Practical Fixing of Cotton Looms

By John Reynolds

LINING UP 2-1 BOXES.

Lining up consists in placing both boxes on a line with the race plate of the loom. Start from the first or top box. Get this box on a line with the race plate by turning the adjusting nuts C, Fig. 98. A steel straight edge will be found useful for this work. When the first box has been lined up, push in the sliding tooth O, Fig. 98, and turn the loom over so that the second box will rise. Now test the second box to see if it lines up with the race plate of the loom. If this box should be ¼ in. too high the stud K, Fig. 98, is too far out from the center of the box-crank L. To remedy this fault loosen the stud K and move it towards the center of the crank L, but be sure to move it so that the boxes will move only one-eighth or one-half of the distance in excess of that required. Then bring the first box in position again

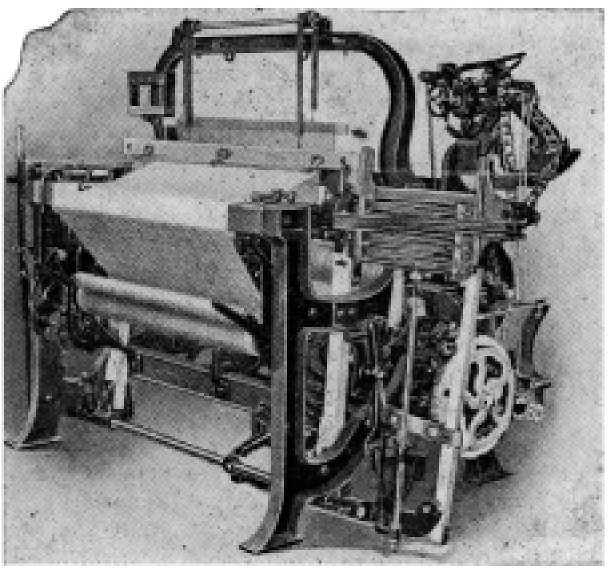

FIG. 101.—A 4 AND 1 BOX GINGHAM LOOM.

and line this box with the race plate. Regardless of the distance that the box moves, whether too much or too little, take only half of this distance by the stud K on the box crank L. Be sure to come back again to the first box and get the other half from the adjustments on the bottom of the box-rod.

If it is found, when coming from a level first box to the second, that the second box is about ⅛ in. too high or too low, get the adjustments from the stud F on the forward end of the box lever. Moving this stud out will give more throw to the boxes; moving it in will give less. This slot is used to get a rise or fall of only 1/16 in. to ⅛ in. Under no circumstances should the stud I be moved after it has once been centered with the center of box crank. It is bad practice to get this stud off of the center.

TIMING THE BOXES.

The boxes must not begin to move until the loom crank has passed the bottom center. The movement must be completed before the crank reaches the top center. They must be level and at rest when the pick is to be delivered.

One method of timing the boxes is as follows: With the loom crank on the bottom center push in the sliding tooth O and move the segment gear Q until the first tooth is fully engaged with the projection or knuckle of the sliding tooth. Tighten up the segment gear, otherwise the weight of the boxes will cause it to slip. The only objection to this method of timing is that no two fixers will set the loom crank in the same position for the bottom center, and the distance of one tooth is the difference between right and wrong timing.

A method practiced by experienced loom fixers is to take the shuttle out of the box and draw the lay of the loom forward until the dagger strikes the bunter. With the loom crank in this position the boxes should be raised or lowered a full ⅛ in. This is easily determined by watching the back lip of the box where it runs parallel with the lower edge of the picker slot. This is almost a standard setting with box-loom builders. Many of the later types of box looms are built with the segment gear Q keyed on the bottom shaft with the timing as described here.

ADJUSTING THE RELEASE MOTION.

A release motion is intended to guard against breakage. If the shuttle is half in and half out of the box when the boxes are changing, it is obvious that something would have to break if some means were not employed to prevent it, hence the use of a release motion, which works well if adjusted correctly. The spring E must be strong enough to keep the two parts of the motion together when working

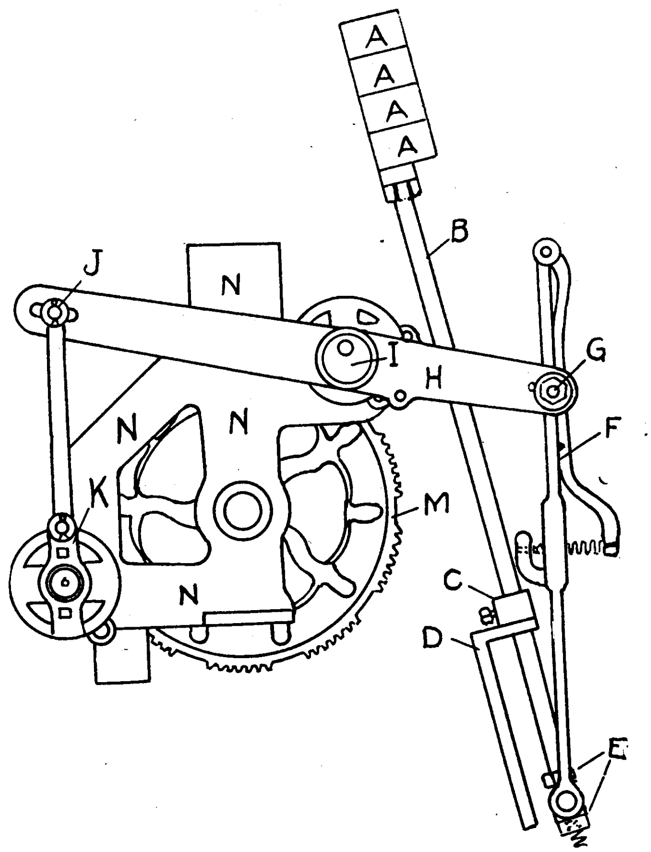

FIG. 102.—BOX LIFTING MECHANISM.

under normal conditions, but must open up when the shuttle gets fast. Sometimes the shuttle will be so tightly bound in the box and in contact with the picker than when the boxes are changing the pressure will be too great, and the release motion will be forced open.

Some fixers remedy this condition by putting two springs on the release motion. This will effect a cure in one way, but on account of the additional pressure the teeth and the knuckle of the sliding tooth O will wear out very quickly. By the exercise of care this can be avoided. Place the shuttle half in and half out of the box. Have the sliding tooth fully engaged. Move the loom by hand and it is then easy to determine the amount of pressure required to open the release motion. Too much pressure is liable to break the teeth on the segments or break the end of the box lever G. Too little pressure leaves the boxes with a weak foundation. There is no hard and fast rule governing the strength of the spring. This is a matter of judgment.

Pickers play an important part in the running of a box loom. Pickers should never be bought from stock or without regard to the looms on which they are to be used. The manufacturer of pickers usually measures the loom parts in order to get the proper fit. A new picker should need no trimming. A rawhide picker should make its own hole. Pickers not in use should never be allowed to dry out. They should be kept in a bath of linseed oil. The wooden plug should not be taken out except when the picker is about to be used. After running a few weeks the picker will gather dirt and lint which clogs up the passage. Do not use a file to take out the dirt. A half-inch twist drill will clean out the picker, leaving a smooth passage. Pickers should be oiled by the weaver at least twice a day.

When a new bracket is put on the loom it often fits so as to bring too near to the boxes the end of the spindle at the end of the lay. This is a dangerous condition, because it causes a tendency to throw the shuttle out towards the weaver. If there is any variation the spindle should be a little farther from the boxes at the beginning of the pick than at the finish. This will cause a tendency to push the shuttle towards the reed.

All adjustments must be made when the shuttle is on the box or dobby side of loom. This should not be forgotten. Otherwise many bad warp breaks will be made.

4 AND 1 BOX MOTION.

The fixer who has paid strict attention to the explanation of the 2 and 1 motions will have little difficulty in handling the 4 and 1 box motion. The same methods are employed in leveling the boxes, adjusting the picker and picker spindle, timing the boxes and fixing the release motion. The only difference is in the timing of the boxes and operating the boxes for the different patterns. What is termed "boxing" the colors requires some judgment. The main point is to avoid skip boxes; that is, jumping from box 1 to box 4 or from box 4 to box 1, or even from box 1 to box 3 and the reverse. While the box motion is built to skip boxes, it is good practice to avoid them because the easier and shorter the lifts or drops, the longer the motion will run without fixing. There are times when skip boxes cannot be avoided. If the boxes are set to skip unnecessarily, the fixer, weaver and manufacturer suffer from the consequences.

Fig. 101 shows a 4 and 1 gingham loom of the ordinary type. This 4 and 1 box loom is frequently equipped with a head motion, as shown in the upper right-hand corner of Fig. 101. This loom is of very solid construction and gives little trouble to the fixer.

Fig. 102 shows the box lifting mechanism and illustrates the directions for lining up the boxes, which is really the only difficult operation in fixing this loom. AA are the boxes; B, box rod; C, check collar; D, rod guide bolted to the rocker shaft; E, adjusting nuts; F, release motion; G, adjusting slot in box lever; H, box lever; I, eccentric; J, rear slot in box lever; K, box crank adjuster; L, box crank; M, star wheel; N, frame holding the entire motion.

Particular attention must be given the eccentric I, the box crank adjuster K and box crank L.

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SIZE OF RUBBER THREAD.

The number or count of square rubber thread, such as is used in elastic fabrics, indicates the number of threads in one inch when laid side by side. Thus a No. 36 rubber thread is 1/36-inch square.

The size is sometimes indicated by the number of yards per pound. The yards per pound vary in *inverse* proportion to the area of a cross section of the thread. For example, the length of one pound of No. 20 rubber thread, with a sectional area of 1/400 square inch, is one-quarter of the length of one pound of No. 40 rubber thread, with a sectional area of 1/1600 square inch or one-quarter of the area of the No. 20 thread.

As the count indicates the actual dimension of one side of the thread in fraction of an inch, the square of the count varies in *inverse* proportion to the sectional area. Thus a 20s thread has an area of 1/400 sq. in.; a 40s, 1/1600 sq. in., the areas being in *inverse* proportion to 400, the square of 20, and 1600, the square of 40.

It follows from the above that the yards per pound are in *direct* proportion to the square of the count. For example, 40s (square 1600) rubber will have four times as many yards per pound as 20s (square 400).

The specific gravity of vulcanized rubber as found in rubber thread varies with the amount and kind of material mixed with the rubber in the process of manufacture. The best authorities give the specific gravity as .925. At this density a cubic foot of rubber weighs 925 ounces. No. 1 rubber thread is 1 inch square and at a specific gravity of .925 the number of yards per pound is found as follows:

1728 cu. in. rubber = 925 ozs.

1 yd. No. 1 rubber (36 cu. in.) = 19.2 ozs.

16 (ozs.) ÷ 19.2 = 5/6 yd. No. 1 thread per lb.

The length in yards per pound for any number of rubber thread is found by multiplying the square of the number by 5/6.

Ex. Find lengths per pound of No. 20, 30, 40 and 50 and 60s rubber thread.

400 × 5/6 = 333 yds. 20s per lb.
900 × 5/6 = 750 yds. 30s per lb.
1600 × 5/6 = 1333 yds. 40s per lb.
2500 × 5/6 = 2083 yds. 50s per lb.
3600 × 5/6 = 3000 yds. 60s per lb.

The number of rubber thread is calculated from the yards per pound by reversing the above operation, multiplying by 1 1/5 being equivalent to dividing by 5/6.

Ex. Find number of rubber thread measuring 750 yards per pound.

750 × 1 1/5 = 900.

Square root of 900 = 30, number of rubber thread.

The size of rubber thread is also determined by a gauge, similar to that used for wire. Owing, however, to the compressibility of rubber, it is difficult to determine the size accurately in this way.

The method of calculating the size from the length and weight is more reliable, but in using it in cloth analysis allowance must be made for the reduction of the size by stretch and absorption, when determining the original size of the thread. The tension under which the thread is held in an elastic fabric reduces the size by destroying some of the power of contraction. There is also a diminution of size by reason of the absorption of the rubber by the surrounding textile materials; this varies with the amount and kind of impurities used in the manufacture of the thread.

No general rule can be given for change of size from either of these causes.