

BROCADE, in Commerce, a stuff of gold, silver, or silk, raised and enriched with flowers, foliages, and other ornaments, according to the fancy of the merchant or manufacturer. Formerly the word signified only a cloth woven entirely of gold, both in the warp and in the woof, or all of silver, or of both mixed together; thence it passed to those stuffs in which there was silk mixed, to raise and terminate the gold or silver flowers: but at present all stuffs, even those of silk alone, whether they be programs of Tours or of Naples, satins, and even taffeties or lustrings, if they be but adorned and worked with some flowers or other figures, are called brocades. In manufacturing brocades, the flatted gilt wire is spun on threads of yellow silk approaching as near as may be to the colour of gold itself. The wire, winding off from a bobbin, twists about the thread as it spins round; and, by means of curious machinery, a number of threads are thus twisted at once by the turning of one wheel. The principal art consists in so regulating the motion, that the several circumvolutions of the flatted wire on each side may just touch one another, and form, as it were, one continued covering. The Venetians have carried on a large trade to the Levant in a kind of brocade called *domasquete*, which, though it has only about half the quantity of gold or silver as that made among us, looks far more beautiful. The flatted wire is neither wound close together on the silk threads, nor the threads stuck close in the weaving; yet by passing the stuff betwixt rolls, the disposition and management of which is kept a secret, the tissue or flower is made to appear one entire brilliant plate of gold or silver. At the beginning of the last century, the French government, ever vigilant for the advancement of arts and commerce, judged this manufacture important enough to deserve their attention; and accordingly, for contriving the machinery, they engaged the ingenious M. Vaucanson, known throughout Europe for his curious pieces of mechanism, who, in the memoirs of the academy for the year 1757, gives an account of his success, and of the establishment of such a manufacture at Lyons. The lower roll was made of wood, 32 inches in length, and 14 in diameter; the upper one of copper, 36 inches long, and 8 in diameter: this last is hollow, and open at one end, for introducing iron heaters. For making the rolls cylindrical, he had a particular kind of lathe, wherein the cutting tool, which the most dexterous hand could not guide in a straight line through such a length as 36 inches, is made to slide, by means of a screw, on two large steel rulers, perfectly straight, and capable of being moved at pleasure, nearer, and always exactly parallel to the axis of the roll. He first disposed the rolls nearly as in the common flattening mill. In this disposition ten men were scarcely sufficient for turning them with force enough to duly extend the gilding; and the collars, in which the axes of the rolls turned at each end, wore or galled so fast, that the pressure continually diminished, insomuch that a piece of stuff of ten ells had the gilding sensibly less extended on the last part than on the first. He endeavoured to obviate this inconvenience by screwing the rolls closer and closer in proportion as the stuff passed through, or as the wearing of the collars occasioned more play between them; but this method produced an imperfection in the stuff, every turn of the screw making a sensible bar across it. To lessen the attrition, each end of the axis, instead of a collar, was made to turn between three iron cylinders called friction wheels: but even this did not answer fully, for now another source of unequal pressure was discovered. The wooden roll, being compressible, had its diameter sensibly diminished: it likewise lost its roundness, so that the pressure varied in different points of its re-

volution. On trying different kinds both of European and Indian woods, all the hard ones split, the soft ones warped without splitting, and of more than 20 rolls, there was not one which continued round for twenty-four hours, even without being worked in the machine. These failures put him upon contriving another method of pressing the rolls together, so that the force should always accommodate itself to whatever inequalities might happen. The axis of the copper roll being made to turn between friction wheels as before, that of the wooden one was pressed upwards by a lever at each end furnished with a half collar for receiving the end of the axis. Each lever had the end of its short arm supported on the frame of the machine, and the long arm was drawn upwards by an iron rod communicating with the end of the short arm of another lever placed horizontally: to the long arm of this lever was hung a weight, and the levers were so proportioned, that a weight of 30 pounds pressed the rolls together with a force equivalent to 17,536 pounds, which was found to be the proper force for the sufficient extension of the gilding. By this contrivance four men could turn the rolls with more ease than ten could turn those which were kept together by screws; and the same weight acting uniformly in every part, the pressure continued always equal, though the wooden roll became oval, and though the stuff were of unequal thickness. A piece of cloth of about two ells was sewed to the beginning and end of the stuff, to keep it out to its width when it entered and parted from the rolls, which could not be done by the hands for fear of burning or bruising them. The stuff was rolled upon a cylinder, which was placed behind the machine, and its axis pressed down by springs to keep the stuff tight as it came off. Four iron bars, made red hot, were introduced into the copper roll, which in half an hour acquired the proper degree of heat, or nearly such a one as is used for the ironing of linen: the wooden roll was then laid in its place, and the machine set to work. The principal inconvenience attending the use of this machine is, that the heat necessary for extending the gilding, though it improves the brightness of white and yellow silks, is injurious to some colours, as crimson and green. A double pressure will not supply the place of heat; and the only method of preventing this injury, or rendering it as light as possible, appeared to be, to pass the stuff through with great celerity.

In order to clean brocades when sullied, neither alkalies nor soap must be used; but this may be effected by washing it with a soft brush dipped in spirits of wine, by which means the lustre of the gold will be perfectly restored, and the colours of the silk, if soiled, will become at the same time remarkably bright and lively.