COMBING MACHINERY.

DESCRIPTIVE CATALOGUE

WITH

DIRECTIONS FOR SETTING,
CARE and USE

OF

COMBING MACHINERY

MANUFACTURED BY

THE WHITIN MACHINE WORKS,

Manufacturers of

COTTON MACHINERY,

WHITINSVILLE, MASS., U. S. A.

1902.

PRESS OF
EAGLE PRINTING COMPANY,
WHITINSVILLE,
MASS.

PREFACE.

We present this Catalogue for the convenience of those using our Combing Machinery, and also to those who are contemplating additions or changes in their combing department.

We venture to express a hope that the tables, diagrams and directions for setting will be found useful to all engaged in cotton manufacturing, but more especially to those using Whitin Combing Machinery.

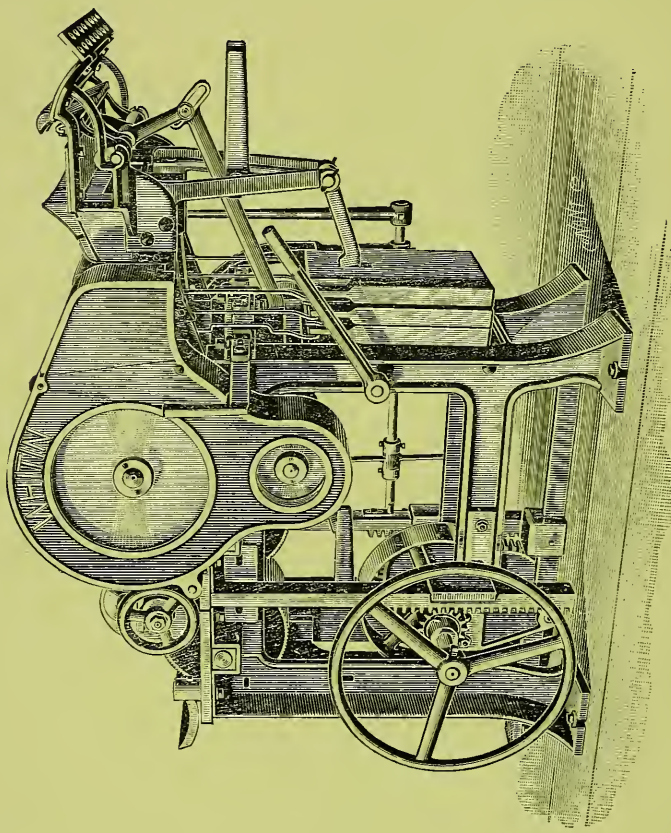
In addition to Combing Machinery. we build Revolving Flat Cards, Railway Heads, Drawing Frames, Spinning Frames, Spoolers, Quillers, Wet and Dry Twisters, Reels, Looms, and Dobbies, all fitted with the latest improvements.

We beg to conclude with the assurance that all orders entrusted in our hands will receive the most careful attention.

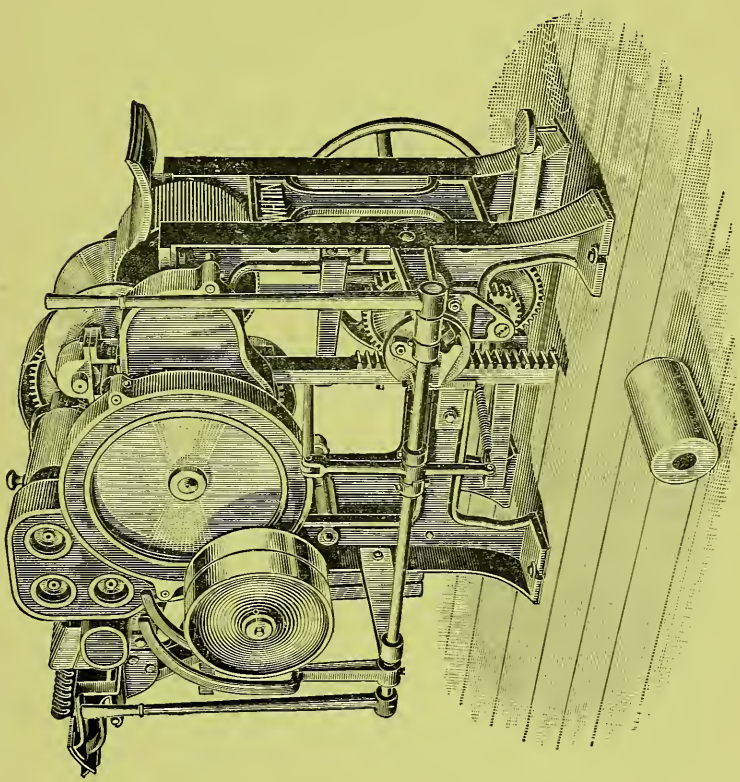
THE WHITIN MACHINE WORKS,

Whitinsville, Mass., U. S. A.

Oct. 1, 1902.



Sliver Lap Machine.



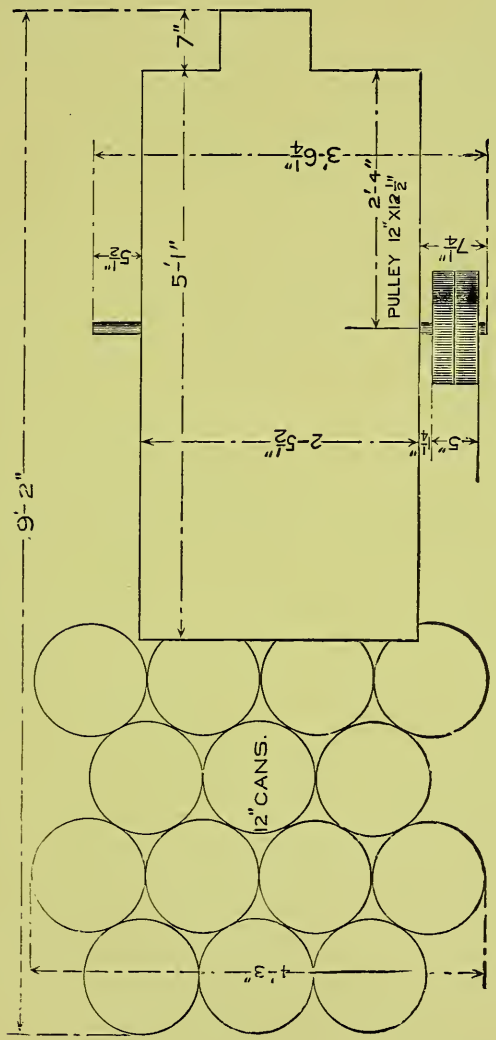
Sliver Lap Machine.

Sliver Lap Machine.

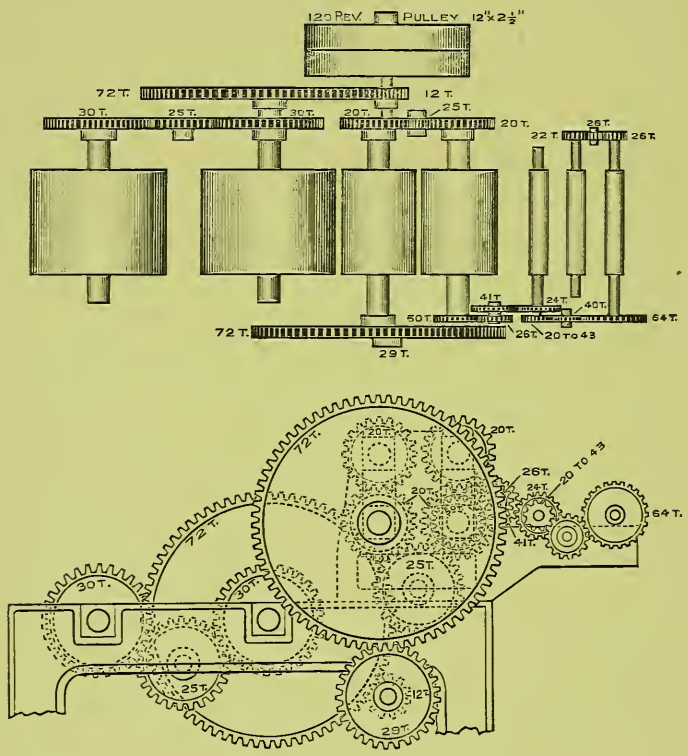
This machine is used to make laps for use on combing machines or ribbon lap machines. The lap is formed by running from 12 to 16 card or drawing frame slivers, held in ordinary cans behind the machine, through guides and stop motion spoons to a draw head consisting of three top and bottom rolls arranged with a slight draught. From these rolls the cotton is condensed by passing through two pairs of heavy calender rolls and is then wound into a lap either 7½″ or 8¾″ wide. When the laps are taken direct to the combing machine they should be 8¾″ wide, but when made for a ribbon lap machine they should be 1¼″ narrower to allow for spread in drawing. As it is essential that the laps made on this machine be of a perfectly uniform nature, a back stop motion is provided for each sliver, which causes the machine to stop instantly on the breaking of an end. Another stop motion is used which stops the machine when the lap reaches its full diameter, thus insuring the laps to be of uniform length. The draught of this machine should be from 1.50 to 2.01 on a 7½″ lap, and 2.01 to 3.22 on an 8¾″ lap, and the rolls in the draw head should be spread from ¼″ to ⅜″ over the length of the staple used.

PULLEYS:—12″ diameter by 2½″ face, speed according to production required. See page 10.

FLOOR SPACE:—Including cans, 9′, 2″ by 4′, 3″. See plan, page 7.



Sliver Lap Machine, Floor Plan.



Sliver Lap Machine, Diagram of Gearing.

Draught Table, Sliver Lap Machine.

Table gives total draught in machine.

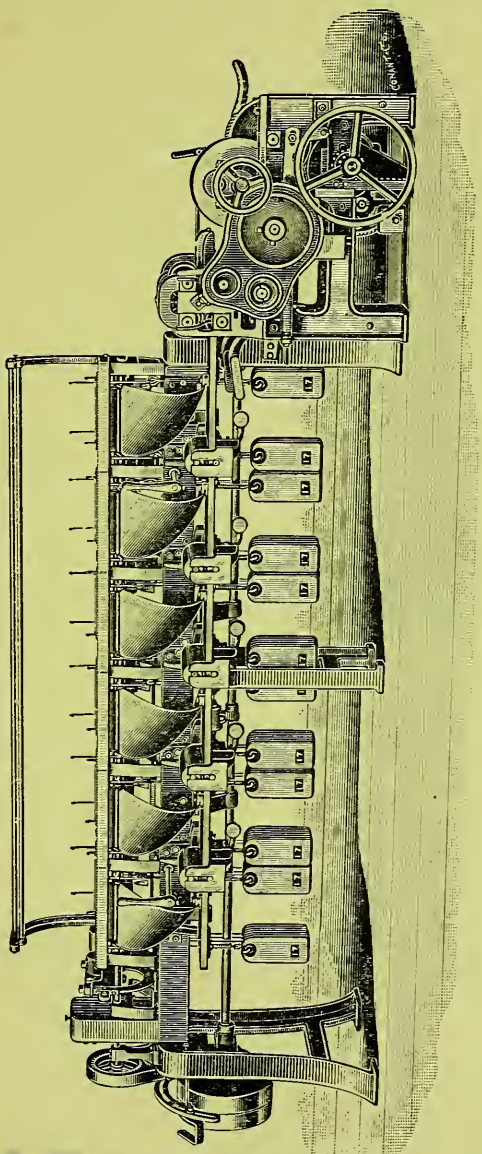
Front Roll Change Gear.	Draught.	Front Roll Change Gear.	Draught.	Front Roll Change Gear.	Draught.
20	3.22	28	2.30	36	1.79
21	3.07	29	2.22	37	1.74
22	2.93	30	2.15	38	1.70
23	2.80	31	2.08	39	1.65
24	2.68	32	2.01	40	1.61
25	2.58	33	1.95	41	1.57
26	2.48	34	1.89	42	1.53
27	2.39	35	1.84	43	1.50

Sliver Lap Machine.

Production per day of 10 hours, allowing 10% off for oiling, cleaning, etc.

Revolutions per min. of 5 in. calender roll.	Grains per yard of lap produced.													
	200	210	220	230	240	250	260	270	280	290	300	310	320	330
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
45	303.1	318.2	333.4	348.5	363.7	378.8	394.0	409.1	424.3	439.4	454.6	469.7	484.9	500.0
50	336.7	353.6	370.4	387.2	404.1	420.9	437.8	454.6	471.4	488.3	505.1	522.0	538.8	555.6
55	370.4	388.9	407.4	426.0	444.5	463.0	481.5	500.0	518.6	537.1	555.6	574.1	592.6	611.2
60	404.1	424.3	444.5	464.7	484.9	505.1	525.3	545.5	565.7	585.9	606.1	626.3	646.5	666.7
65	437.7	459.6	481.5	503.4	525.3	547.2	569.1	591.0	612.9	634.7	656.6	678.5	700.4	722.3
70	471.4	495.0	518.5	542.1	565.7	589.3	612.8	636.4	660.0	683.5	707.1	730.7	754.2	777.8
80	538.7	565.7	592.6	619.6	646.5	673.4	700.4	727.3	754.3	781.2	808.1	835.1	862.0	889.0
90	606.1	636.4	666.7	697.0	727.3	757.6	787.9	818.2	848.5	878.8	909.1	939.4	969.7	1000.0
100	673.4	707.2	740.9	774.5	808.2	841.9	875.5	909.2	942.9	976.6	1010.2	1043.9	1077.6	1111.2

2.48 revolutions of driving pulley to 1 revolution of 5 in. calender roll.



Ribbon Lap Machine.

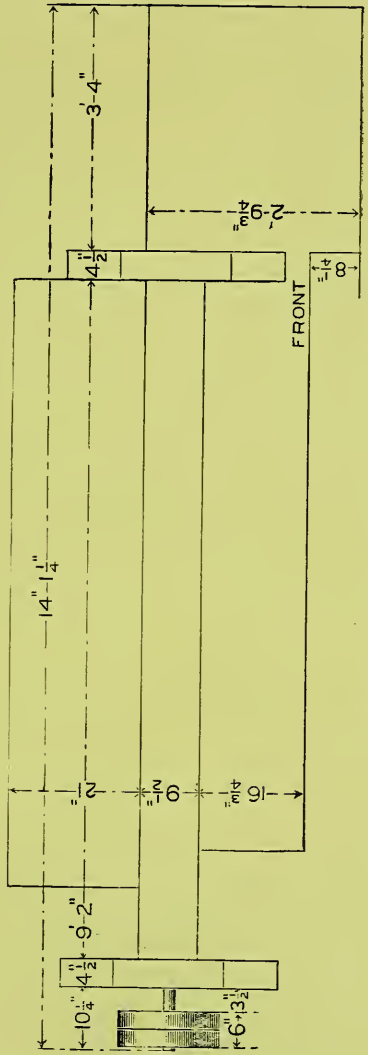
Ribbon Lap Machine.

The object of this machine is to so prepare the laps for the combing machine that the web of the slivers will be of a more even and uniform structure than that of the sliver lap machine, thus placing the fibers in a better condition for the action of the combing machine.

Six laps from the sliver lap machine, each 7½″ wide, are placed in the ribbon machine creel and drawn through four lines of fluted rolls. Highly polished, brass covered, curved plates guide the ribbon evenly on top of each other on the sliver plate, along which the ribbon is drawn through several press rolls to the lap head where it is compressed and formed into a lap 8¾″ wide ready for the combing machine. The machine is provided with a back stop motion which stops the machine whenever a lap in the creel breaks down or runs out; a full lap stop motion is also provided in the lap head which insures the laps to be of uniform length. The average draught is about six but varies to some extent, as the sizing for the combing machine is done on this machine. The rolls in this machine should be spread ⅛″ to ⅜″ over the length of the staple, according to the weight of the lap going in at the back.

PULLEYS:—16″ diameter by 3″ face, speed according to production required. See page 16.

FLOOR SPACE:—14′, 1¼″ by 4′, 7½″. See plan, page 13.



Ribbon Lap Machine, Floor Plan.

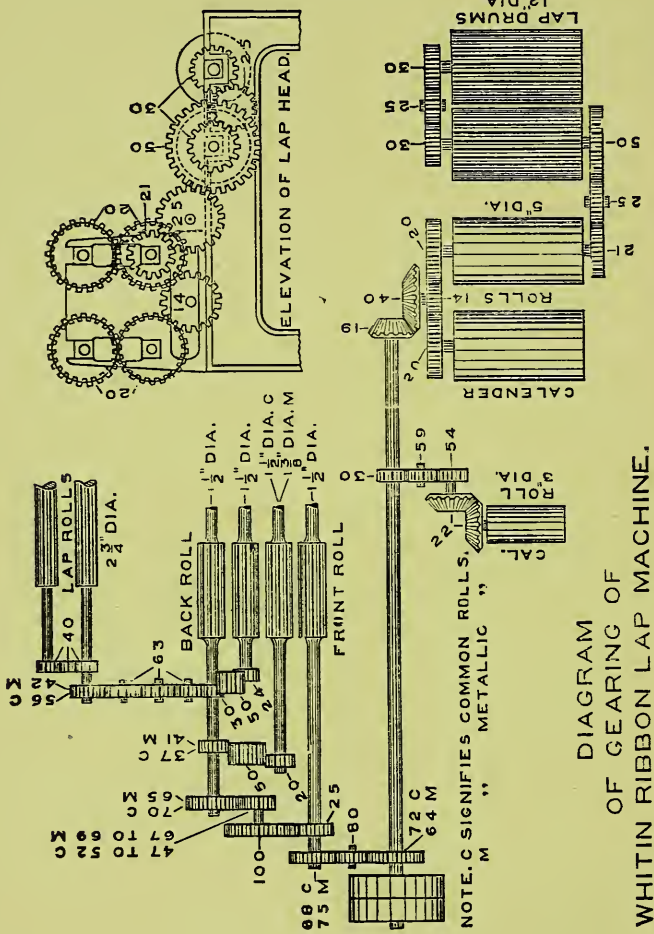


DIAGRAM
OF GEARING OF
WHITIN RIBBON LAP MACHINE.

Draught Table—Ribbon Lap Machine.

Table gives total draught in machine.

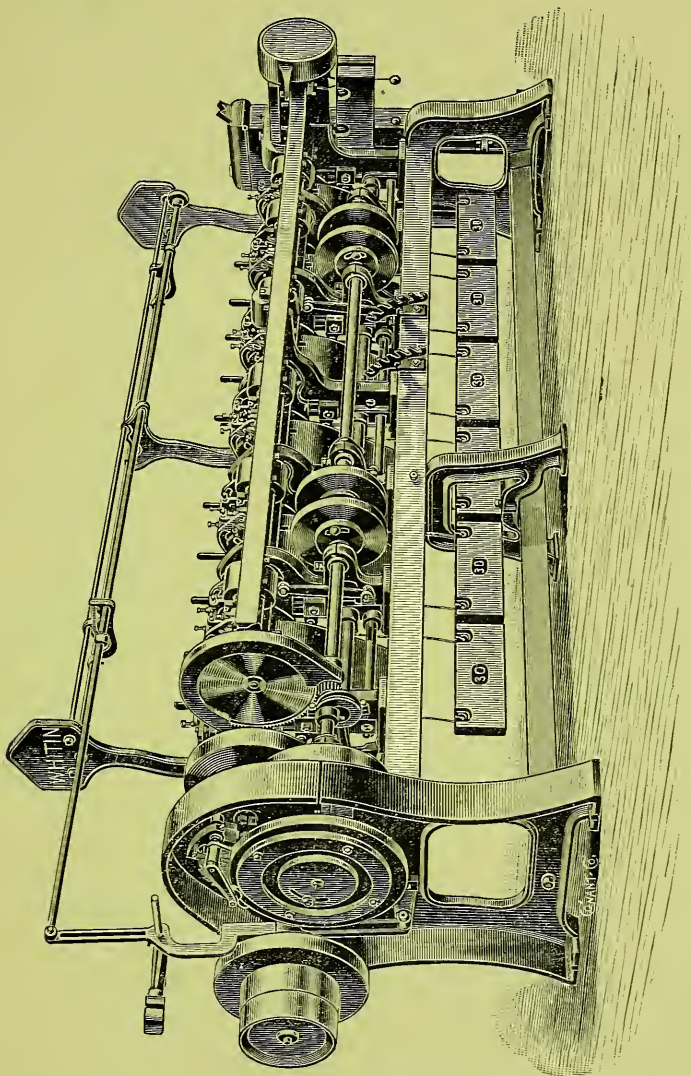
Change Gear.	Draught.	Change Gear.	Draught
47	6.40	50	6.02
48	6.27	51	5.90
49	6.14	52	5.78

Ribbon Lap Machine.

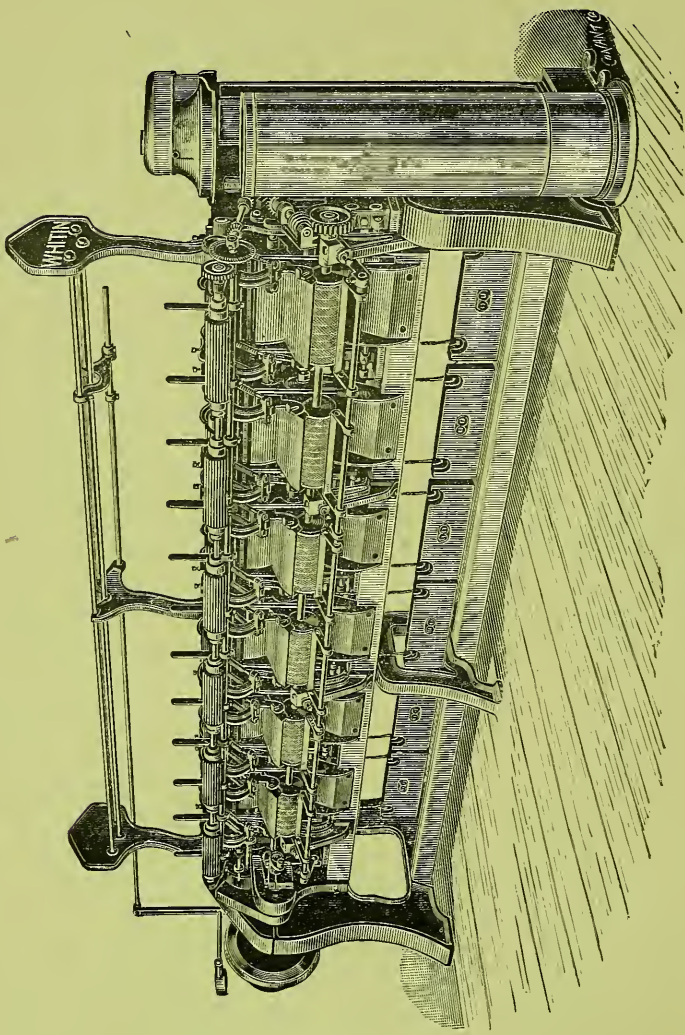
Production per day of ten hours, allowing 10% off for cleaning, oiling, etc.

Revolutions per min. of 5 in. calender roll.	Grains per yard of lap produced.												
	200	210	220	230	240	250	260	270	280	290	300	310	320
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
85	572.4	601.0	629.7	658.3	686.9	715.5	744.1	772.8	801.4	830.0	858.6	887.2	915.9
90	606.1	636.4	666.7	697.0	727.3	757.6	787.9	818.2	848.5	878.8	909.1	939.4	969.7
95	639.8	671.7	703.7	735.7	767.7	799.7	831.7	863.7	895.7	927.7	959.7	991.6	1023.6
100	673.4	707.2	740.9	774.5	808.2	841.9	875.5	909.2	942.9	976.6	1010.2	1043.9	1077.6
105	707.1	742.5	777.8	813.2	848.5	883.9	919.3	954.6	990.0	1025.3	1060.7	1096.1	1131.4

3 revolutions of driving pulley to 1 revolution of 5 inch calender roll.



Combing Machine (Front).



Combing Machine (Back).

Improved Combing Machine.

Our Improved Combing Machine will comb cotton from 7/8" staple to 2" staple without further change than setting or timing. This machine contains several features which are improvements on our old style machine, constituting a great advance, and largely increasing the economical value of the machine on all kinds of stock. The specialties to be noticed in the construction of this machine are as follows :—

Two sets of lifter and nipper cams are used instead of one set as in our old style of machine. By this construction torsion of the nipper and lifter shafts is prevented and a better nip secured. The cams have been remodelled so as to eliminate the vibrations in the machine to a great extent, thereby rendering it possible to obtain a greater production, with equal quality, by increasing the speed to 100 nips per minute where formerly 85 nips was considered the limit. The cams are cut by improved machinery thus securing a smooth running motion at any speed.

The Owen feed roll stop motion (patent applied for) prevents breakages of nipper bars, half laps, and loss of production due to lap winding about the bottom feed roll. A carrying roll is provided on the sliver plate whereby the breakage of sliver before entering the draw-box is greatly reduced. The circular comb brushes are driven by a variable gearing motion of three different speeds to compensate for the wear of the brushes. A traverse motion is also applied to the brush shaft whereby the circular comb is cleaned much more effectively. Half laps and fluted segments are made to templates and are all set concentric with cylinder shaft. All half laps are interchangeable as are also the fluted segments, and they will both interchange respectively with those on combing machines (of the same size of lap) made by John Hetherington & Sons. This feature commends itself to manufacturers using the Hetherington machines. All shafts are supported in heavy bearings that are rigidly held, preventing all chances of displacement. The gearing is thoroughly guarded by covers. All parts of the machine are made accurately to templates by the use of improved machinery so that necessary repairs will go into place readily without re-fitting.

The machine is built with six or eight heads to take laps 8 3-4 inches wide. A coiler for either a 9-in., 10-in., 11-in. or 12-in. diameter can is furnished with each machine. The speed of the machine depends on the grade of stock used and quality of work desired. (See Production Table, page 24.)

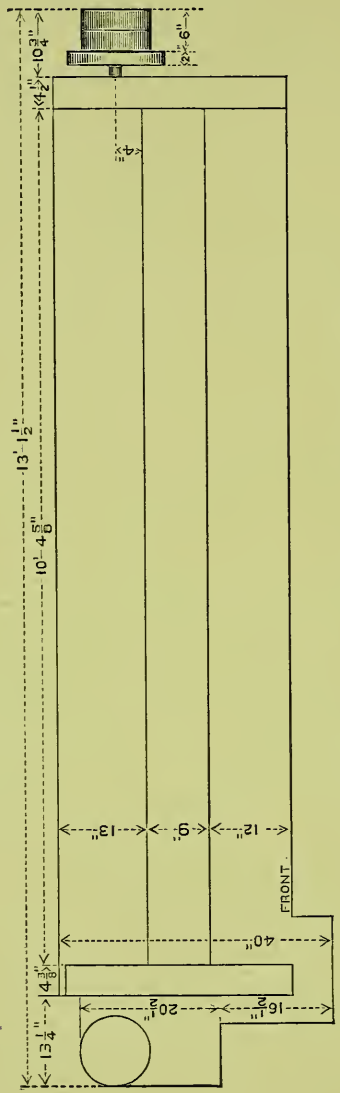
PULLEYS.—10 in. or 12 in. diameter by 3-in. face and run 3.80 revolutions for every nip.

POWER :—One-half horse power.

WEIGHTS :—Shipping weight 3000 pounds ; net 2800 pounds.

FLOOR SPACE :—(See plan, page 20.)

EXTRAS REQUIRED :—Sliver cans 9 in. to 12 in. diameter, 36 in. high, with spring bottoms. Three waste boxes for back of machine, to be made of sheet iron, fibre, or wood, of the following dimensions (outside) :—30 in. long. 12 in. wide, back 26 in. high, front 19 in. high.

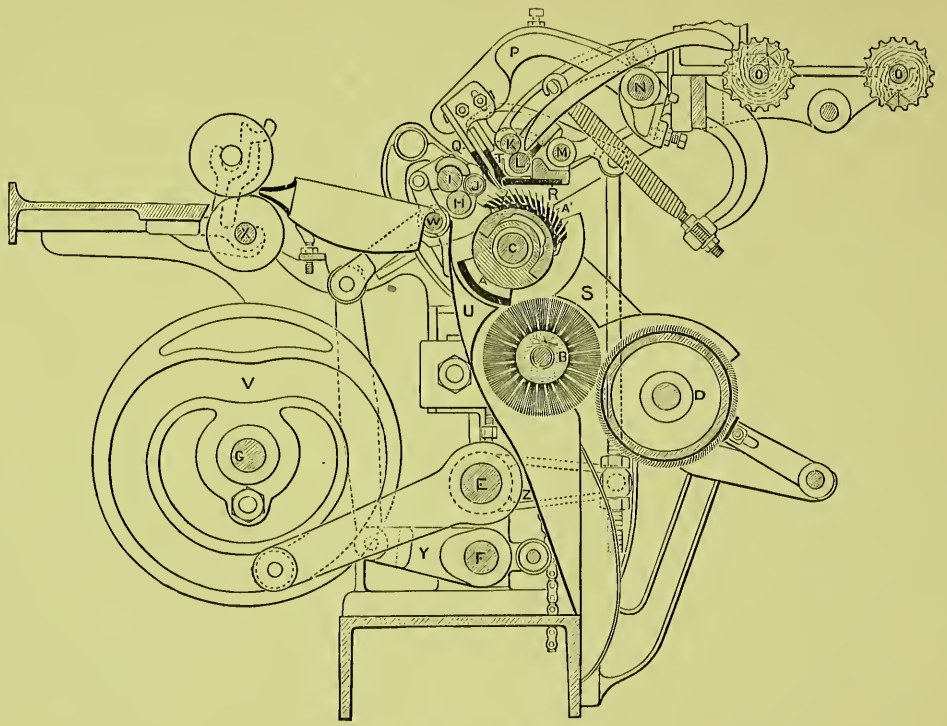


Floor Plan of Six Head Combing Machine.

NOTE.—Eight Head Machine is 16 feet long.

References.

A—Fluted Segment.
B—Brush.
C—Cylinder Shaft.
D—Doffer.
E—Nipper Shaft.
F—Large Lifter Shaft.
G—Cam Shaft.
H—Steel Drawing-off or Detaching Roll.
I—Brass Clearing Roll.
J—Leather Drawing-off Roll.
K—Top Feed Roll.
L—Bottom Feed Roll.
M—Nipper Arm Fulcrum.
N—Top Comb Shaft.
O—Lap Roll Shaft.
P—Top Comb Arm.
Q—Top Comb.
R—Cushion Plate.
S—Doffer Cover.
T—Nipper Knife.
U—Waste Chute.
V—Nipper Cam.
W—Small Lifter Cam.
X—Calender Roll Shaft.
Y—Lifter Shaft Lever,
Z—Nipper Shaft Lever.
A'—Half Lap.



Section of Combing Machine.

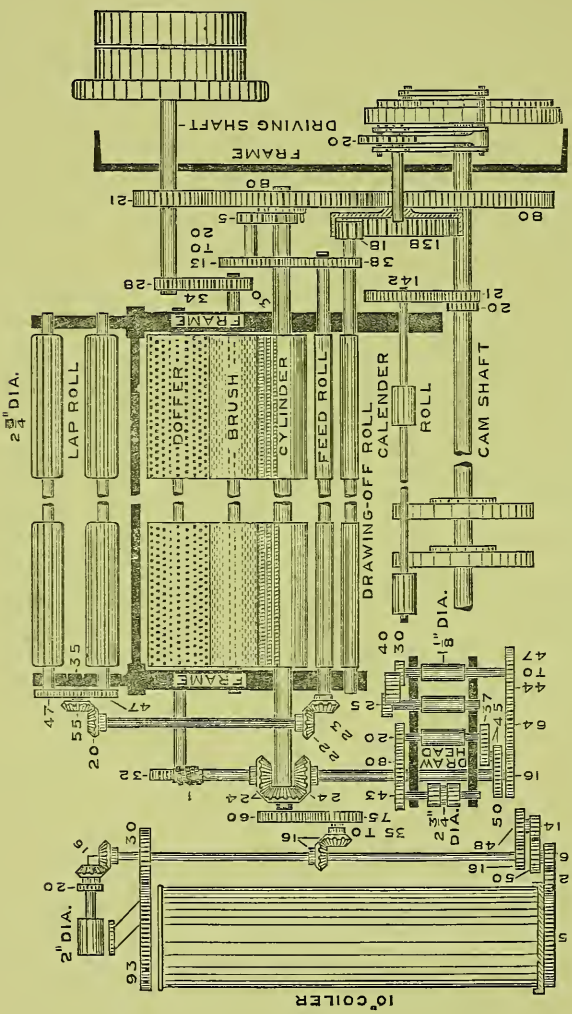


DIAGRAM OF GEARING OF WHITIN COMBER.

Calculations for Draught Constant of Combing Machine.

(See Diagram of Gearing.)

$$\frac{47 \times 55 \times 22 \times 38 \times 5 \times 60 \times 2}{35 \times 20 \times 23 \times \text{change} \times 1 \times 69 \times 2\frac{3}{4}} = \frac{424\,434}{\text{change}} = \text{Draught.}$$

Divide 424 434 by draught gear and get the draught.

Divide 424 434 by draught required and get the draught gear.

To enable users of our machine to obtain the draught or draught gear without requiring the use of a constant, we append the following table :—

Draught Table of Combing Machine.

This table gives total draught between 2¾″ corrugated lap rolls and 2″ coiler calender rolls.

With draw-head back roll change gear 46 teeth.
With draw-head front roll change gear 37 teeth.
Total draught in draw-head 4.41.
Change gear on coiler connecting shaft 69 teeth.

Feed Gear.	Total Draught.	Feed Gear.	Total Draught.
13 Teeth.	32.65	17 Teeth.	24.97
14	30 32	18	23.58
15	28 30	19	22.34
16	26 53	20	21 22

NOTE :—The change gears on the coiler connecting shaft are 35 to 75 teeth, inclusive, and depending on the draught in the draw-head must be such as to take up what the draw-head calender roll delivers.

The draw-head back roll change gears are 44 to 47 teeth inclusive. and should be such that the roll draws the sliver along the table as fast as delivered. The draught of the draw-head is usually 4.41 but may be changed by changing the front roll change gear.

Combing Machine.

Table showing the number of pounds of combed sliver produced in one day of 10 hours allowing 5% off for cleaning, oiling, etc.

Coiler Connection gear 69 teeth.

Nips per minute.	Grains per yard of combed sliver.															
	40	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
75	37.08	38.94	40.79	42 64	44.50	46.35	48.21	50.06	51.91	53.77	55.62	57.48	59.33	61 18	63.03	64.88
80	39.55	41 53	43.51	45 49	47.46	49.44	51.42	53.40	55.37	57.35	59.33	61 31	63.28	65.25	67.22	69.19
85	42.03	44.13	46 23	48.33	50.43	52 53	54.63	56.73	58.84	60 94	63.04	65 14	67.24	69.34	71.44	73.54
90	44.50	46.72	48.95	51.17	53.40	55.62	57.85	60.07	62.30	64.52	66.75	68.97	71.20	73.43	75.56	77.89
95	46.97	49.32	51.67	54 02	56.36	58.71	61.06	63.41	65.76	68.11	70.45	72 80	75.15	77 50	79.85	82.20
100	49.44	51.91	54.39	56 86	59 33	61.80	64.27	66.74	69.22	71.69	74.16	76.63	79.11	81.59	84.07	86.55
105	51.91	54.50	57.11	59.70	62.30	64.89	67.48	70.08	72.68	75.27	77.87	80.46	83 06	85.66	88.26	90.86
110	54.38	57.09	59.83	62 54	65.27	67.98	70.69	73.42	76.14	78 85	81.58	84.29	87.01	89.73	92.45	95.17
115	56.85	59.68	62.55	65.38	68.24	71.07	73.90	76.76	79.60	82.43	85.29	88.12	90.96	93.80	96.64	99.48
120	59.32	62.27	65.27	68 22	71.21	74.16	77.11	80.10	83.06	86 01	89.00	91.95	94.91	97.87	100.83	103.79
125	61.79	64.86	67.99	71.06	74 18	77.25	80.32	83.44	86.52	89.59	92.71	95.78	98.86	101.94	105.02	108.10

3.80 revolutions of driving pulley to one nip.

Directions for Setting
Improved Combing Machine.

BY ELWIN H. ROONEY.

The following directions are not of an arbitrary nature, but are merely intended as an aid to those whose experience with combing machines is of a limited nature. Experience with different grades of staple will suggest changes which may, with advantage, be adopted in preference to our rules.

Cleaning the Parts of Combing Machine.

All shafts in the combing machine should be taken out and thoroughly cleaned. All the shaft bearings should also be cleaned before the shafts are replaced, as well as other parts of the machine that may be covered with grease or other preservative.

Assembling the Combing Machine. Setting the Shafts.

Users will find it most convenient to replace the shafts in the following order:—Lifter and Nipper shafts, 1¼″ and 1½″ diameter, running in the base of the upright stands; Cylinder shaft, coupling this to the short shaft that carries the index gear; Driving shaft; Cam shaft; Notch wheel shaft. See that all caps are screwed firmly to their places and that all shafts run freely after the caps are well set up. Put the large gear covers on head end of the machine and see that they do not interfere with the moving parts of the machine.

Setting End Cam.

Put on pawl arm with cam roll on it. Set these caps up hard. Throw 80 tooth gear out of mesh by sliding endwise and turn cam shaft till the roller in pawl arm is in the heel of the large cam on the end of the machine. Turn the index gear till the number 5 ½ stands opposite the pointer and slide the 80 tooth gear back into mesh and bolt it to its sleeve.

Fluted and Needle Segments.

See that the fluted segments are screwed down firmly, and then put in needle half laps and screw them down firmly. Be sure and have them thoroughly cleaned. Put small tin casings between the two segments and see that they fit closely.

Lifters to be in Line.

See if the lifter slides on the small shafts are all in a straight line before putting them in place, and also see that these set screws are well tightened. Put brass bushings in detaching roll bearings and place the detaching roll in the bushings. See that this roll and the small lifter shafts are free after the caps are screwed on, they are both under the same cap. Connect the small lifter shafts with the large lifter shaft. The detaching roll should be set to the fluted segments with a No. 21 gauge.

Setting Cylinders.

Put on large tin waste chutes, being particular to have each square and true, particularly at the point where they come between the upright stands. Then set the cylinders in the proper place by turning the index gear till number 5 is opposite the pointer. Then turn cylinders on the shafts till they all stand with the front edge of the fluted segment 1⅛″ from the back side of the detaching roll. Use the 1⅛″ gauge to caliper this distance. Screw the cylinders firmly to the shaft by the set screws at each end of each cylinder. See that each cylinder stands midway of the waste chutes, particularly at the point where they cover the ends of the cylinders.

Draw Head.

Put doffer worm-gear shaft in place. Put draw-head together and place gears and covers in position and connect with the gear on end of the cylinder shaft.

Setting Top Comb Shaft.

Put top comb shaft in its bearing. Screw on the caps and set 7″ from the back side of the detaching roll to the front side of the top comb shaft.

Setting Brushes.

Put in the brush shaft and set the brushes so that the bristles will touch the brass faces of the needle bars. Do not set the brushes hard against the needles.

Setting the Nippers.

Put on the cushion plates and adjust them by the small screws at the back, so that the front edge of the cushion plate is the thickness of a piece of writing paper from the lip of the nipper knife. Be sure and have the nipper knife perfectly straight. Fasten the plates securely in place by the binding screws and try the setting after tightening the binding screws. Place the nipper frames all on the floor and connect them with the nipper stands, and slide the feed roll into place endwise, then lift them together into place. Set the arm (with the stop screws in them) about an angle of 31 degrees by adjusting the stop screws. Then set the front edge of the cushion plate the proper distance from the detaching roll. Use only one screw in each frame to make this setting and, when cushion plate is set, fasten the stop screw you have used with the check nut. After all the frames have been set in this manner, set the other stop screw with the one that is set with paper so that both screw points in each end will hit the stand at the same time. Four gauges are used for this, ranging from 1⅛″ to 1 5-16″, according to the stock used. While gauging this distance, set the nipper frame up or down until the cushion plate is the thickness of No. 12 gauge from the segment. This is to level the frames merely; they are all reset to the half lap needles later. The nipper knife will now stand at about an angle of 31 degrees. To get more angle on the nipper knife, turn the screws in the upright arm further in. In setting the nippers it is always best to begin in the center of the machine and work each way.

Setting Feed Roll.

Set front side of the feed roll from the detaching roll 1 13-16″ to 1 15-16″, that is, if the cushion plate has been set 1 1-8″ to 1 5-16″. Put on nipper springs and give a tension by screwing the nuts about ¼″ after they begin to draw. Feed roll should start when figure four is opposite the pointer. Set the cross shaft from the feed roll to the corrugated lap rolls.

Setting the Nipper Rods.

Connect nipper frames to large nipper shaft. See that rods enter the swivel freely. Turn the comber until the first row of needles on the half laps point to the center of the detaching roll, or until pointer is at 14¼ on index gear. See that the roll is in high part of nipper cam under the sliver plate. Put stop gauge under the point of the stop screw and adjust nuts on connection rods until the pressure is nearly taken off the gauge. At the same time set the nipper frames up or down until the cushion plate gauges No. 19 from the needles. Tighten all bolts and check nuts and try gauges again to see if settings have moved.

Timing the Nippers.

Set the lever that controls the opening and closing of the nippers so that they will open at 3½ and close at 9¼ on the index gear. Do this by moving the cam on its sleeve and by the long adjusting screws.

Setting the Top Combs.

See that the tin strip that holds one set of needles stands about 1-32″ further down than the fixed needles. Turn combing machine until fluted segment is under top comb needle. Cam should be at its lowest point. Give top comb an angle of about 31 degrees and set it about 1-16″ from the leather roll. Set dogs on top comb shaft so that all the combs will be lifted at the same time. Gauge combs so that they will stand about 20 gauge from segment. Set cam on end of combing machine so combs will be down when index gear is at No. 5.

Setting Doffers.

Put the doffers in place and set them about 1-32″ from the brushes. Do not have the doffer wire touch the brush ; the waste will be nepped if it does. Set the doffer comb the same relation to the doffer as the doffer is to the brushes. Put the doffer covers on castings, setting them so that they are close to the "bite" of brush and half lap on cylinder, and high enough to throw the waste down. Set them close to the doffer on the back side.

Setting Lap Aprons.

Put in place the aprons that reach from the wooden corrugated lap rolls to the steel feed roll and see that the brush on the end of apron strikes onto the steel feed roll. Have index wheel at 14¼ in making this setting.

Setting the Top Feed Rolls.

Put the feed roll in the bearings and adjust so that the top feed roll is parallel with the feed roll proper. Hook on the springs and give about the same tension as the springs on the nipper frames. Set the wooden corrugated lap rolls to the aprons and adjust the vertical lap fingers so that the lap will feed fair with the aprons.

Setting Lifters.

Put the leather detaching rolls in place. See that the flat side of brass bushings on end of these rolls bears against the lifter slides. Attach the roll weights to the stirrups and hang the stirrups in the bearings made for them in the brass bushings. Turn the combing machine until the segments come under the leather detaching roll. See that roll in lifter cam, under the sliver plate, is in the highest position. Loosen lifter quadrant and throw the lifters up till the No. 21 guage will go between the brass bushings and the highest lifter slide. Then set all the other slides, individually, till they stand the same as the first one. Make them all secure and see that there is no chance for them to slip back.

Timing the Leather Detaching Rolls.

Place a slip of paper between the lifter slides and the brass bushings and adjust the time to rise and fall by turning the lifter cam on its sleeve, and by the long screws in the quadrant. Have the paper released at 6¾, and have the lifter return and tighten the paper again at 8¾ on the index gear. The rolls may be left in contact with the fluted segment until 9¼ without detriment.

Timing Detaching Rolls.

Adjust the large cam at the end of comber on its sleeve, so that the detaching roll will begin to move forward when No. 6 on the index gear stands opposite the pointer.

Setting Brass Clearing Rolls.

These rolls should simply be set parallel with the steel detaching roll and quite clear from the leather detaching rolls. Set the brass rolls the thickness of No. 15 guage from the leather rolls.

Draught of Calender Rolls.

Two gears are placed on the cam shaft to drive the calenders, 20 tooth for regular work and 21 in case the sliver in the conductors does not pick up readily, as in damp weather. Either is in position for convenient use. If these gears are changed a corresponding change must be made in the gear on the back roll in the draw head. These gears run from 44 to 47 teeth and effect the take up of the sliver on the sliver plate.

Recapitulation of Timing of Parts of Combing Machine.

Nippers open at	- - -	3½	index gear.
Nippers close at	- - - -	9¼	" "
Lifters down at	- - -	6¾	" "
Lifters up at	- - - - -	8¾	" "
Top combs down at	- -	5	" "
Detaching roll moves forward at	-	6	" "
Feed roll moves forward at	-	4	" "

To Increase Waste.

By setting top comb closer.
By setting cushion plates closer.
By feeding later.

Speed of Combing Machine.

Speed of comber: 80 to 100 nips per minute. Laps should weigh from 260 to 300 grains per yard for short stock, and from 235 to 260 for long stock.

Leather Rolls.

All leather rolls should be well covered and should be perfectly straight from end to end. This applies especially to the leather detaching rolls. Rolls should be varnished once every week and loose bushings kept well oiled.

Cleaning and Oiling.

All principal bearings should be oiled once a day, and minor bearings every other day. Gearing to be greased or oiled occasionally.

The detaching roll bearings should be kept clean and well oiled. The top combs should be cleaned at least once a day and the half laps at least once a week.

All adjusting screws, set screws, bolts and nuts should be set up tight at all times.