

## **I. INTRODUCTION**

The development of this work is because they have many drawbacks when bringing machinery, especially when this is second and make it work. The installation and commissioning of the S-400 Saurer looms of tweezers, was held in Textiles "Vinardi". Where these looms They manufacture 100% cotton fabric.

So it was necessary to study and prior knowledge on the Learning Guide, and their characteristics, basic functions such as orientation, motivation, understanding.

As the woven, warp preparation and gummé, to then proceed Carreto or beam to mount the machine tucked performing operations or knotting of the warp yarn. Also discusses the importance of the quality and defects occur because the tissue.

They have taken into account the knowledge, studies and experience gained over the years of practice in the particular section of Weaving, with this type of looms talk about their operation and main parts.

Then proceed to Mounting and leveling to be done, appropriate adjustments and calibrations and finally the choice of gears according to the need and the type of fabric to make and the type of maintenance required.

Arriving at establishing a results analysis and Settings Mounting concluding with industrial health and safety, which is very important because of the risks that we have identified in a weaving section, completing the development of this tutorial to stop evaluations reinforce learnings.

## **II. DESARROLLO OF COTENS**

### **1. TEACHING GUIDE**

A tutorial is an instrument printed educational guidance to the student, which includes all necessary information for the proper use and management of profitable content of the text, the tutorial should support the student to decide what, how, when and with help why study the content of a course in order to improve the utilization of the available time and maximize learning and application.

#### **1.1. BASIC FUNCTIONS**

The basic functions of a tutorial such as the guidance, motivation and understanding.

#### **2. TISSUE PLANE**

Entanglement is an orderly one or more strands forming a sheet-resistant, elastic and very flexible, which form a fabric taking the name according to its linked taffeta, twill, satin, etc.

#### **2.1. WARPING.**

It is the process of assembling onto a beam all threads that are to form the warp of the fabric, with the predetermined order or arrangement according to the ligament, which is part of the fabric in the warp and named it must be rolled into a own device for this process called Carreto or warp.

#### **2.2. WARPERS MACHINES**

Its purpose is to prepare the warp knitting operation, bringing the yarns onto a beam or Carreto which then goes to the loom with all wires that are to form the warp of the fabric.

##### **2.2.1. DIRECT WARPING**

Urdición This system is used in colored threads are for films and small (small amount), are also used for cashmere, and is a long process where high density is obtained warping and better quality.

##### **2.2.2. INDIRECT WARPING**

Such urdición allowed no list of colors, since most can weave two colors, working with long films, single out, and subsequently passed to the gluing process.

#### **2.3.GUMMED**

During weaving the warp yarns are subjected to high stresses, due to the tension must suffer to bending in different directions and frictions between themselves and with healds and comb, for this reason, in most cases, and smoothed must be reinforced by gluing the wire body fibrils protruding therefrom, thus preventing warps in very dense fibrils may consecutive interlacing two yarns causing them to break.

#### **2.4.TUCKED**

The operation wires by placing shims then meshes healds and finally by the comb is known from Tucked or revision of the yarns which it is to be done when working with tissue or other material or if we are first building a machine.

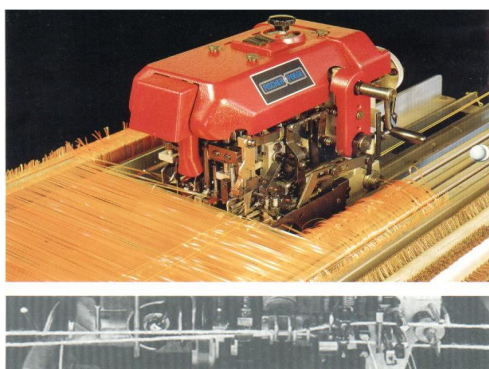
The knot is the operation performed when needed to continue with the same tissue type only want to change the vacuum for a full Carreto to continue weaving this is what can be done manually or with a car knotter.

## 2.5. KNOTTED

In the case of having to manufacture other tissue just equal to that obtained in the loom, with the same revision therefore the new warp threads are knotted by simple retortion with warp ends which have left anterior together a small piece of fabric, tying it done manually or automatically.

The machines are responsible knotters join the ends of the finished warp loom with the new Carreto or from the beam.

The warp from the loom are squeezed between two pairs of jaws with rough surface after making sure you are not missing any thread and that they are properly crossed, which is obtained by careful wire brushing.



*Fig.1 Knotter Automatic Machine (It is installed in the frame running the knotting process)*

Selector tongs and the knotter needles should be appropriate to the kind and number of threads can not work as to be the same coarse yarns that thin threads.

## 2.6. FABRICS AND QUALITY

A fabric as we know is the intertwining of yarns forming a fabric before being processed in this article as a garment fabric.

In terms of quality for the weavers and garment manufacturers there a simpler definition that says that the quality in tissue from defects, and to find the quality of the fabric would have to first make a list of any defects that may be because so to speak.

## 3. LOOMS TYPES OF PLANS

The various systems that exist today to carry the plot from one side to the other of the warp looms each of these have their advantages and difficulties ahead about the different types of tissues that exist.

- Rapier. - The rapier frames are inserted in the tip by this we mean all the gripper start from small oscillations about the crank caused by these caused either by the connecting rods, levers and eccentrics. The grippers are carried by strips or bands of flexible and rigid anyway the carrying gripper reaches half and half is carried by the clamp on the other side to thereby complete the knitting process.

### 3.1. PLIERS FLAT LOOMS SAURER S-400

Looms Planes S-400 made Saurer transfer warp yarns from the warp Carreto or turn threads are driven blades holder bars through which each of the yarns, are then separated by the flat boxes which allow through its ascent and descent rest allows forming the shed through which the weft, which is adjusted against the previous batan carrying a comb, via the grippers from one extreme to another transport perform these , by means of bands which are located on the bars of the loom and thus cycling and start the machine again, so the rolled fabric is formed and, after passing through guide rollers.

The fabric is wound on the beam of tissue, the same being driven by a chain drive and sprockets. The governor gear works in oil, in airtight casing.

The accurate and reproducible adjustment of the past is by way of a gear change easy. The regulator "is synchronized with dobby machine or eccentric.



*Fig. 2 Saurer Loom Clamp-S-400 (Weaving Article canvas 100% Co.*

### 3.1.1. OPERATION AND MAIN PARTS MACHINE

Part of the brake system which is formed by two coils

which produce a magnetic field having two metal rings, which act with the clutch. The coil is connected directly to the main shaft and the other to the motor shaft by a pulley and a trapezoidal belt.

When the loom is operated, the rings are joined finned internal driving by half a magnetism produced by the coil attached is attached to the steering wheel axis, when a stoppage (of any type: frame, warp, etc.). rings are disconnected by magnetism rupture occurred.

The calibration of the rings with the plates is 0.3 to 0.5mm, tolerance is acceptable to 0.7mm wear due to friction that exists at the time of braking.

The brake system 400 SAURER loom, has a tolerance of wear to 0.9mm, must stop in approximately 260°, thus avoiding faults in the fabric, since the clamps are in their respective rods, the control is mechanical.

### 3.1.2. BENCH.

The bed is the most important part of a loom are placed here since all parts of the machine is also in their legs where leveling takes the entire machine.

### 3.1.3. FOR-WARP.

The warp is a rail assembly thereof having lamellae, and each warp yarn has a slide as tissue density are arranged than 2, to 6 rows which are in the rails are distributed, two kinds of the open sipes that can be removed easily and closed in which the yarns are placed while the smooth. For each of the sheets passing a warp yarn when a yarn break the sheet falls and makes a bridge between the two sides of the contact rail insulators, thus closing an electrical circuit brake activating the electromagnet allowing the same progress in the stoppage of the loom and the warp yarn breakage is indicated by a signaling lamp in this case is white.

### 3.1.4. FOR-PLOT.

The sensor whose function is to identify frames to the weft yarn and otherwise the machine stops immediately, while the engine is disconnected and tighten the brake of the machine.

This system. Unemployment, its principle is based on the piezo principle, high accuracy and quick response, this type of unemployment requires little maintenance and is almost impervious to dirt and dust and shocks.

These systems are composed of a central unit and various signal transmitters that are placed in the path of the wire and only need a small voltage, your reaction time is a few milliseconds.

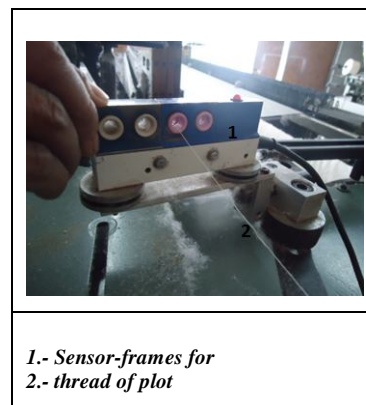


Fig.3 Sensor-frames for

### 3.1.5. WARP REGULATOR.

This regulator is provided on the machine near the Carreto or beam in the lower left is responsible for maintaining constant warp tension letting out the Weave and advancing to the beam. Regulator serves as the holder - manually regulating wire through a rod decreases as the diameter of the thread holder Carreto must then be moved downwards, this increases the angle of advance of the beam, in this way can be warp tension constant with the same amount of warp during the entire process.

### 3.1.6. RAZOR

The slot machines can be displayed either on the right or left of the loom, views from the weaver's place. These allow to control the upward and downward movement of the heald frames leading to the formation of the shed by setting the characteristic type weave fabric. The electronic rotary Maquinita up to 12 frames. The box hooked system is very quick, with a 12mm and encartamiento Buscapasadas. This type of razor design works through its detectors carton according chopped.

### 3.1.7. BUSCAPASADAS

The objective of this system is to search move past frames, to find the last, this is done while the loom is stopped and this system operates winding mechanisms of the fabric and the unwinding of the warp, with a system further comprising last search which is added to the little machine to facilitate the search for past or previous runs.

This system consists of a separate motor which actuates a clutch, which connects directly to the drive shaft of the dobbie operating the dobbie in reverse.

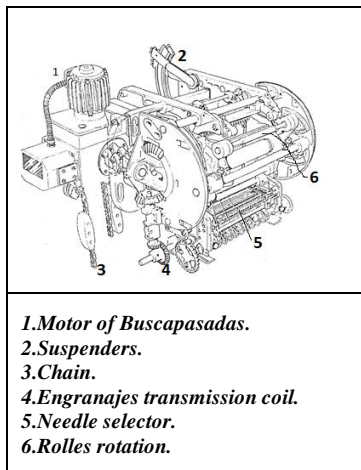


Fig.4 Clippers

### 3.1.8. ORGAN PASS PLOT.

The bodies carry the plot from one extreme to another is leading the plot clips launa halfway and carries the plot hook to the other end.

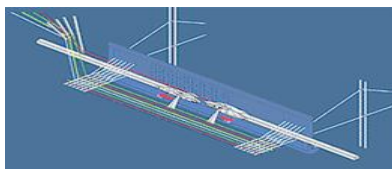


Fig.5 Weft insertion.

First this thread passes through a pre feeder and then go through the first tensor, which gives a first voltage to the thread, then come to a guide-frame Jimmy where he guides the thread and given second intention, continues its journey presenters finger which presented according to colors there Cunado one single color works and finally going to the fork is a kind of hook that catches the thread tightly and presents it to the head of the clip, for this meets its target up well; scissors there at the beginning and at the end of the passage of the weft yarn to cut excess. Then talk about the most important

### 3.1.9. HEAD.

As mentioned previously the head of the clip is the body responsible for receiving the frame fork and transfer the weft thread into the center of the machine.

We can adjust the clamp in two ways:

1. - Grab the frame with closed clamp
2. - Caught open clamp frame

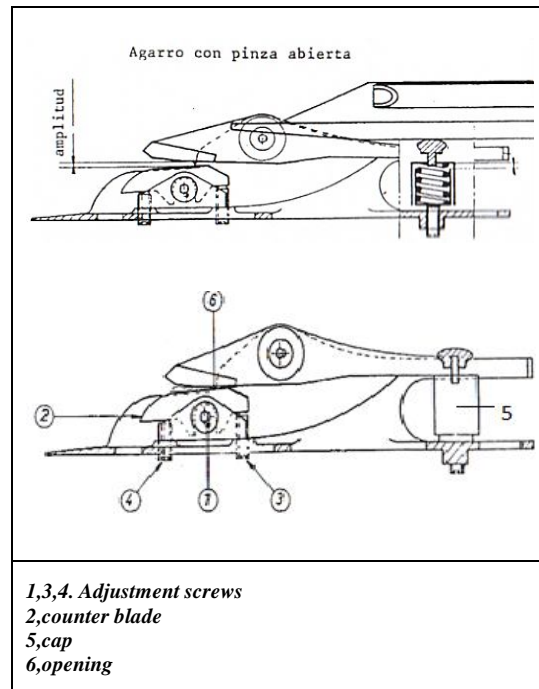


Fig.6 I grab the clip open frame with raster Caught closed clamp

### 3.1.10. HOOK.

The hook is in charge of carrying the plot from the center of the loom to the other end of the screw 13 is loosened and adjusted the minimum aperture allowing passage of the plot thickens, and taking account of any knots. Then we press the screw again and must be a minimum difference of 0.15 mm

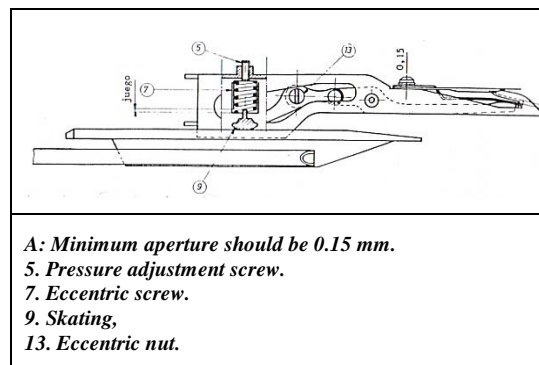


Fig. 7 Hook

### 3.1.11. BATAN.

The Fuller as stated above is the entire set of pieces placed where combs guides, the duration of the weft insertion Fuller remains in rear position to allow passage of the plot.

### 3.1.12. DEVICE SELVAGES.

The selvage devices have the function of forming the selvedge on the side where the weft gripper takes

place and where the fork in its delivery ends. The threads are cut on both sides through the needles are put back in the shed again, and so we obtain a compact edge or tucked called. In this type of looms Saurer boxes suspended him selvedge devices as tucked selvedge but do not cut and which adapt scissors through a cutting working cam selvedge yarns and thereby avoid wear on the devices selvedges.

### 3.1.13. TEMPLAZOS.

The templazos serve to help maintain the original width of the fabric, by means of discs or rings provided with gaskets, with which it can regulate the intensity of the fabric tempered.

We should always check that the rings are clean and the teeth are in good condition and the tines bent or broken tissue damaged and must be replaced.

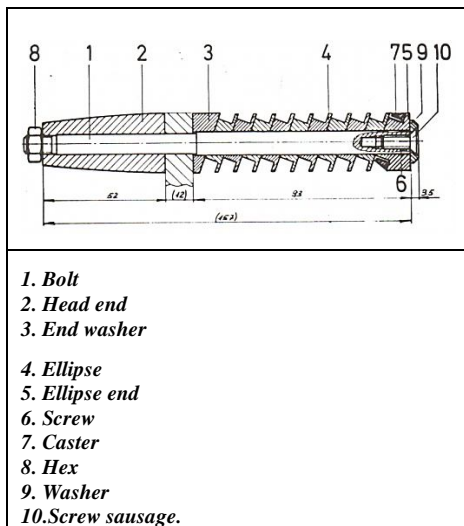


Fig.8 Cilindro del Templazo Ø24.

### 3.2. ELEMENTS OF TRAVEL WARPING.

Warping yarns go through a series of mechanisms before forming the shed and be part of the fabric, these mechanisms help us carry the thread in an orderly and regular well afford to make a design or to control failures that may exist in warping.

Then speakest of them:

#### 3.2.1. BLADES.

The blades are hollow elements of steel or some other material of steel, are in the warp rods for these can be open or closed, can be placed first on the threads when these are mounted on the loom while the second the wireless necessarily be passed before

review by the meshes of the heddles. A variety of forms of these hairpins.

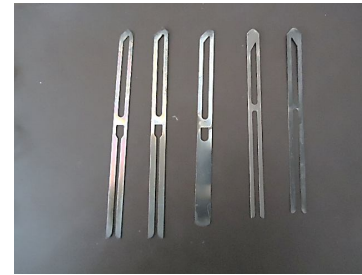


Fig.9 Different types of sheet.

#### 3.2.2. MARCOS AND SMOOTH.

It is an element made of wood or aluminum that has three movements are: UP, DOWN, REST, where the smooth.

Serve to separate the warp threads into two series, so you can freely pass the plot, by the space left by the two sets of wires, whose space or dihedral angle is called drag. To fabricate the fabric, it is necessary that the threads change position at each pass, the healds are reciprocated up and down. The number needed depends Heald ligament.

Currently have the eyelet mesh inclined at 45 ° which has the following advantages: it reduces the friction, occupy less space and are more comfortable to pass the thread



Fig.10 Mark on the loom and smooth types.

#### 3.2.3. COMB.

Organ loom as the name says is a comb used to push past the fabric and manufactured to determine and maintain the density.

It has three important functions.

1. - Distribute the warp yarns evenly.
2. - Allows the clamps have a straight path for the passage of the clip from one side to another.

3. - Provides adhere the weft yarn to the loom to close the shed.

### 3.3. REEL SYSTEM FABRIC.

Each beat is fulling a piece of tissue Arroya exactly like the previous which passes through a system of elements that compose the system until a winding beam.

The number of revolutions made by the beam depends on the working speed of the loom. Therefore under normal tissue there is a direct relationship between the number of teeth of the last wheel and the number of picks per inch in the fabric being woven.

Mechanisms formed by a chain and a sprocket mounted at the motor side of the loom transmit movement of the side gears of the winch drum to the cylinder.

His movement is synchronized with the movement of the cylinder drum through a chain and sprockets.

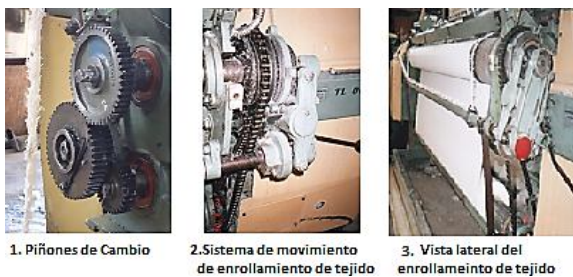


Fig.11 System for the winding movement Tissue

The relationship between the winder roller and the drum is such that the roller is always trying to wind the fabric faster than it exits the cylinder drum.

To compensate this difference, there is a friction clutch which allows slipping sprocket. By varying the friction clutch, it is possible to run the tension in the fabric when this is wound on the roller. To vary the friction clutch, loosen the screw and turn the hand wheel. To increase the tension on the clutch hand wheel is rotated to the right and left to decrease. The mechanical design of a winding depends on the type of fabric to curl.

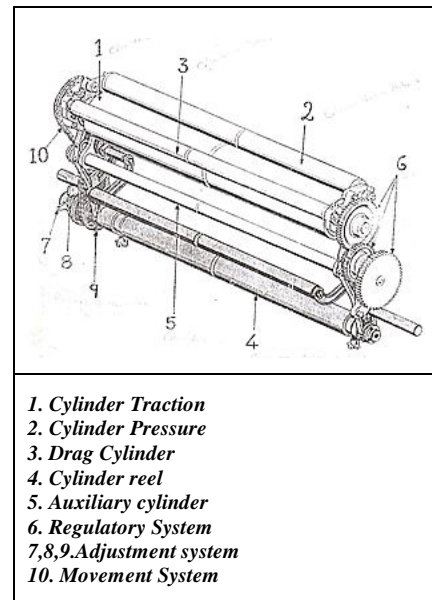


Fig.12 Winding System.

### 3.4. FRAME TRAVEL BODIES.

Before entering the weft into the shed passes through a series of elements beginning with the coil, the bobbin creel, the pre feeder, tensioning wire guide fingers, the frames to the host until finally reaching the fork towards presenter llevadora head clamp which allow us to hook clamp led to travel and reach the end of the plot which is the other end of the fabric on a regular basis with the tension and quantity needed.

#### 3.4.1. COIL.

The type of coil is important to keep their taper, its course, its initial diameter, diameter end, bending the wire, the number of nodes containing reserve coils and as these values step by influencing the shed . The bobbin thread and play a leading role in the circuit of the plot and they depend largely a result in the modern weaving machines.



Fig.13 Coil weft yarn.

#### 3.4.2. CREEL.

The creel is support where coils are located plot. The creel must be highly flexible, with a modular

construction, able to be adapted to different needs and sizes of coils, with the adjustable positioning thereof.

### 3.4.3. PRE FEED.

The pre weft feeder is an automatic mechanism that feeds the weft insertion device and which is controlled by a microprocessor. This element allows a more uniform and consistent extraction of lower instantaneous velocity in the coil, to reduce the number of breaks and thus improving productivity.

### 3.4.4. BRAKE FRAME.

The gripper weaving machine having a braking element and located between the guide fingers prealignment frame, for communicating a braking value whilst the weft insertion occurs. In the gripper system must keep a certain braking moment on the clamping and transfer, to facilitate gripping thereof by the grippers

### 3.4.5. PRESENTER.

The presenter of the plot is between the frame and fork for this helps guide and present the plot in motion right time comes your main shaft is connected to a shaft that reaches the distribution box presenters by an electromagnet makes the job of presenting the thread at the head of the clip at the time that this will happen and is hidden out of the way on their way when this happens and so the process repeats.

### 3.4.6. FORK.

The fork guide frame is the last item that passes the frame and is in charge of presenting the plot to clamp this fork is also in the distribution box connected to a roller on a small radius of cam, and is in the left side of the box

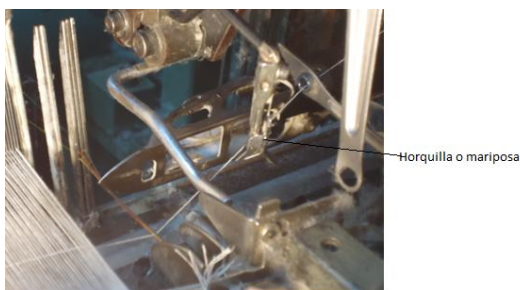


Fig.14 Fork

### 3.4.7. CLIPS.

The clamps are in charge of inserting the weft into the shed of warp to form the fabric in the following manner.

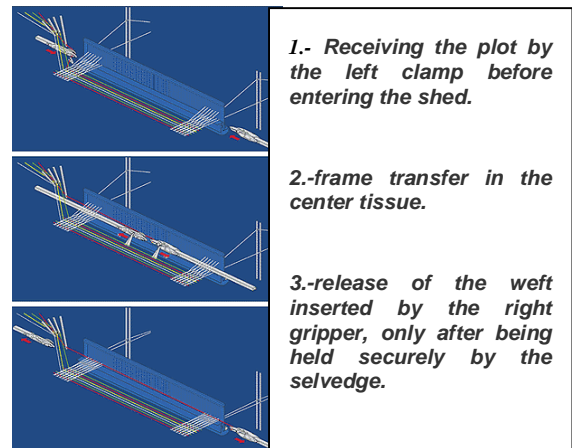
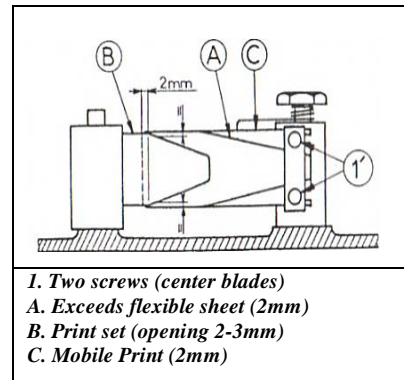


Fig.15 Weft insertion by means of the clamps.

### 3.5 THE SHED.



The pierced opening is shaped triangular or quadrangular prism, achieved in the warp threads by the different inclinations which they suffer to be uploaded and downloaded some other through the movement conferred to the heddles.

The warp yarn passes through the eyelet mesh warp, accompanying the movement of this, and so in conjunction with, jostle for. The insertion of the weft into the warp, in order to determine the ligament tissue.

The shed being used in Saurer loom S-400 is:

Open shed. - Form of circulation in which the weft is inserted when the heddles are at the extreme points of his career, while Fuller receives the shock of the moment that the shed is still slightly open. This highlights the warp, rippling in a higher proportion of the plot.

### 4. ASSEMBLY.

To put the mount or install any type of machinery should have the necessary tool as calibration devices allows us to verify that the equipment is properly installed with the exact regulations and required positions.

It is important that looms planes will be assembled must have an industrial floor, ie those interior floors that are subject to any of the following load applications:

The load on a concrete floor it will induce efforts and work of the designer is to keep that effort permitted under the concrete to be in perfect condition the floor is leveled properly, especially for a weaving room due to constant vibration given.

## 5. LEVELING.

Loom for leveling the following procedure is followed:

1. - First place the spirit level on the different parts of the loom, this is done to preserve the health of the various mechanisms and extend the life of the looms.
2. - With the help of hydraulic jacks raise the machine side by side so you can stick them to the floor properly.
3. - After performing this process is recommendable paste loom legs with the aid of felts and in some cases with the aid of pieces of thin iron sheets to power get the correct level after six months in operation the machinery back to check the status of your leveling.

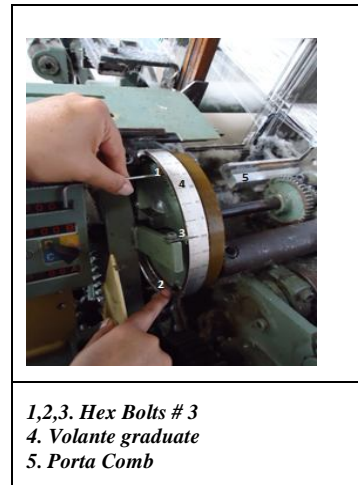
## 6. ADJUSTMENTS AND CALIBRATIONS.

To perform such procedures should take into account the order as reached because each depends on the other to fulfill this process and result in the total functionality of the loom before running will have all the necessary tools and specific calibers in due course use.

### 6.1. INDEX ADJUSTMENT

The index is an important element of the loom consists of a graduated wheel, in the same we're going to calibrate almost entirely for this machine proceed as follows:

- We put the loom in front stalemate.
- Loosen hex # 3 graduate regulating wheel at 0 ° and adjust again.



1,2,3. Hex Bolts # 3  
4. Volante graduate  
5. Porta Comb

Fig.16 Index Adjustment Regulating

- Put the loom at 35 °, measure the distance between the front strip and the "U" comb through security holder mark the point where I take the initiative and call this measure the dimension "N".
- Put the loom at 325 °.
- We measure again and call the dimension dimension "N1".
- If the value of N1 is equal to the value of N calculated the arithmetic mean of these two values Nm.
- Bring the comb holder U this mean value Nm.
- Check with the steering wheel to graduate in two positions 325 ° and 35°

### Example:

35° value of N=40mm.

325° value of N1=42mm.

	1850	2050	2250	2450	2650
<b>A</b>	1755	1935	2135	2335	2535
<b>B</b>	1615	1815	2015	2215	2415
<b>C</b>	1455	1655	1855	2055	2255

Table 1

- We have the "U" comb 41mm slide and block the wheel to 325 °.

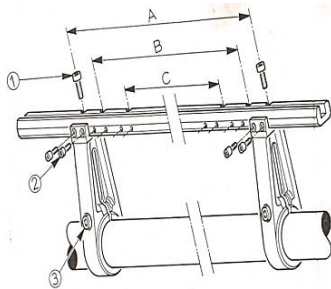


- Check that  $N = N1$ , and so we see that the index is correctly adjusted.

## 6.2. WIDTH COMB.

For the placement of this lever is very important to know what type of fabric to be manufactured because in the "U" there regulations comb holder that lets us know the possible adjustments to be carried out to position these levers Fuller.

For this we have developed a table that relates the length of the comb with the position of the two levers.



DIMENSIONS	A
1° table	40
4° table	76
8° table	108
12° table	128
13° table	25
16° table	32
19° to	
24° table	34

Fig.17 Dimensions wide comb

Thumbnail Fuller levers 1,2 and 3 screws.

We choose what kind of case and we proceed:

- We pulled the pins 1 and 2 with the hexagonal # 5 and # 6 respectively.
- Unscrew the hex bolt 3 to # 14.
- Shift lever Batan to match the width of the hole corresponding to the selected tissue.
- Refit the pins 1 and 2.
- Tighten bolt 3 with the required pressure.
- Check the position of the "U" comb holder.

It is important that this process is performed each time the width of the reed switch or fabric before mounting and warping.

## 6.3. AJUSTMENTS.

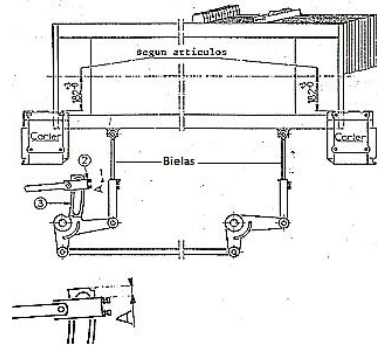


Fig.18 Height adjustment.

**Height adjustment.** - To adjust the height of the first frame by connecting rods so that the center encruzamiento grommets are their smooth to  $182 \pm 3\text{mm}$  from the upper face of the crankcase of the sley.

Smooth settings Boxes (2. Cursor, 3. Lever traction). Place likewise other tables at the same level first.

It is recommended that for this setting, place a picture of taffeta and place the encruzamiento to  $0^\circ$  or  $360^\circ$  on the framework maquineta graduate

## 6.4. PLACEMENT COMB.

The comb is the element through which pass the yarns according to the recommended tucked into the tissue to elaborate design, this batanara each wire which in turn are inserted into the shed.

- The length of the "U" comb holder according to the width of the comb is indicated by Table 1 to calculate the distance X.

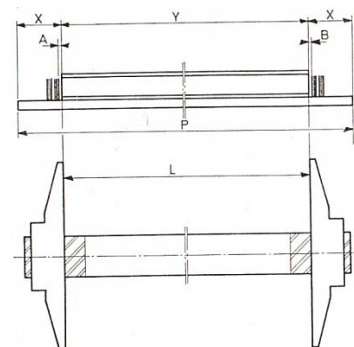


Fig.19 Carreto

ANCHO DE PEINE (Y)	1850	2050	2250	2450	2650
LONGITUD U PORTA-PEINE (P)	1920	2120	2320	2520	2720

Formula

$$X = (P - Y) / 2$$

Where: X = Lateral distance on each side

P = length "U" Porta-Comb

Y = width Comb

data:

$$X = ?$$

$$Y = 1920\text{mm I own } (192\text{cm})$$

$$P = 220\text{cm}$$

Resolution:

$$P = (220 - 192) \text{ cm} / 2$$

$$X = 28\text{cm} / 2$$

$$X = 14\text{cm} \text{ ---- that should be left on each side.}$$

### Pulley diameter according to the manufacturer.

The speeds of the machine is indicated by Table are theoretical values in practice, the theoretical values according to the diameter of the motor pulley so as not vary clutch are values as given by the manufacturer and its parts are properly encoded according to its mediated and speeds + 10% varies according to the weight of warping in boot times, the number of frames, the number of threads, fabric type, machine status here mentioned some of the most relevant for the increase or decrease in its theoretical speed.

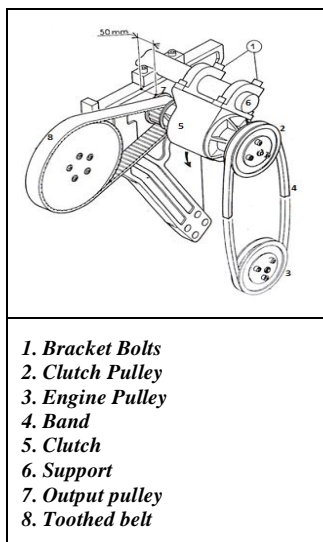



Fig.20 Belt tension.

### 6.5. REGULATION PAROS.

Strike	Column	In the case
2. Warp	White	
1. Plot	Green	
3. Security	Blue	Needle 1. Engrase 2. Bands or 3. Electricity Blue



The distance between the magnet and the sensor has to be 1mm.

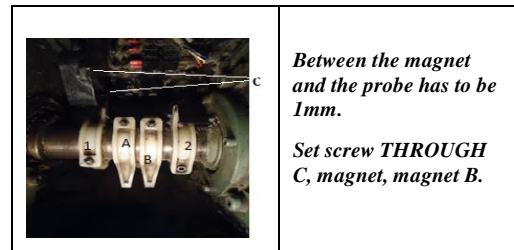


Fig.27 Sensors Paros regulation.

### 6.6. CONTROLS IN CASE OF PAROS.

These controls relate to the existing flare tower lights on, which indicates the cause of each of the strikes, for this we developed a Table 5 that facilitates understanding.  
Signal lights.

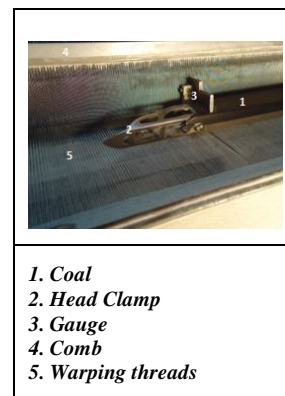


Fig. 22 Alignment and adjustment of the needle.

This is one of the most important aspects of good care and when made, because alignment and adjustment must be precise and accurate work

when there is no possibility of collision between the head pin and hook llevadora as it happened this would irreparably damage the coals of the machine.

**Alignment and adjustment of the needle through the galga3.**

- At 180 ° we ensure that there is no play of the needles.

- Remove the head and hook.

- Set the gauge and fix the supporting height of the coal on the "U" comb holder toward the inner end thereof.

- The needle should be directly in touch effortlessly horizontal, vertical or gauge.

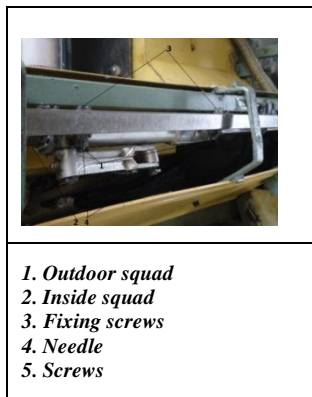
**For adjustment of the height**

- Loosen the screws of the needle outside the top 3 on 1 and 3 on the bracket screw inside 2.

- Place the needle in contact with the horizontal face of the gauge.

-Tighten the three screws 3.

**For lateral adjustment.**



*Fig. 23 Lateral adjustment.*

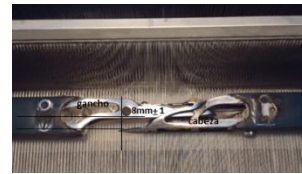
- Loosen the two fixing screws 4 squads 1 and 2 on the slide.

- Place the needle in contact with the vertical face of the gauge.

- Tighten the two screws 4.

- Replace the head and hook.

- Check the distance of 8mm ± 1 between the top of the head, the back of the hook and the hook height centered in the head.



*Fig. 24 The distance of 8mm ± 1 between the head and the tip of the hook*

**6.8. SETTING THE HOOK AND HEAD.**

Calibration of the hook and is the measurement head is effected when the two pieces are going to be in contact with each other.

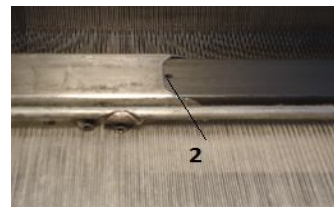
**Proceed as follows:**

- Place the machine at 180 °.



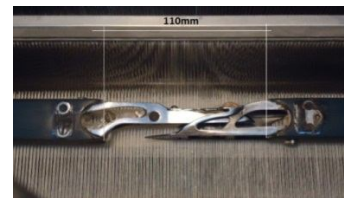
*Fig.25 Screw 1 Needle brake.*

- Loosen the screw 1 of fastening belt or needle named brake.



*Fig.26 Reference hole 2.*

- Slide needle coal, bringing the reference hole of the inner needle 2 with the metal edge of the outer needle, this process is executed in both left and right sides both.

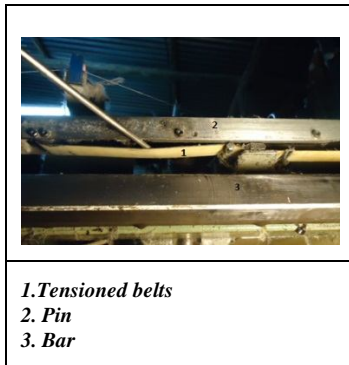


*Fig.27 Extremity positioned settings of needles 110 + 2.*

- End extremities positioning adjustment of the needles 110 ± 2mm from one another as shown in Fig.

**6.9. TENSION BELTS.**

The belt tension varies according to the speed of the machine and the width of the fabric. We must always be careful to use these not being worn tearing, time changing belts avoid breakage when the machine is running avoiding clashes between them and damaged parts of the clip.



1. Tensioned belts  
2. Pin  
3. Bar

Fig.28 Tension belts.

It is important to know that there is a safety signaling illuminates when destención belt in this case turns on the light blue column and dash inside the red LED lights # 1.

If this happens proceed:

- We catalog the status of the belt, there may be deterioration thereof.
- Background oppress lever micro switch, we found out that there is a set of 1mm with belt.
- If everything seems normal, dismantle the needles,
- Clean up and find out the status of the rollers.
- Open the main switch for the launch.

These settings allow for a minimum voltage of the straps and extend the life of the rollers.

### 6.10 SETTING FORCEPS.

This type of regulation is performed according to the width of fabric taken as a reference and the width of the comb, and the arrangement of the lamellae of the false selvedge as follows:

- Put the machine, positioning the index to 49°.

- The comb is centered on "U" porta - comb and 6 to 13mm slides along the comb.



Fig.29 Nut 1 patella shaft.

- Loosen the axle nut 1 patella.
- Head and hook tip alignment before false comb.
- Move the tip of the hook head in alignment with the outer side of the lamellae of the false selvedge.
- Tighten the nut 1 axis of the patella.
- Run the same adjustment on both the left and the right.
- Check that everything is properly tightened.

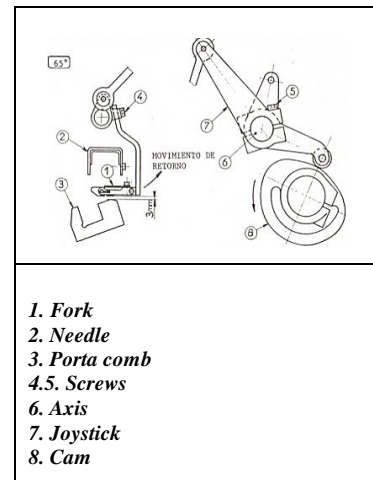
### 6.11. FRAME GUIDE FINGERS.

These fingers are those with the plot at the time that the thread will be entering the shed this out, grabs his head and takes the thread to the hook in order to finish the process of circulation.

### 6.12. FRAME FORK GUIDE.

This element also known in the textile industry "butterfly", is one that has the thread at the top of the clip to go to the shed, the warp yarns.

#### 1.- Position in height to the presentation.



1. Fork  
2. Needle  
3. Porta comb  
4.5. Screws  
6. Axis  
7. Joystick  
8. Cam

Fig.30 Position height adjustment to the presentation.

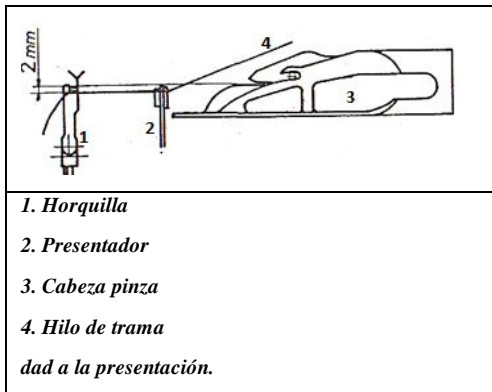
- Put the machine in 65 °, and its elements are positioned as shown in Fig.48.

- Place the roller on the cam as shown in Figure 48.

- Loosen the screw 4 and adjust the fork height so that the bottom is at 3mm of the "U" comb holder 3.

- To guide the machine to manually control the distance between the needle 2 and the upper part of fork 1 during its return movement.

**2. - Position of depth to the presentation.**



*Fig.31 Depth position in the presentation*

- Place the machine index at 46 °.

- Have the head near the plot.

- Adjusting screw 5 with control lever 7 of the fork about its axis 6 so that the fabric is in the indicated position as shown in Figure.

**6.13. ORGAN PASS PLOT.**

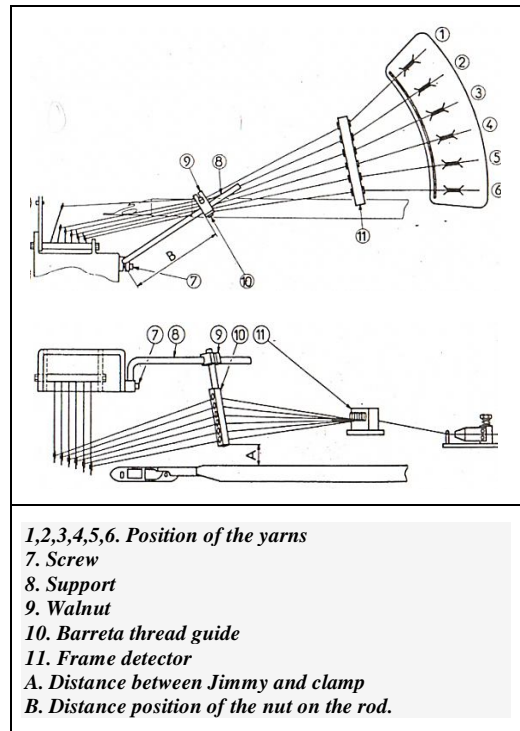
Are elements through which flow from the weft yarns leaving the cone until it reaches the head of the clip where it is retained for then moving the hook, these organs are:

1. Brake or tensor dishes.
2. Sensor thread presence capacitor.
- 3 .Plot for brake pads.
4. Jimmy frame guide.

For the first needs a regulating voltage to manually brake the latter is necessary in the case that regulate the sensitivity of a variable resistor it is the command to the capacitor sensor which allows the presence of the yarn touch circulating in inside. For the third and fourth then explain the detailed process of regulation.

**JIMMY GUIDE FRAME.**

Its regulation proceed with lateral positioning, depth and height of this Jimmy.



*Fig.32 Barreta guide frames lateral position, depth and height.*

**6.15. BRAKE ADJUSTMENT FRAME.**

This brake mechanism is a frame that is composed of lamellae which produce a thread pressure and thus stop the movement.

For this its regulation focuses on three important steps.

**1. Preliminary Regulations.**

- Set the roller 7 on the smaller radius of the cam relates to the screw head towards the front of the machine.

- Place the eccentric shafts 3 in middle position.

- With the two screws 1 A flexible sheet focus regarding fixed blade B. The flexible sheet must exceed 2mm fixed blade.

- Align the movable plate with the flexible sheet C as indicated in Figure A below

- Turn the screw around the flexible sheet 2 to provide an inlet opening 2 to 3mm as can be observed.

- Adjusting screw 6 with the movable lever 4 about the shaft 5 so as to achieve a set of 2mm between the shaft 3 and the movable lamina C.

**2.- Adjusting the brake pressure.**

Acting more or less on the retention screw 8, as the plot you are using.

**3.-braking time adjustment.**

The eccentric shaft 3 can vary the braking of the weft grip according to the frames used.

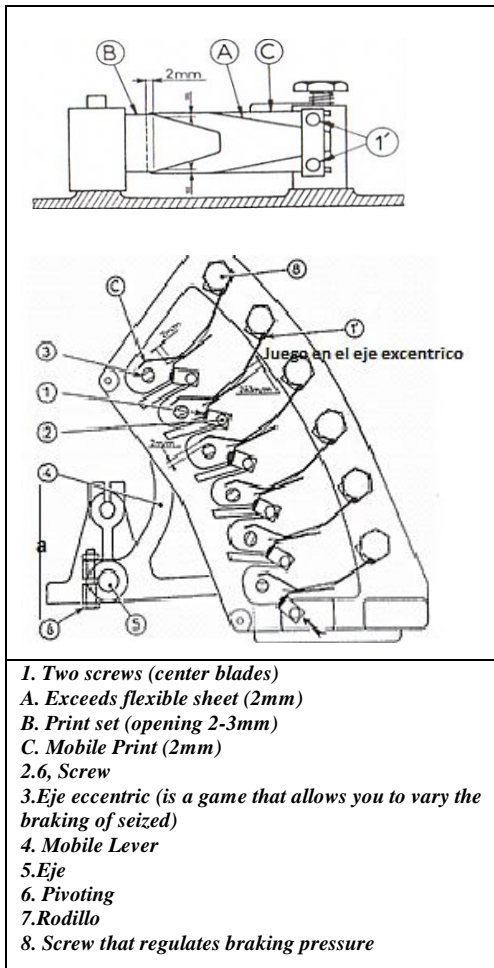


Fig.33 Brake control plot

**6.16 SETTINGS AND FALSE TUCKED SELVEDGE.**

The false selvedge yarns are intertwined to progressively remove excess edge is cut by scissors and send the waste, while the scissor cut evenly

fabric selvedge excess thread is picked up by the threads of false edge.

Set. - To set the false edge is still four important steps.

1.-position of the wire gauze

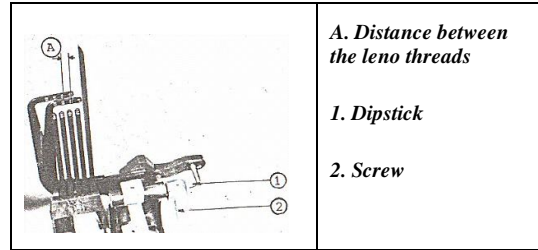


Fig.34 The distance between the wires A leno must be identical in the two steps.

- Fits through rod 1 after loosening the screw

**2. When crossing.**

The superposition of the leno threads is placed.

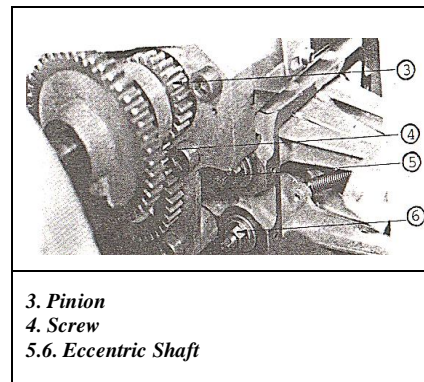
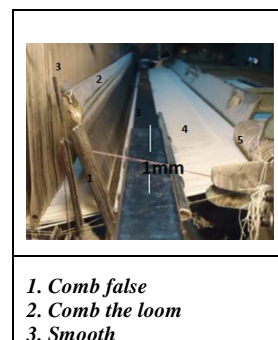


Fig.35 When crossing.

- Left side around 315 °.
- The right side about 330 °.

Adjustment is made by rotating the pinion 3 on its axis after loosening the screw 4.

**3.- Level Crossing**



4. Tissue  
5. Templazos

Fig.36 Level crossing 1mm.

This step proceeds ordering the machine at 180 ° in this position fits the threads than 1mm above the outer needle through the eccentric shaft 5.

4. - Distance between the needle and the false comb.

- Slacken the threads straight.

- Bring the needle 4mm of false comb through the eccentric shaft 6.

### 6.17. SETTING WARP TENSION.

It is performed by correcting the unwinding by the thread holder.

Correction unwinding by the carrier threads. The rod 4 is fixed on A or B when the thread holder has significant fluctuations, mount the rod 4 in B to limit movement of the slider 6.

Adjust the machine to 180 °.

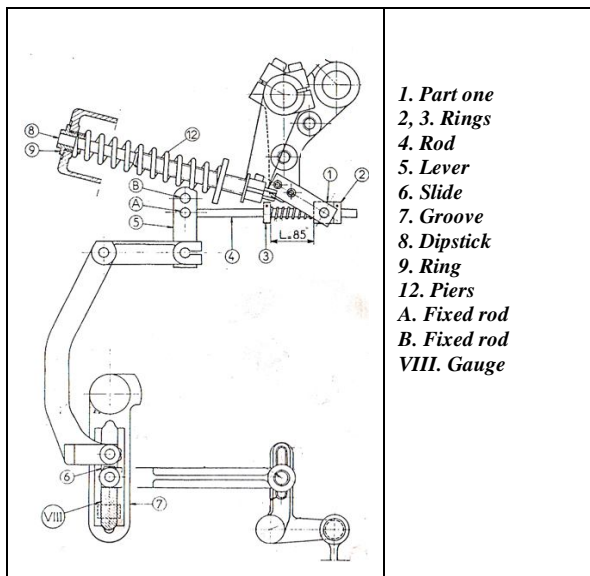


Fig.37 Correction unwinding by carrier threads.

### For a machine with Warp mounted:

- Release the warp by rotating the handwheel the developer to allow the passage gauge VIII between the slider 6 and the bottom of the groove 7.

- Unlock the ring 2.

- Tension the warp so that the tip of the rod 8 touch the guide ring 9 (in this position the lever 5 must be vertical).

- Adjust the ring 2 to come into contact with the workpiece 1 and the spring length  $L = 85$  mm by the ring 3.

- Remove the gauge

### For a machine without the warp mounted:

- Decompress the springs 12 bear the rod 8 to friction ring 9.

- Adjust the ring 2 so that the slider 6 comes into contact with the gauge.

- Remove the gauge.

Note: In case of major shift in height slide-wire, check the adjustment of the Rings 2 and 3.

### 6.18. CALIBRATIONS, ADJUSTMENTS AND ELECTION OF SPROCKETS AS NEEDED.

All calibrations has been detailed, step by step so that the machine has been assembled from leveling works until fully in treatment, it has been used for gauges or shims themselves for this type of machine and the tools available all textile workshop.

For regulations after the machinery, the operation proceeds to regulate small details that might remain inconclusive due process to be completely ready, these regulations are implemented knowing what kind of fabric being manufactured with all the features you need to follow the same.

Any corrections and adjustments is the last step and you can even say that it is part of a preventive and corrective maintenance of planes looms, all settings all the necessary adjustments are made depending on the need this procedure.

Finally after the fabric chosen to be carry the width, we proceed to choose the number of picks per inch for this you need to choose the set of gears that will work, this analysis is performed with the help of sprockets which indicates the gear A, B and the number of teeth of each of these to produce the respective last tissue that can occur

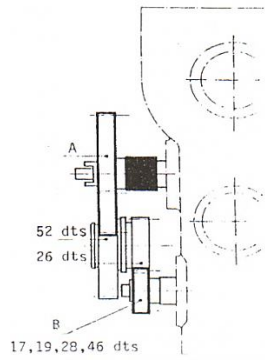


Fig.38 Scheme to change according to past Sprockets we do. Sprockets and number of passes (K = constant).

	A	Number of passes		
		B=17 K=0	B=19 K=0	B=28 K=0,4
a	35	18,1	16,2	11,0
b	36	18,6	16,7	11,7
c	37	19,1	17,2	12,0
d	38	19,6	17,7	12,3
e	39	20,1	18,2	12,6
f	40	20,6	18,7	12,3
g	41	21,0	19,2	12,9
h	43	21,4	19,7	13,1
i	43	21,8	20,2	13,4
j	44	22,2	20,6	13,7
k	45	22,6	21,0	14,0
l	46	23,0	21,4	14,2
m	47	23,4	21,8	14,5
n	48	23,8	22,2	14,7
o	49	24,2	22,6	14,9
p	50	24,6	23,0	15,1
q	51	25,0	23,4	15,3

Tabla 4

## 7. MAINTENANCE.

Maintenance is simply that all the repair and overhaul work necessary to ensure the smooth and the good condition of conservation, monitoring and care that they require to avoid possible unexpected breakdowns or repair these with the largest set of measures and actions necessary to ensure the normal operation of machinery or equipment, in order, to keep the service for which they were designed within its estimated useful life.

## CONTROL.

The maintenance inspection should cover the following aspects:

- Plan carefully and completely each specific operation.
- Provide appropriate equipment for each job or operation.
- Keep all equipment in good condition.
- Anticipate the risks of each issue of maintenance and safety standards required in each case.

- Select and train qualified personnel to perform various maintenance operations.
- Focus on the use and maintenance of personal protective equipment.
- Control of spare parts.

Maintenance work must be performed taking into account: delivery or existence of the pieces, use thereof and other factors affecting operations.

Overall stocks should take all necessary pieces except those purchased for immediate use.

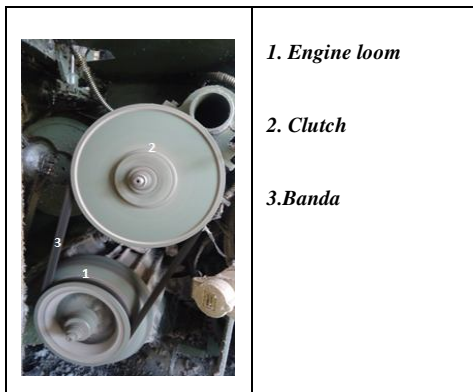
### 7.1. DESIGN OF A PLAN FOR THE LOOM SAURET MANTENIMIETO S-400.

Will perform this maintenance plan based on information on the operation of the machine and the set-up and problems that occurred in the state of parts based on actual experience and many hours in the operation of the equipment, the suggestions the operations and maintenance team were also key for this maintenance. As many times as was necessary to make a repair or a complete change of the same.

## 8. PERFORMANCE ANALYSIS PROCESS.

The process begins with the movement of a three phase motor 5HP 1 which provides the force necessary to implement the various mechanisms of the systems making up the loom.





*Motor and clutch bands.*

The movement of the drive pulley is connected by a further pulley belt 3 to the smaller diameter end of the clutch 2, which consists of electromagnets for advancing and stopping the machine at the other end has a pulley for a set of 6 bands which transmit the movement to a large diameter pulley which is connected to one of its piston which transforms the same circular movement oscillatory movement horizontally.

Another mechanism that connected to a reciprocating element called sword or arm, everything that happens on the right side of the machine for this work to be transmitted to the left side makes it through a tree or main shaft which is also responsible moving the comb containing at Fuller.

The weft insertion process begins with the proper selection of material approximately 3Kg coils are these conical or cylindrical, which must pass by the pre feeder, then brake for the creel own plates in which the coil rests, then through the brake frame which yields a continuous braking, in moments should remain a little loose to avoid unnecessary effort when it is accelerated to high speed by both the first and the second clip, then passes the thread for the inside of the frame which is a device that automatically shuts palpated by a piezoelectric element may capture the motion of a thread friction with the hand and with a reaction time of 20 milliseconds, the next element is the which weft presenter at the right time according to the sorting machine, submit to thread entering the fork and finally in the spring so that the weft yarn is led by the head and in the center of the clip leads other end called hook to get to the other end of the fabric, the comb batanara blow it until the tissue.

The above process is performed thousands of times a day, according to the machine speed. The fabric is collected by a beam forming works two synchronized with the unwinding of the warp.

All these processes must be continuously monitored by the mechanic or the weaver that many times

already very familiar with the machine and solve problems specific to the job.

## 9. ANALYSIS OF ASSEMBLY AND LEVELING.

The assembly was held for the parts that need to be assembled or assembled to thereby form a system or part of this, an example is the clamps that are separable as the head, hook for easy carrying.

- Other parts to be mounted is the brass and plastic coating that protects the moving parts, while the loom gives aesthetic.

- The electrical box assembly, which is attached to the floor in the correct position and lugged Fisher F10 3in bolts enough to hold these boxes.

-The creel, which is placed on the right side of the loom with devices aligning weft path to facilitate the weaving process.

- Warping The bearing assembly weighs approximately 271Kg weight, this is introduced into the shaft of the machine where the warp is unwound.  
- Review and compensate the oil level as the case in all crankcases and reserve the oil pump.

- Place the chopped at the winch, this will be for the tissue to manufacture default.

- For three-phase power, check the correct order of the phases to give the correct direction of rotation to the motor.

- Check fuses of the machine that are in the proper order to Amperage needed each and that these are not broken or shorted.

- Check all bolts and properly armed parties, as part of wine which had dismantled to be armed at the intended site

**Leveling.** - Conducted longitudinally and transversely leveling was done twice because the machinery was moved to another location. The frames must be leveled obtaining one overall flatness which indicates the position of the bubble of the level out to thereby prepare a felt wedges in approximately one millimeter to compensate for unevenness is present on any of the legs of the machine.

Place the loom in the position to work checking the level in parts of the main transmission shaft and the housings of the right and left, if there is unevenness is

compensated with wedges previously wetted contact cement to find the appropriate level, then this is allowed to stand machinery without working about 24 hours to adhere completely and no slippage.

All this is done so that there is wear on parts fully functioning is important to note that the level should be checked in the course of six months working as a precaution.

## 10. ANALYSIS OF SETTINGS.

For calibration of this type of looms must use some special elements suitable tool.

<p><i>Special Calipers</i>  <i>Calibre of Bataan and Front Terminal</i>  <i>Gauge needle or forceps</i>  <i>Selvages gauge pin</i>  <i>Gauge</i></p> <p><i>Warp unwinding</i>  <i>Belts and Tensiometer</i></p> <p><i>Bands</i>  <i>Levelling bubble</i></p>	<p><i>Tools</i>  <i>Set in inches and metric hex.</i>  <i>Mixed set of keys and crown mouth</i>  <i>Game Runs about-face</i>  <i>hammer</i>  <i>Gata Hydraulics</i>  <i>Flexometer, etc..</i></p>
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Tabla 5. Gauges and the most commonly used tools.

Besides tools and gauges should take into account the characteristics of the fabric and material that are going to work, so the parameters to take into account for calibration:

- Width of fabric.
- Tissue type.
- Number of passes in plot.
- Type of raw material.
- Title of yarn in weft and warp.
- Number of frames to use.
- Number of threads.

## INDUSTRIAL HYGIENE AND SAFETY.

Hygiene is focused on health surveillance and prevention of occupational diseases, study monitoring and assessing the conditions that cause it.

The Industrial Security over time has acquired different concept thereof having a single purpose is to improve staff welfare workers through a safe working environment and functional, improving infrastructure and increasing technology in equipment ergonomically to their best use.

The purpose of the implementation of security measures is to make it as safe as possible to the machine. It is advisable that the security measures are

comprehensive in nature. The preferred method is one that establishes an order of priority between integrated prevention measures, so it is always advisable to choose always the priority measures. This order is as follows:

- a) Measures to prevent intrinsic, which tend to avoid risk or reduce risk.
- b) protection measures, which tend to protect against dangers inevitable.
- c) Warnings, seeking to inform and warn users when the protection is not possible.
- d) Additional provisions.
- e) intrinsic Prevention

## 11.1. PERSONAL PROTECTIVE EQUIPMENT PPE.

When choosing a PPE should consider this to be effective against the risks to be protected without introducing new ones.

Keep in mind that

- The worker shall be entitled to participate in the election
- You must provide the necessary training to use them properly you know.
- You have to take a number of precautions in their use and maintenance:
- Clean them regularly.
- Keep them in a clean and dry after use.
- You will need to follow the manufacturer's instructions. They have to come in a language you can understand.
- Will have to check that there are parts available and regularly reviewing the EPI to remove those that are damaged or out of use.

## III CONCLUSIONS.

- The development of this tutorial facilitate the understanding and practice of weaving promoting meaningful learning of the people who use it.
- This tutorial is an instrument that includes the information needed to guide, motivate and support of integrated activities support the student to use their

spare time, maximizing their learning about Planes Pliers Looms Saurer S-400.

- The results are best, as it has made the Saurer Loom S-400 by a good installation, calibration and maintenance leveling has good performance and productivity.

- The operating system of the machine Saurer S-400 is through the braking system that goes to the main shaft and the engine so this should always be in top condition should be biannual maintenance and calibrations within the range set .

- With the system tucked, you can pass in heald wires, foils and combs in a process, the wire is inserted, as before, through eye mesh and foil and then positioned directly on the machine's passing combs

- The quality of the knot depends on good preparation and placement of the warp threads of both final and the beam to tie Carreto or whether to do it by hand or with the help of a knoter.

- Refinement of the different systems of unemployment in both warp and weft are of vital importance which increase the efficiency of the looms that occupy it as they have a significant contribution to reduce unnecessary loss of material, fault correction time without certainly has a large-scale production.

- We believe that while better functioning of the loom and there is a predictive, corrective and Repair, is greatly lowered breakage of parts, thus increasing production, reducing failures avoiding strikes so there is a better quality Tissue.

- The investigation has found that the Saurer Loom S-400 emits a noise level of about 95 dB, which allows us to say that you should use hearing protection

#### **.IV RECOMMENDATIONS.**

- It is recommended that when you go to develop an educational guide not follow a single model, since the structure of it is due to the conditions in which they need to develop the guidance, motivation and understanding of the reader, according to their use as well as its contents and activities are according to the learning you want to promote.

- It is recommended for any work on the machine except normal operations Weaving, stop the machine and cut the power, after performing any operation on the machine stopped, when light it must be all the

protection systems in place and anyone working near this until you verify correct operation.

- It is recommended that you must control the machine leveling after six months of operation, to verify their status and whether to correct in time.

- It is recommended that will adjust the clamps on bars where these have the tight part because many of the bars times are not entirely uniform, so that a game should be not be less than 0.05 mm so that no heating occurs in one of them.

- When moving from one item to another you should set the ball races with full width provisionally before mounting comb comb to avoid any accidents.

- Avoid where possible to enter fat or oil between the plates and the clutch disc because it produces heat and eventually damage the coil.

- We should not put tool, accessory, clothing or accessories with wide sleeves that may disrupt the free operation of the machine in operation.

- When changing to a new machine knitter, you should seriously consider the dimensions of the cylinder, the wire sets and the product and the team's current sticker.

- Regularly clean the lint that accumulate on roofs, in the light, and power cables to avoid damage of the same.

- proper maintenance of the machinery used because in this way can reduce the existing noise level, avoiding the deterioration of the gears or parts that are exposed to friction or impact.

- It is recommended that when standing in the weaving section should wear ear protection, eye and face mask use and whether to perform a lumbar belt exertion.

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