

passed or contracted in the course of his business for the period of thirty days after the same were payable, or being insolvent makes a preference to any creditor, or makes an assignment for the benefit of existing creditors with or without preference. Power is granted to the Court to grant extensions of time for payment, and to reduce the indebtedness *pro rata*, so as to enable the insolvent to proceed with his business if it seem best; and if approved by the Court, an agreement between the debtor and a majority in amount and number of his creditors may be carried into effect. Any conveyance, transfer or payment made and received in view of bankruptcy may be set aside if found by the Court to be contrary to the just rights of other creditors. A very extraordinary provision is made giving a preference in payment or security, if the Court thinks fit, to money obtained and used in good faith, although unsuccessfully, to avert an impending bankruptcy, or to save a threatened sacrifice of property, or for sickness or other like necessity. It is further provided that if it shall appear to the Court that any creditor has wilfully and oppressively sought to bring about the bankruptcy of the debtor, or to obtain any fraudulent advantage over other creditors, it may deny such wrong-doer any participation in the estate, or, if it should deem it just, a partial benefit of his claim. The discharge of the bankrupt shall not operate against any liability for fraud, trespass or other wilful tort, but the validity of any discharge in bankruptcy shall not be contested after the expiration of two years from its date. The District Courts are to be always open for the reception of petitions and consideration of the business under this Act, and at their regular terms bankruptcy business shall have precedence over all other kinds. The Supreme Court is charged with the duty of making such additional rules in equity as may be required, and to fix all fees and costs for services under the Act. The foregoing will convey a fair idea of the bankruptcy system which the Judiciary Committee of the Senate of the United States believes likely to meet the urgent demands which are made by the commercial classes in the United States, as they are in Canada, for a law that will secure an equitable division of the estates of insolvent debtors. It is at least deserving of consideration, and it meets one of the many objections that were made to our old law, inasmuch as it places all the members of the community on the same footing.

IRON MANUFACTURE. (8).

Continuing the subject from the close of our article of the 31st ult. referring to the advantages of a large furnace and long shaft,—if these dimensions are exceeded, the result, so far as reduction and carbon impregnation are concerned, is the establishment of a region of neutral character in the furnace, which may probably be advantageous in securing regularity of action, but is of no value in altering the power of the gas to hold only a certain amount of carbonic dioxide. Experiment with a shaft 120 ft. long under the Duryee process, is being made in the furnace nearly completed in our eastern suburbs, although with a different fuel. It is to be hoped that the sulphuretted compounds in our Canadian crude petroleum may not prove an obstacle to its use in this enterprise.

If the operation of smelting be carried on so that the whole of the carbonic dioxide, arising from deoxidation of iron ore and carbonation of the reduced iron, escapes in the gas discharged from the furnace at a temperature of 275°. the air does not require to be heated beyond 297° to ensure the greatest economy of fuel. The use of the hot blast admits of a change in the relation between the solid and gaseous contents of the furnace, that has the effect of accelerating the distribution of heat from the gas through the solid materials, which are thus heated more rapidly, while the gas is more fully saturated with oxygen, because of its longer retention in the furnace.

It appears that the differences in the amounts of fuel requisite for smelting different kinds of iron ore are due to the fact that the rate of reduction must be almost as rapid as the rate of fusion. The means by which economy of fuel is to be effected in accordance with this principle are to increase the capacity of the furnace sufficiently to ensure the most perfect combustion of the fuel inside the smelting furnace, instead of having carbonic oxide outside the furnace and returning to it the heat so generated in the hot-air apparatus. The improvement on the consumption of fuel in certain cases is not so much due to any additional heat conveyed into the hearth of the smelting furnace as to the increase in the reducing energy of the furnace gas consequent upon the increased temperature to which the ore is raised in the upper portions of the shaft.

The formation of carbonic oxide is probably one of the most important features of the smelting operation, since there is every reason to believe that the reduction of the iron ore is effected mainly, if not entirely, by this gas, aided perhaps in

some instances by hydrocarbon vapor and gas produced from the fuel by the action of heat—and this is probably what suggested the use of hydrocarbon oil to Dr. Duryee in his experiments. In the immediate neighborhood of the tuyeres the oxygen of the air-blast becomes saturated with carbon immediately it comes into contact with the fuel at that part of the furnace. It is at this point that while the fuel is being consumed the reduced metal and the earthy substances with it are melted, and, falling down into the hearth, make room for a fresh quantity of the material in the shaft of the furnace to sink down and undergo the same change, while the gaseous mixture of carbonic oxide and nitrogen ascends and communicates its heat to the materials above.

The volume of the carbonic oxide formed by the conversion of oxygen into carbonic oxide is twice that of the oxygen consumed, and when carbon is burnt in this manner by atmospheric air, containing 21 per cent. of oxygen by volume, the gas produced will have by volume 34.71 per cent. of carbonic oxide, and 65.29 of nitrogen. The ratio of oxygen to nitrogen in this mixture is 2658.1, the same as in atmospheric air. The result of analyses of gas taken from different heights in the shafts of blast furnaces in England, France and Belgium, Norway and Germany, shows that at some distance above the level of the tuyeres the amount of carbon in the gas is less in proportion to the hydrogen than it is at a lower level. This reduction in the amount of carbon is probably due to deposition of carbon by the decomposition of carbonic oxide, which takes place simultaneously with the reduction of ferric oxide, and appears to be a very important feature of the action taking place in the smelting furnace. The temperature at which the elimination of carbon takes place is, according to the best authorities, between 399° and 455°, and it accompanies the reduction of ferric oxide (Fe_2O_3) by carbonic oxide (CO). The carbon thus eliminated appears to be diffused through the mass of the iron ore undergoing reduction, and this absorption of the carbon is attended with a considerable disintegration of the ore, to such an extent that it is sometimes converted into a black pulverulent mass. We shall begin the next article of this series with the "manufacture of malleable iron."

Two Western fire insurance companies, hitherto confined to Ontario, are about to amalgamate and take out a Dominion license. Other arrangements are also being made with the view of strengthening the combination and affording still further security to the public, with better prospects to the shareholders.