water may have been applied before the evaporation of liquids had taken place, either of which would bring about disastrous results.

"Dry blistering" is simply the hasty absorption of the liquids from outer coats by putty or paint which is expressly porous, depriving the coating of the requisite amount of binding and adhesiveness.

To prevent blistering, close up every lurking place for moisture by the use of the A B C system of painting, which will be found to be as easily done as repeating the alphabet. Be careful to have each coat dry before applying another, and you may laugh at the trouble which some of the craft call "deviltries."—*Coach Painter.*

Effect of Intense Cold on Beer.

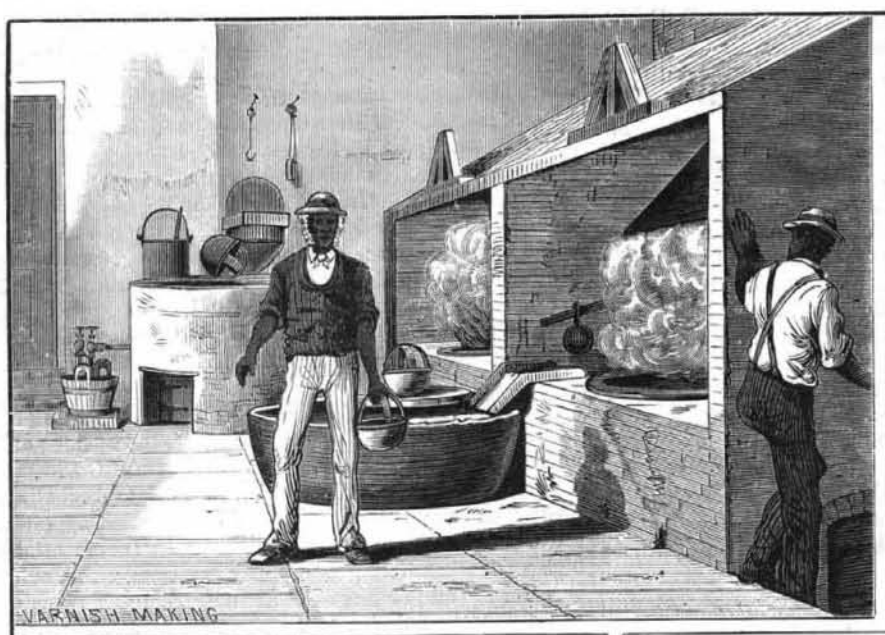
There are some advantages and many disadvantages to the brewer arising from very cold weather. Beer keeps far better when the thermometer stands below 50° F., but when the thermometer is for days several degrees lower than the freezing point, the usual arrangements for storing beer in this country altogether fail to keep it in good condition. The ordinary cellars, both of breweries, retail establishments, and private houses, are but ill adapted to protecting beer from intense cold, and the result has been apparent during the last few weeks in large quantities of beer either turning up cloudy or failing to drop bright; with a reduction of temperature there is a diminished power of holding albuminous bodies in solution, and therefore some of these separate, producing a cloudiness which requires a long period of high temperature to remove again. Another result of cold weather is to cause beer to turn flat; in its normal and healthy state beer should undergo a slow but regularly secondary fermentation, by which a certain amount of carbonic acid gas is evolved which serves to keep up the "life" of the beer; at very low temperatures the organisms which cause this fermentation are inactive, and no gas being evolved, the beer becomes flat. The greatest danger to beer during the winter months is the sudden changes of temperature; with the thermometer one day at 55° F. and the next at 25° F., it is impossible to keep beer in condition, at least with the usual cellar arrangements which prevail in this country.

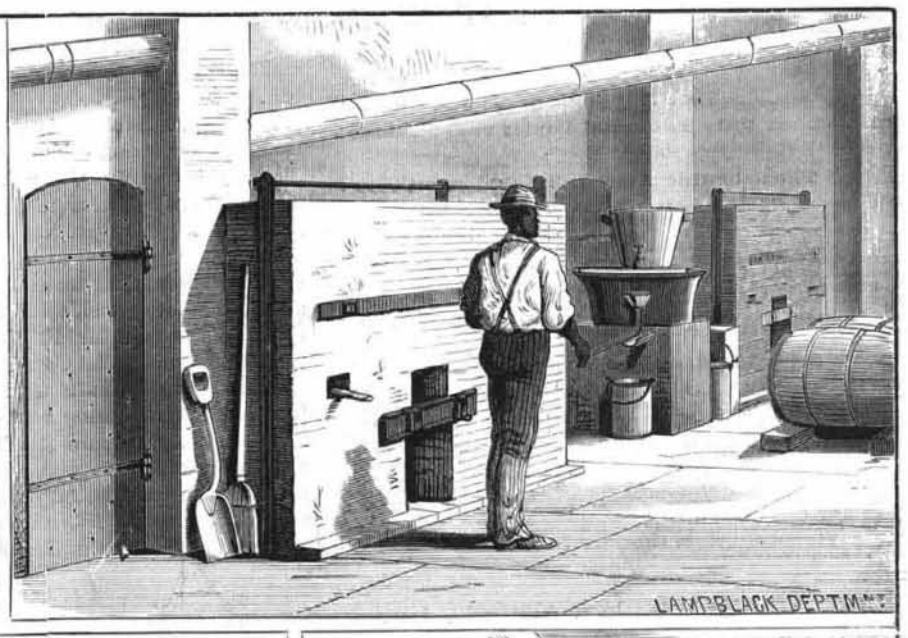
SCIENTIFIC AMERICAN

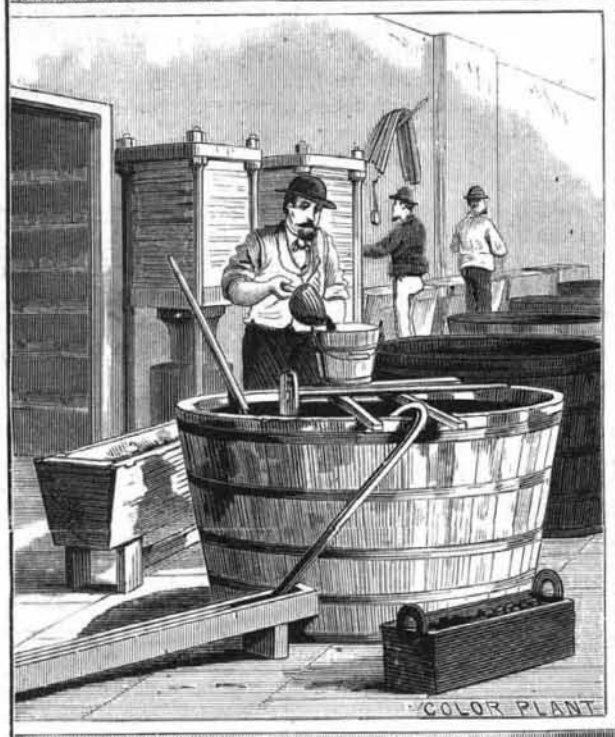
[Entered at the Post Office of New York. N. Y., as Second Class Matter.]

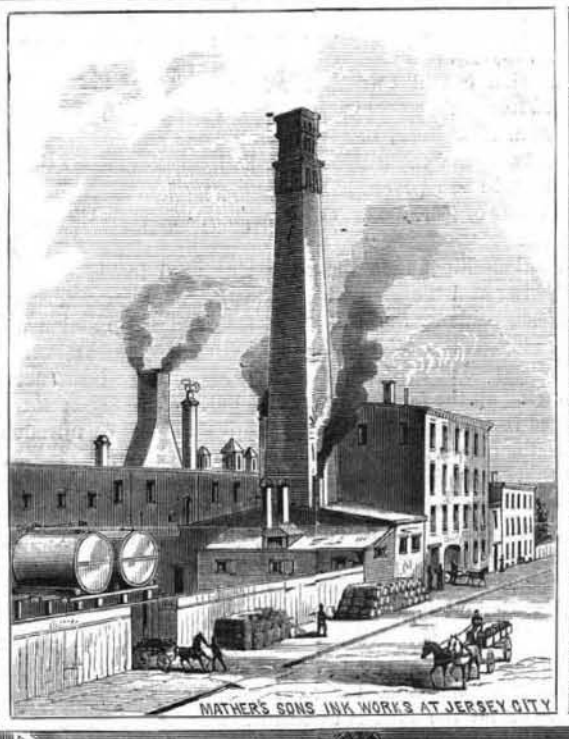
A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY AND MANUFACTURES.

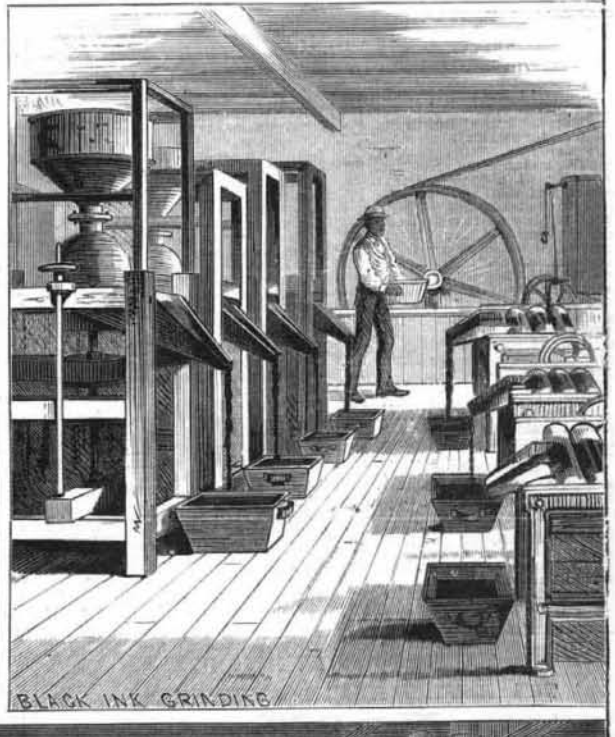
Vol. XLII.—No. 15. [NEW SERIES.] NEW YORK, APRIL 10, 1880. [$3.20 per Annum. [POSTAGE PREPAID.]

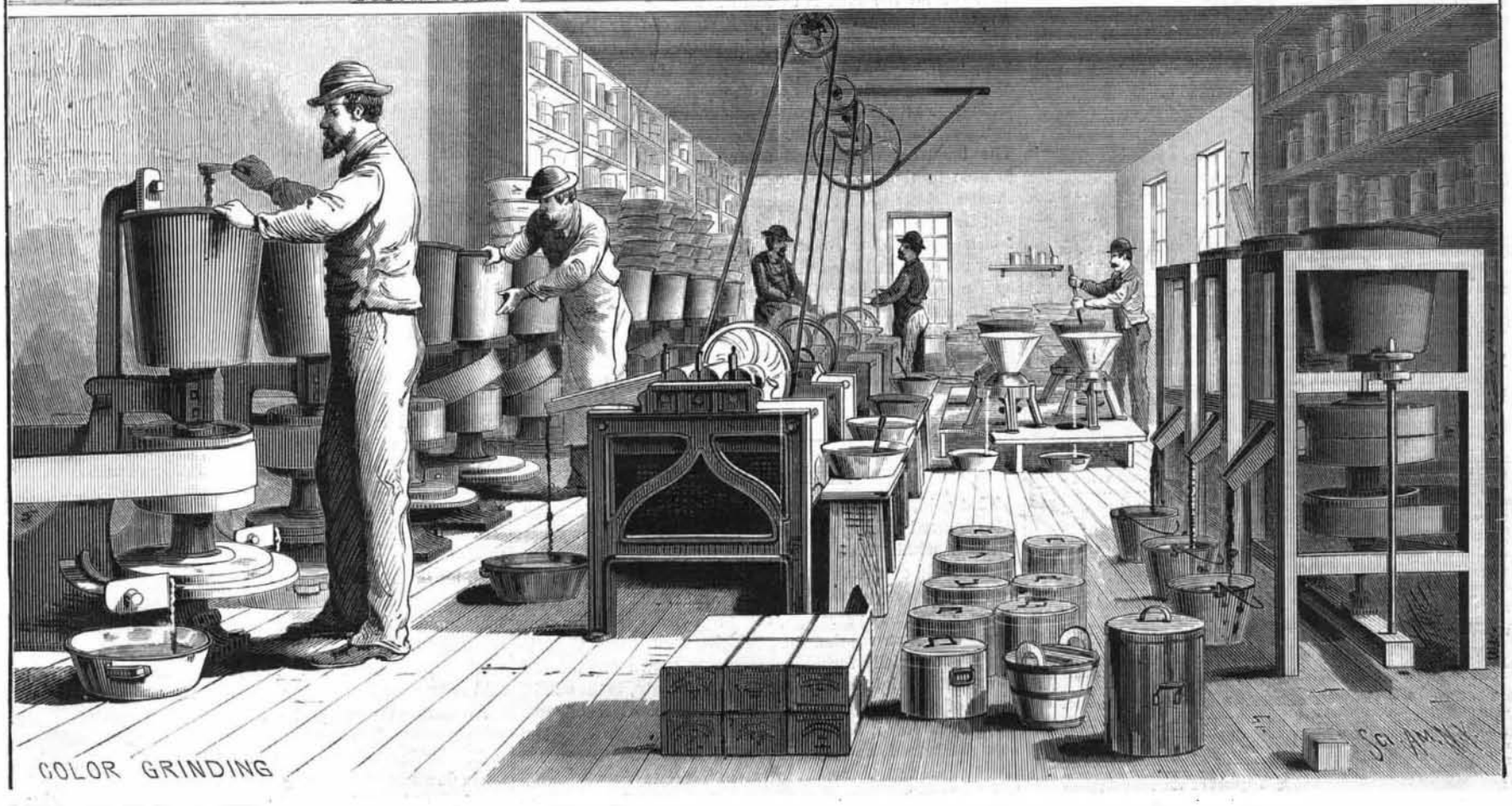












THE MANUFACTURE OF PRINTING INKS—GEORGE MATHERS' SONS' INK WORKS, JERSEY CITY, N. J.—[See page 229.]