

SPOTTING GUM.

R. E. DOOLITTLE, TOWNSHIP HIGH SCHOOL, HARRISBURG.

In discussing Spotting Gum, a follow-up method will be used. First, its value as a marker for the valve-stem hole will be discussed. For this reason, more than any other, was time, money, and effort expended in producing something that would lessen the ever increasing number of "Seconds" as a result of off-center valve stems.

Spotting Gum was developed to answer the above question as to the reduction of this number of "Seconds", which would otherwise be rated as first class merchandise. The answer was neither solved by the Planning Department, nor by the Production Department. Nor was it answered by any other body of men outside of one and probably the smallest department in the entire Company's organization, the Chemical Laboratories. The title herein stated is rather figurative, because most of the laboratories in the large rubber industries are far too small to handle the work placed upon them for solving analytical questions pertaining to the various kinds of raw materials that are used in the construction of rubber goods. In the chemical laboratories it was readily found that methylene blue would produce a spot from a very small quantity of dye, if properly applied, and this led to the development of an apparatus for the necessary application. In working out the details of this matter it was found through experimentation that the use of methylene blue was very expensive, and also that it called for the spot to be applied directly to the top plate of the valve base which is made of the same material as the rest of the tube. This particular section, being made of the same stock as the tube could be reclaimed, if it was not used, but with this spot on it, it has to be thrown in the scrap. In order to surmount this costly obstacle, a stronger dye was sought for and one that was cheaper, if it could be had, that would meet the requirements expected of it. The results of the experiments reveal that a red rubber dye number 1, made by the Federal Color Laboratories was used to meet this requirement. In the use of this dye the ap-

parent loss of the top plate was recovered, because this plate was no longer used to carry the spot, and therefore could be recalendered and reclaimed. In changing from methylene blue to red rubber dye Number 1, it was learned that the dye gave very satisfactory results from another layer in the base. The application of this material to the second layer of the base, can only be made possible by the material of the dye being in the proper chemical state.

In making the gum the chemical properties are so proportioned that they give a very peculiar reaction. The pale, crepe, raw rubber is used, after it has been thoroughly washed and freed from all foreign bodies; then thirty-two ounces are milled together with sixteen ounces of sulphur and one ounce of paraffine. This process is carried out until all of the various ingredients have been thoroughly mixed and the pale crepe has been sufficiently broken down to admit its molecules to associate with those of the paraffine and sulphur. After the completion of the milling process, the compound is then transferred to a masticator, where it is dissolved in benzol. During this operation, sixteen ounces of dye are added, after sixteen ounces of it have been thoroughly dissolved in benzol. This is allowed to mix and then six ounces of glue are added, dissolved in two hundred fifty cubic centimeters of water. The compound is then churned until the proper consistency is reached by the evaporation of the benzol. In discussing the relationship of the ingredients, it will be clearly pointed out that each of them have a particular function to perform in the action of the compound upon the finished product. The sulphur and paraffine add to the curing qualities of the pale crepe; while the dye is used, as you will soon see, for coloring, while the glue has another very important part to play in making the compound have what is known as a short consistency, rather than that of a stringy nature.

Having the material thoroughly mixed and of the right consistency, its next application is to the actual portion of the valve-base. This is done in the following manner: The valve-base is made up of three separate lay-

ers. Each of these layers is of a different size and carefully laid out, the bottom layer being the smallest, while the rest range upward to the largest section which is the cap. The cap is made of the same material as the tube, while the two other layers are made of frictioned fabric. This is fabric treated with two coats of rubber sent through a machine known as a "Calender," a machine consisting of three large rolls, one on top of the other. Between the top and second rolls there is a milling process carried out. The frictioning rubber is milled here, and, during this operation, the second roll carries a complete layer of rubber covering it entirely. The fabric is now brought between the second and the third roll. In this operation the fabric is given one coat of rubber. This operation is repeated by sending the fabric through upside down, that is, placing the rubber-coated side next to the third roll. Upon the completion of this operation the frictioned fabric is sent to the cutting room. In the cutting of these sections for the construction of the valve-base power driven punch presses are used. These presses are equipped with dyes of accurate size; cutting each section to its proper dimensions. These presses are so arranged that the material is unwound from one spool, and, as it passes through the press, wound upon another, each one operated by mechanical forces in connection with the punch press. These spools mentioned here are filled as the Fabric is frictioned from the "Calender." As this material passes through the press, each of these sections is cut to its proper size. These sections as they are cut do not fall from the strip because of the adhesive properties of the rubber. In the cutting of these sections we see the direct application of "Spotting Gum." In the cutting of the central section this dye has been accurately laid off in such a way that there is a nozzle protruding through it directly in the center. This nozzle is adjustable according to the distance between it and the fabric. This adjustment is so made that the space between them is just large enough for the spotting gum to come in contact with the fabric. As a result there is left a spot about one-quarter of an inch in diameter. In placing the spot it can be clearly

seen that the substance wants to have a short rather than a stringy consistency. This spot will now be followed to the next operation, that of building the valve-base itself; but before we leave this particular punch press, you will notice that it has a particular attachment made for it different from the rest. This attachment is the means by which the gum is forced through the nozzle in the center of the dye. The pressure gun is so operated that the force which causes the gum to come through the nozzle is kept constant. It was first worked by the operator of the machine, but it was soon found that it was impossible for human hands to maintain a steady grip for any period of time, so mechanical means was resorted to. In answering the situation a ratchet arm and gear were fastened to the pressure arm, and this was regulated in such a manner that each time the hammer fell in the punch press an additional pressure was applied to the gum in the gun. The solving of this problem was a greater step forward than had thus far been acquired.

In bringing the above mentioned steps up to the next operation we will interest ourselves in the construction of the valve-base. The sections, as they have been previously cut out, are now ready for use. We will see how they are applied in making the valve-base. First, in the construction it will be noticed that the various sections are applied as follows. The small section is first; then the next section, larger in size, is assembled with the smaller section in the center of the larger one. These two sections are both made of the fabric already mentioned. The last section to be applied is the cap, which is made of the same material used in the body of the tube. Most of this sort of work is done by girls who work on a piece rate scale. They work at a rapid rate of speed, because three girls can build enough valve-bases in a day to keep the plant production up to five or six thousand tubes per day. After the base is complete, it is placed in cases where each layer is separated by a cloth, giving the case a book-like appearance. These cases are then taken to the Tube Rolling Room where the last step in the working with raw materials takes

place. In this room there are long machines known as lathes which are used to wrap tape from one pole on to another. In describing the various operations taking place here we must start with the receiving of the raw materials. The tube stock comes into this department in long cases made somewhat like those used to hold the valve-bases. These cases are placed on a long, low, table and, as the protecting clothlayer is pulled back, a long hollow steel pole is laid at the outer edge of the tube stock. These poles are from eight to ten feet in length. The valve-base is taken from the case and is placed about thirty inches from the left end. As soon as this base has been placed in its proper position, the stock is then rolled around the pole. In this operation it will be noticed that the valve-base is on the inside next to the pole. It then goes to the lathes where three inch tape is wrapped on it, while this same tape is being unwrapped from another pole. Thus you see the operation answers two purposes. The tube is now ready for curing. These machines are large iron cylinders, incased in asbestos, with huge doors which bolt into place. The tubes are placed on a steel truck, and when its load of twenty-five is complete, it is rolled into this huge iron cylinder. The door is bolted into place and the steam pressure applied. For twenty-two minutes these tubes remain in this cylinder, under a live steam pressure of sixty pounds. The cure finished, the tube goes back to the lathes where it is unwrapped. Moving it along in an efficient manner, the next step will be to remove it from the pole. This process is carried out by the use of a suction-force machine. It consists of a hollow jacket just large enough to allow a certain sized tube-pole to be placed in it. The outer edge of this jacket tapers down to a pretty fine edge. As the pole is forced through the hollow opening, the edge of the tube is peeled back over the edge of the jacket. The air is turned on, forming a suction to hold the tube in place on the jacket while at the same time a force of air is applied against the turned portion of the tube, forcing it and the pole away from the machine. In this operation the tube is turned right side out.

The next operation is that of punching the valve-stem hole through which the stem is to be placed. Here is where the real need of spotting gum falls. It was necessary to locate this hole accurately. This spot shows very definitely where the center of the valve-base lies. The development of this material in approximately six months paid for the time and money expended for its perfection. It can clearly be seen that off-center valve-stems were completely eliminated.