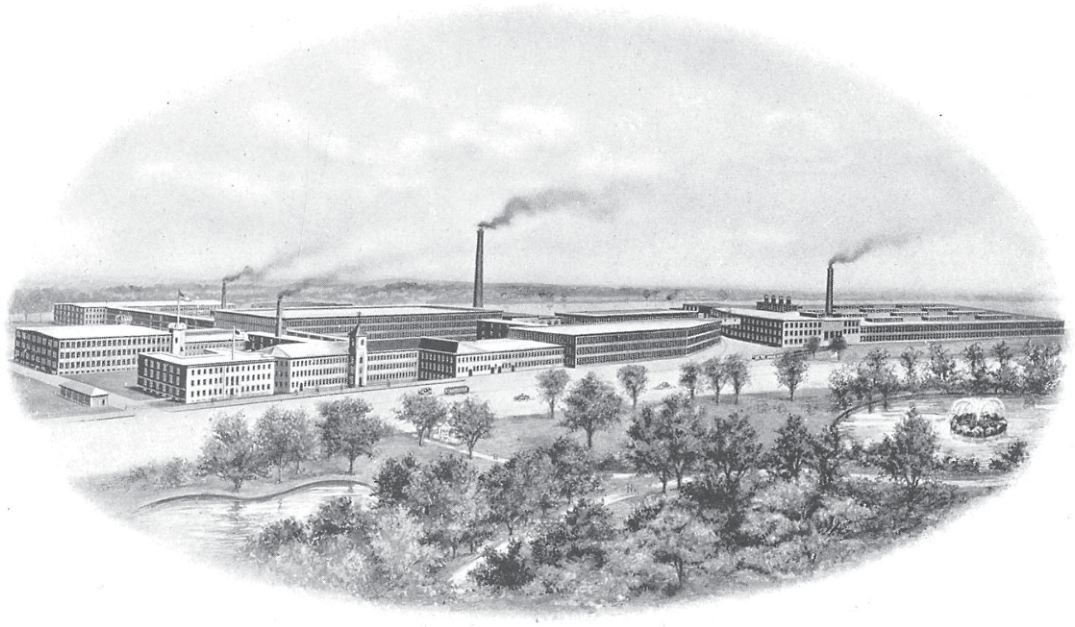
Cotton Combing Machinery

WHITIN
Combing Machinery

1922 Edition



Whitin Machine Works

ILLUSTRATED AND DESCRIPTIVE CATALOG

OF

WHITIN

COTTON

COMBING MACHINERY

AND

HANDBOOK OF USEFUL INFORMATION

FOR OVERSEERS AND

OPERATIVES

WHITIN MACHINE WORKS

WHITINSVILLE, MASS., U. S. A.

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LYNN, MASS.
U. S. A.

INTRODUCTORY

WE TAKE pleasure in presenting this, the sixth edition of our catalog of Combing Machinery, attention being particularly called to its many new features.

To meet the requirements and preferences of the textile trade, we manufacture two types of Combers, viz.: Model D–2, Whitin type and Model E, Nasmith type. For several years past, both types have demonstrated their efficiency in operation, maximum productive capacity and adaptability in working all kinds of stock, by installations in many American and European mills.

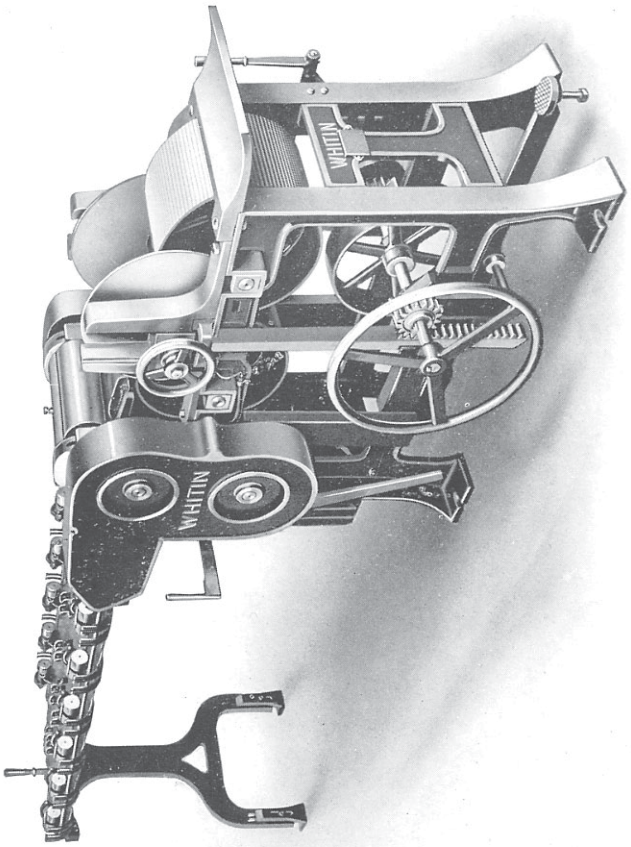
In order to build combing machinery which shall be unexcelled by any in the market, we have installed much new and special machinery for its manufacture so that we are in position to meet all requirements and to insure satisfactory results to all using our make of machines.

On the following pages the principal features of Whitin Combing machinery are illustrated and described together with tables and rules of instruction for their operation.

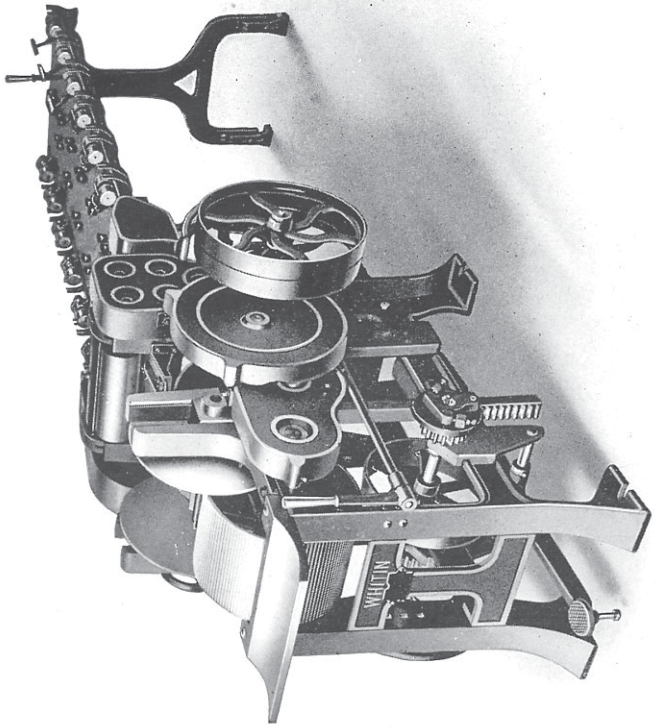
Owing to changes that may have been made in the details of our machines since the issue of this catalog, we cannot assume any responsibility for the dimensions and floor plans given in the catalog unless verified by our Engineering Department. Up-to-date floor plans should be obtained from us before planning for the installation of our machines.

WHITIN MACHINE WORKS

INDEX



Sliver Lap Machine



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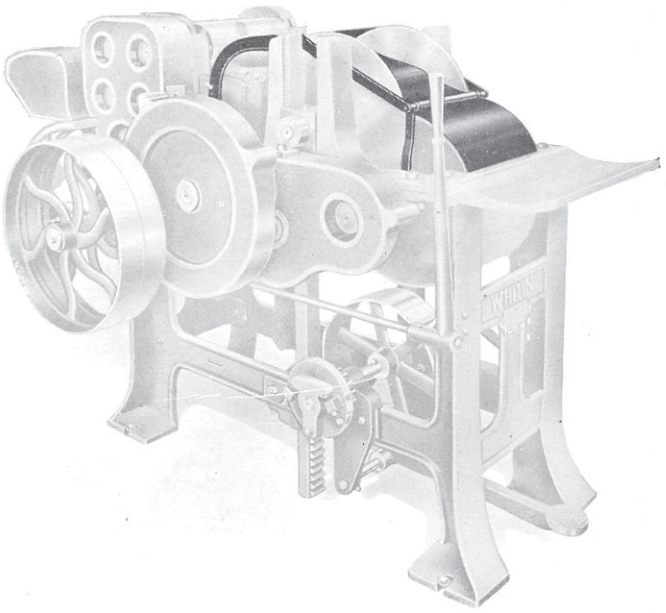


accidents by preventing the hands or clothing of the operative from being caught in the lap winding rolls.

Driving Pulleys: 19 inches in diameter by $2\frac{1}{2}$ inches face; the speed ratio of the driving pulleys being one revolution of the pulleys to one revolution of the 5-inch calendar rolls.

Speed of the Machines is according to the production required, being usually from 90 to 100 revolutions of the 5-inch calender rolls.

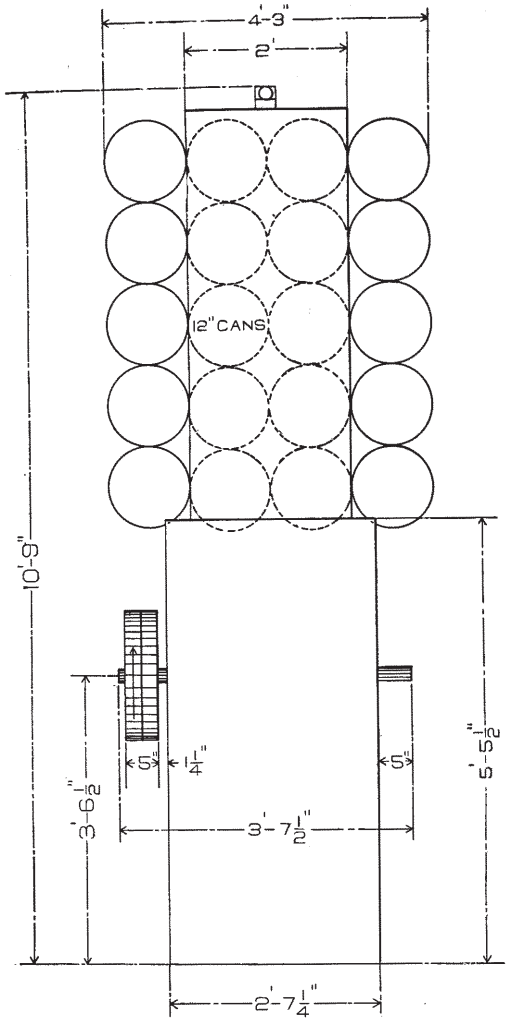
The Production of one sliver lap machine is sufficient to supply six combers.

Power: $\frac{1}{2}$ horse power is required.

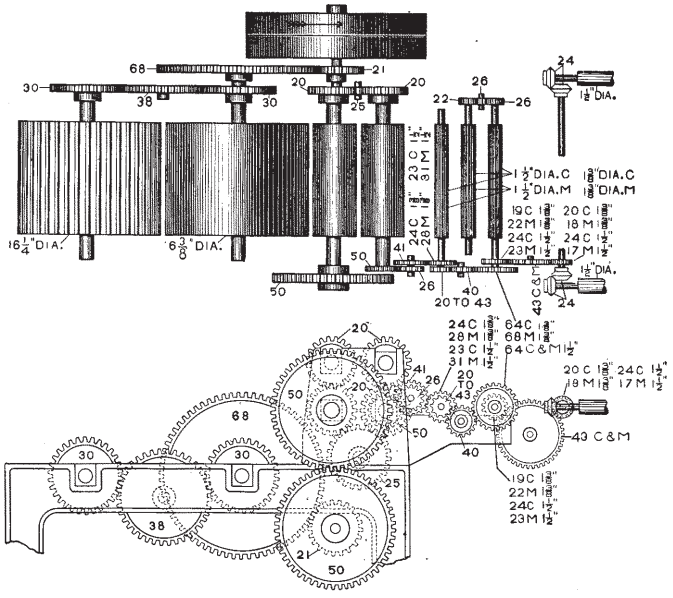
Floor Space: Including twenty 12-inch cans, 10 ft. 6 in. by 4 ft. 3 in.

Car Load: Two sliver lap and two ribbon lap machines, set up.

Weights—Domestic: Net, 3000 pounds, Gross, 3200 pounds
" **Export:** Gross, 3500 pounds, Cubic Feet, 65



FLOOR PLAN OF SLIVER LAP MACHINE



NOTE: C SIGNIFIES COMMON ROLLS
M METALLIC "

$9\frac{3}{4}$" SLIVER LAP MACHINE DIAGRAM OF GEARING

Draught Table of 9¾ in. Sliver Lap Machine

TABLE GIVES TOTAL DRAUGHT BETWEEN BACK ROLL AND FLUTED LAP-DRUM

Change Gear	1½ in. Common Rolls	1⅜ in. Common Rolls	1½ in. Metallic Rolls	1⅜ in. Metallic Rolls	Change Gear	1½ in. Common Rolls	1⅜ in. Common Rolls	1½ in. Metallic Rolls	1⅜ in. Metallic Rolls
20	3.12	3.56	2.96	3.03	32	1.95	2.22	1.85	1.89
21	2.97	3.39	2.82	2.89	33	1.89	2.15	1.79	1.84
22	2.84	3.23	2.69	2.75	34	1.84	2.09	1.74	1.78
23	2.72	3.09	2.57	2.63	35	1.78	2.03	1.69	1.73
24	2.60	2.96	2.47	2.52	36	1.73	1.98	1.64	1.68
25	2.50	2.84	2.37	2.42	37	1.69	1.92	1.60	1.64
26	2.40	2.73	2.28	2.33	38	1.64	1.87	1.56	1.59
27	2.31	2.63	2.19	2.24	39	1.60	1.82	1.52	1.55
28	2.23	2.54	2.11	2.16	40	1.56	1.78	1.48	1.51
29	2.15	2.45	2.04	2.09	41	1.52	1.73	1.44	1.48
30	2.08	2.37	1.97	2.02	42	1.49	1.69	1.41	1.44
31	2.01	2.29	1.91	1.95	43	1.45	1.65	1.37	1.41

Calculations for Draught Constant — See Gearing Diagram

1½ in. Common Rolls

$$\frac{64 \times 23 \times 26 \times 20 \times 50 \times 21 \times 30 \times 16.25}{C \times 41 \times 50 \times 20 \times 50 \times 68 \times 30 \times 1.5} = \frac{62.459}{\text{Change Gear}} = \text{Total Draught}$$

1½ in. Metallic Rolls

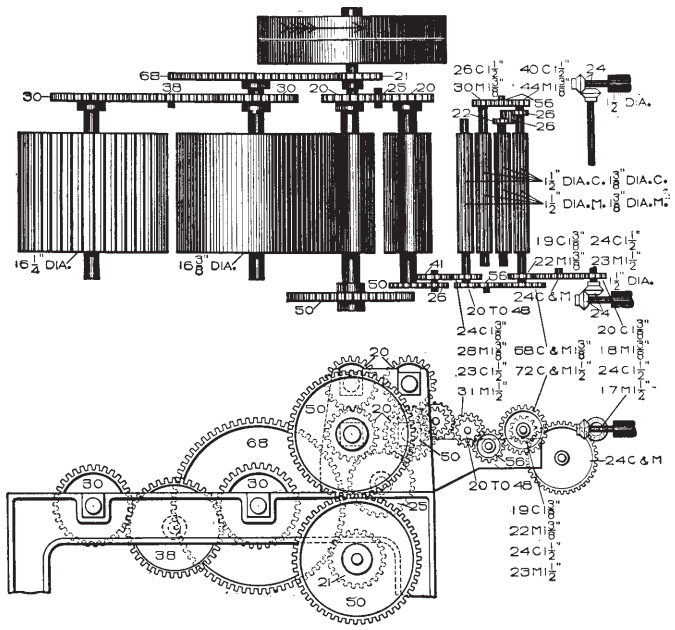
$$\frac{64 \times 31 \times 26 \times 20 \times 50 \times 21 \times 30 \times 16.25}{C \times 41 \times 50 \times 20 \times 50 \times 68 \times 30 \times 2.13} = \frac{59.285}{\text{Change Gear}} = \text{Total Draught}$$

1⅜ in. Common Rolls

$$\frac{64 \times 24 \times 26 \times 20 \times 50 \times 21 \times 30 \times 16.25}{C \times 41 \times 50 \times 20 \times 50 \times 68 \times 30 \times 1.375} = \frac{71.10}{\text{Change Gear}} = \text{Total Draught}$$

1⅜ in. Metallic Rolls

$$\frac{68 \times 28 \times 26 \times 20 \times 50 \times 21 \times 30 \times 16.25}{C \times 41 \times 50 \times 20 \times 50 \times 68 \times 30 \times 2.00} = \frac{60.59}{\text{Change Gear}} = \text{Total Draught}$$



NOTE: C SIGNIFIES COMMON ROLLS.
M " METALLIC " .

DIAGRAM OF GEARING. 11 1/16" SLIVER LAP MACHINE.

Draught Table of 1 1¾ in. Sliver Lap Machine

TABLE GIVES TOTAL DRAUGHT BETWEEN BACK ROLL AND FLUTED LAP-DRUM

Change Gear	1½ in. Common Rolls	1½ in. Metallic Rolls	1⅜ in. Common Rolls	1⅜ in. Metallic Rolls	Change Gear	1½ in. Common Rolls	1½ in. Metallic Rolls	1⅜ in. Common Rolls	1⅜ in. Metallic Rolls
20	3.51	3.33	3.78	3.03	35	2.01	1.91	2.16	1.73
21	3.34	3.18	3.60	2.88	36	1.95	1.85	2.10	1.68
22	3.19	3.03	3.43	2.75	37	1.90	1.80	2.04	1.64
23	3.05	2.90	3.28	2.63	38	1.85	1.76	1.99	1.59
24	2.93	2.78	3.15	2.52	39	1.80	1.71	1.94	1.55
25	2.81	2.67	3.02	2.42	40	1.76	1.67	1.89	1.51
26	2.70	2.57	2.91	2.33	41	1.71	1.63	1.84	1.48
27	2.60	2.47	2.80	2.24	42	1.67	1.59	1.80	1.44
28	2.51	2.38	2.70	2.16	43	1.63	1.55	1.76	1.41
29	2.42	2.30	2.60	2.09	44	1.60	1.52	1.72	1.38
30	2.34	2.22	2.52	2.02	45	1.56	1.48	1.68	1.35
31	2.27	2.15	2.44	1.95	46	1.53	1.45	1.64	1.32
32	2.20	2.08	2.36	1.89	47	1.49	1.42	1.61	1.29
33	2.13	2.02	2.29	1.84	48	1.46	1.39	1.57	1.26
34	2.07	1.96	2.22	1.78					

Calculations for Draught Constant — See Gearing Diagram

1½ in. Common Rolls

$$\frac{72 \times 23 \times 26 \times 20 \times 50 \times 21 \times 30 \times 16.25}{C \times 41 \times 50 \times 20 \times 50 \times 68 \times 30 \times 1.5} = \frac{70.267}{\text{Change Gear}} = \text{Total Draught}$$

1½ in. Metallic Rolls

$$\frac{72 \times 31 \times 26 \times 20 \times 50 \times 21 \times 30 \times 16.25}{C \times 41 \times 50 \times 20 \times 50 \times 68 \times 30 \times 2.13} = \frac{66.69}{\text{Change Gear}} = \text{Total Draught}$$

1⅜ in. Common Rolls

$$\frac{68 \times 24 \times 26 \times 20 \times 50 \times 21 \times 30 \times 16.25}{C \times 41 \times 50 \times 20 \times 50 \times 68 \times 30 \times 1.375} = \frac{75.54}{\text{Change Gear}} = \text{Total Draught}$$

1⅜ in. Metallic Rolls

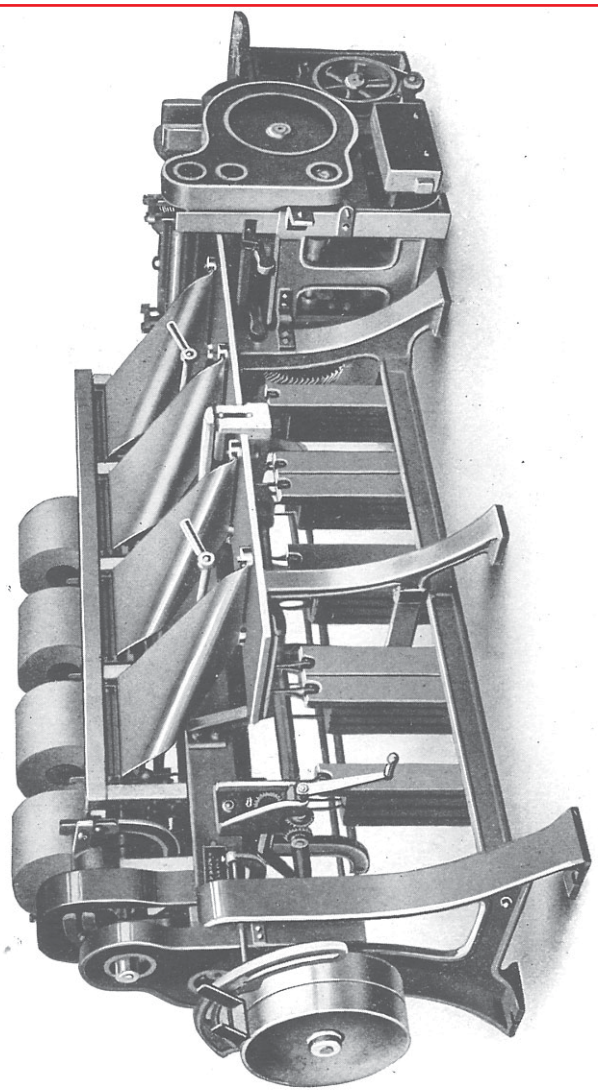
$$\frac{68 \times 28 \times 26 \times 20 \times 50 \times 21 \times 30 \times 16.25}{C \times 41 \times 50 \times 20 \times 50 \times 68 \times 30 \times 2.00} = \frac{60.592}{\text{Change Gear}} = \text{Total Draught}$$

Sliver Lap Machine

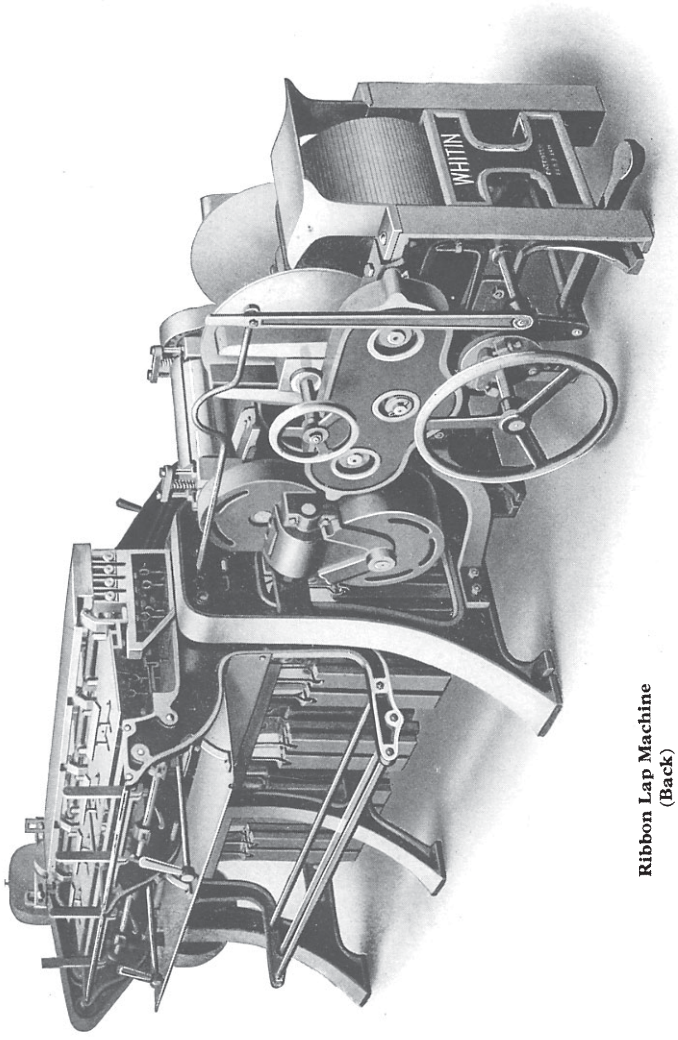
Production per day of ten hours, allowing 25 per cent off for oiling, cleaning, etc.

Revolutions per min. of 5 in. Calender roll	Grains per yard of lap produced													
	350	360	370	380	390	400	410	420	430	440	450	460	470	480
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
85	834.7	858.5	882.3	906.1	929.9	953.7	978.3	1001.3	1025.9	1049.7	1073.5	1097.3	1121.1	1144.9
90	883.8	909.0	934.2	959.4	984.6	1009.8	1035.9	1062.2	1086.3	1111.5	1136.7	1161.9	1187.1	1212.3
95	932.9	959.5	986.1	1012.7	1039.3	1065.9	1093.4	1119.1	1146.9	1173.2	1199.8	1226.4	1253.0	1279.6
100	982.0	1010.0	1038.0	1066.0	1094.0	1122.0	1151.0	1178.0	1207.0	1235.0	1263.0	1291.0	1319.0	1347.0
105	1031.1	1060.5	1089.9	1119.3	1148.7	1178.1	1208.5	1236.9	1267.3	1296.7	1326.1	1355.5	1384.9	1414.3
110	1080.2	1111.0	1141.8	1172.6	1203.4	1234.2	1266.1	1295.8	1327.7	1358.5	1389.3	1420.1	1450.9	1481.7
120	1178.4	1212.0	1245.6	1279.2	1312.8	1346.4	1381.2	1413.6	1448.4	1482.0	1515.6	1549.2	1582.8	1616.4

One revolution of driving pulley to one revolution of 5-inch calender roll.



Ribbon Lap Machine (Front)



Ribbon Lap Machine
(Back)

RIBBON LAP MACHINE

The Function of the ribbon lap machine is to so prepare the laps for the comber that they will be subjected to a minimum waste in the combing operation and also by the addition of doublings add to the evenness of the work. The laps formed by the sliver lap machine are placed upon the lap rolls at the back of the ribbon frame, which deliver their sliver to four lines of top and bottom rolls arranged with the necessary amount of draught ranging from four to five. This draught parallels the fibre, and the resulting ribbons are carried over highly polished curved brass plates and formed one upon another upon the sliver plate, along which the resultant web is drawn through several pressing rolls to the lap head and there formed into a lap $11\frac{3}{4}$ inches wide and from 12 inches to 14 inches in diameter. The construction of this machine has been so simplified as to reduce the element of waste to a minimum.

Stop-Motions are provided, so as to instantly stop the machine whenever the sliver breaks down at the back, or when a lap in the creel breaks or runs out; a full lap stop-motion operates when the lap at the delivery attains its full diameter, and a third stop-motion prevents breakage due to sliver lapping up on the front steel rolls.

Extra laps are carried in a **Low Hung Creel** at the back of the machine, and are protected from lint and dust falling from above by sheet-iron guards of neat design. Owing to this novel construction, it is possible to operate the machine with small help.

The Drawing Rolls are made $1\frac{1}{8}$ inches, $1\frac{1}{4}$ inches or $1\frac{1}{2}$ inches in diameter, the sizes being governed by the length of the staple to be worked. Metallic or leather covered top-rolls are furnished as ordered. All gearing is thoroughly guarded with covers to prevent injury to the operative, and the table on which the cotton is drawn is highly polished and nickeled so as to present minimum friction to the web passing over it.

A Weight-Relieving Motion is provided which will remove pressure by the weights during any extended stoppage of the machine, thereby preventing creasing of leather rolls.

Our Patented Safety Guard may be had as an optional equipment. The use of this guard eliminates accidents by preventing the hands of the operative from being caught in the lap winding rolls. See application to Sliver Lap Machine on page 10.

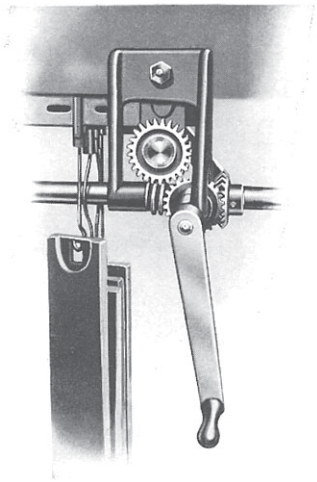
Driving Pulleys: 16 inches in diameter by 3 inches face, running at a ratio of three revolutions of the driving pulleys to one revolution of the 5-inch calender rolls. Speed is regulated by the production desired, ordinarily from 90 to 100 revolutions of the 5-inch calender roll.

One ribbon lap machine is sufficient to supply laps for six combers.

Power: 1 horse power is required.

Floor Space: 11 ft. 7 in. by 4 ft. 6 in.

Car Load: Two sliver lap and two ribbon lap machines, set up.

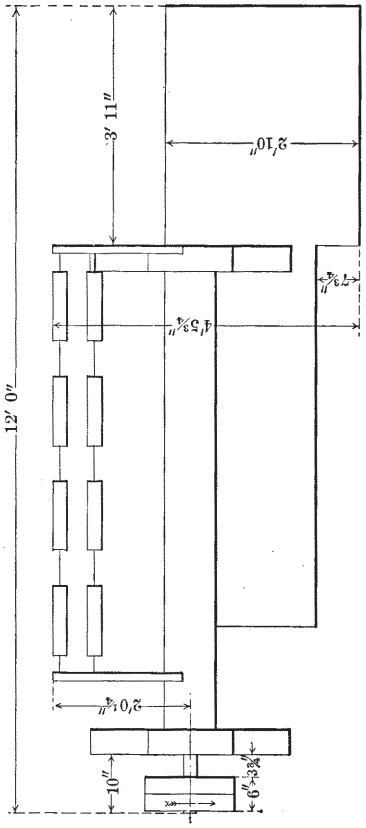


Weight-Reliever

Weights:

Domestic:
Net, 4400 pounds,
Gross, 5000 pounds.

Export:
Gross, 5500 pounds,
Cubic Feet, 135.



Floor Plan of Ribbon Lap Machine

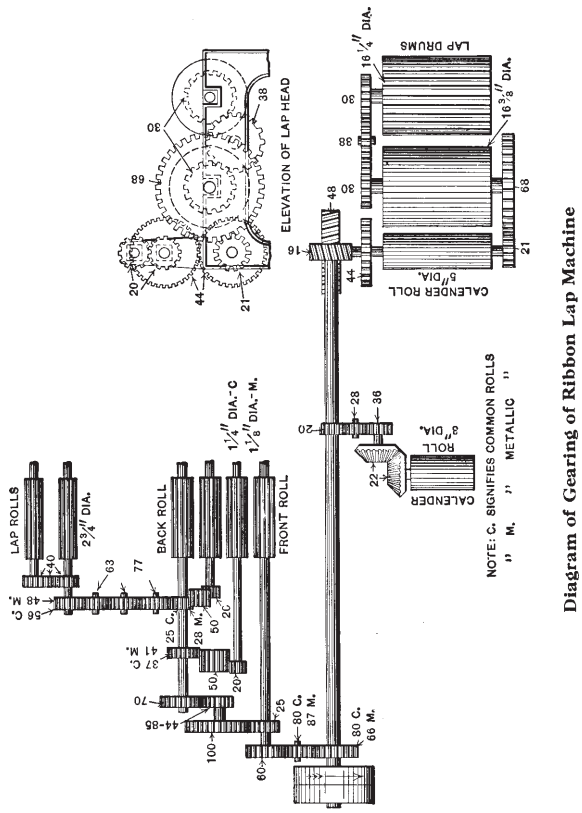


Diagram of Gearing of Ribbon Lap Machine

Draught Table of Ribbon Lap Machine

Table gives Total Draught between 2¾ in. Lap Rolls and 16¼ in. Lap Drums

Change Gear	Draught with Common Rolls	Draught with Metallic Rolls	Change Gears	Draught with Common Rolls	Draught with Metallic Rolls
47	6.09	5.64	67	4.27	3.96
48	5.96	5.53	68	4.21	3.90
49	5.84	5.41	69	4.15	3.84
50	5.72	5.30	70	4.09	3.79
51	5.61	5.20	71	4.03	3.73
52	5.50	5.10	72	3.97	3.68
53	5.40	5.00	73	3.92	3.63
54	5.30	4.91	74	3.86	3.58
55	5.20	4.82	75	3.81	3.54
56	5.11	4.74	76	3.76	3.49
57	5.02	4.65	77	3.71	3.44
58	4.93	4.57	78	3.66	3.40
59	4.85	4.49	79	3.62	3.36
60	4.77	4.42	80	3.58	3.31
61	4.69	4.35	81	3.53	3.27
62	4 61	4.28	82	3.49	3.23
63	4.54	4.21	83	3.45	3.19
64	4.47	4.14	84	3.41	3.16
65	4.40	4.08	85	3.36	3.12
66	4.34	4.02			

Calculations for Draught Constant — See Gearing Diagram

1¼ in. Common Rolls

$$\frac{56 \times 70 \times 100 \times 60 \times 16 \times 21 \times 30 \times 16\frac{1}{4}}{25 \times C \times 25 \times 80 \times 48 \times 68 \times 30 \times 2\frac{3}{4}} = \frac{286.14}{\text{Change Gear}} = \text{Total Draught}$$

1⅛ in. Metallic Rolls

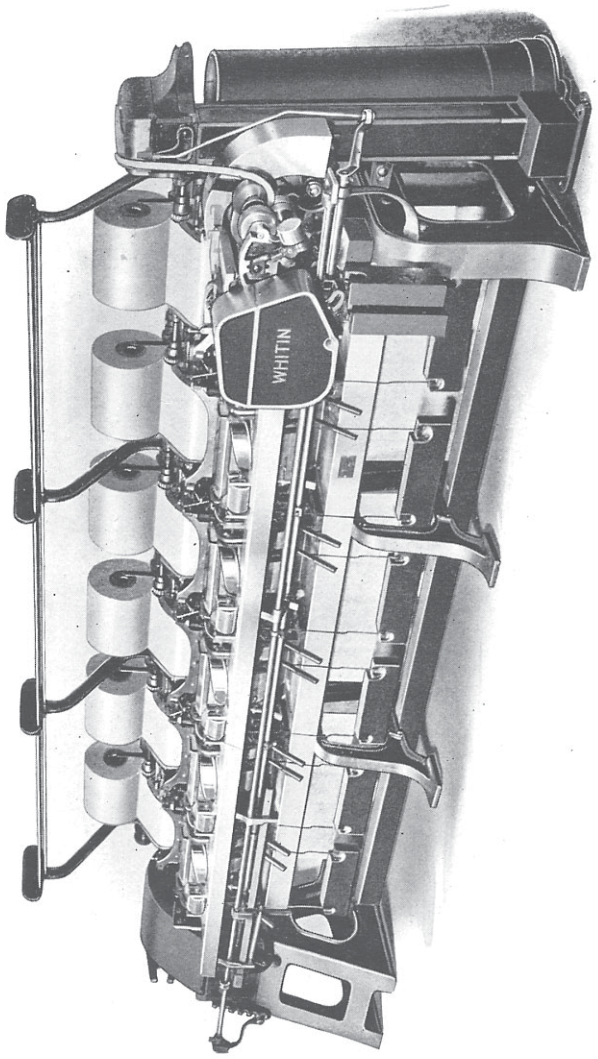
$$\frac{48 \times 70 \times 100 \times 60 \times 16 \times 21 \times 30 \times 16\frac{1}{4}}{28 \times C \times 25 \times 66 \times 48 \times 68 \times 30 \times 2\frac{3}{4}} = \frac{265.435}{\text{Change Gear}} = \text{Total Draught}$$

Ribbon Lap Machine

PRODUCTION PER DAY OF TEN HOURS, ALLOWING 25% OFF FOR OILING, CLEANING, ETC.

Revolutions per min. of 5 in. Calender roll	Grains per yard of lap produced													
	400	410	420	430	440	450	460	470	480	490	500	510	520	530
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
85	953.7	978.3	1001.3	1025.9	1049.7	1073.5	1097.3	1121.1	1144.9	1168.8	1192.6	1216.4	1240.2	1264.0
90	1009.8	1035.9	1060.2	1086.3	1111.5	1136.7	1161.9	1187.1	1212.3	1237.5	1262.7	1287.9	1313.1	1338.3
95	1065.9	1093.4	1119.1	1146.6	1173.2	1199.8	1226.4	1253.0	1279.6	1306.3	1332.9	1359.5	1386.1	1412.7
100	1122.0	1151.0	1178.0	1207.0	1235.0	1263.0	1291.0	1319.0	1347.0	1375.0	1403.0	1431.0	1459.0	1487.0
105	1178.2	1208.5	1236.9	1267.3	1296.7	1326.1	1355 5	1384.9	1414.3	1443.8	1473.2	1502.6	1532.0	1561.4
110	1234.2	1266.1	1295.8	1327.7	1358.5	1389.3	1426..	1450.9	1481.7	1512.5	1543.3	1514.1	1604.9	1635.7
120	1346.4	1381.2	1413.6	1448.4	1482.0	1515.6	1549.2	1582.8	1616.4	1650.0	1683.6	1717.2	1750.8	1784.4

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



Model E Comber, Nasmith Type

MODEL E COMBING MACHINE
Nasmith Type

This machine is recommended for producing a high production of combed sliver from grades of cotton of $\frac{7}{8}$-inch to $1\frac{3}{16}$-inch staple.

As shown in the engraving on the preceding page, the machine is regularly built with six heads designed to take laps 12 inches wide. Particularly prominent features are: A heavy frame with width of base that embodies stability; ready accessibility to all working parts for adjustments and repairs; simplicity of construction; and highest grade of material and workmanship. The possession of these features in the machine ensures the greatest durability and efficiency.

It makes a **perfect piecing** with long overlap even on the shortest cotton.

The quantity of **waste** is easily controlled and if desired will work with very low percentage of waste, even on short staple, for semi-combed yarns.

With the exception of the detaching mechanism, all motions are continuous, thus producing a smooth running machine under prolonged and arduous service with a minimum amount of wear and tear.

The machine is equipped with a mechanical **stop-motion** for each head and also one for the coiler.

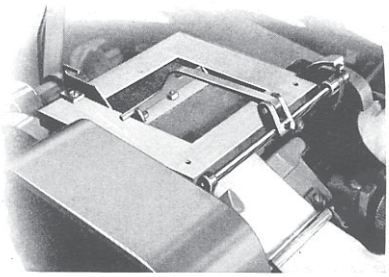
Lapping up of the top-rolls of the draw-box is prevented by means of an Ermen clearer.

Weight relieving devices are provided, whereby the pressure is easily removed from the top detaching rolls.

Our Model B Waste Condenser (see description on page 54) is an optional equipment instead of the usual

doffer and comb motion for disposing of the waste at the back of the machine.

The production varies according to the kind of cotton used and quality of yarn desired. With laps weighing from 600 to 700 grains per yard, allowing 14 per cent. waste and at a standard speed of 96 nips per minute, the production would be 800 to 900 pounds per week of 60 hours.



Draw-Box Clearer

The Driving Pulleys are 12 inches in diameter by 3-inch face and run 3.89 revolutions to one nip. If desired, the machine may be arranged to be driven by an electric motor.

Speeds recommended:

For Egyptian and Best American cotton 95 nips or 370 R. P. M. of pulley.

For Coarse Work 100 nips or 390 R. P. M. of pulley.

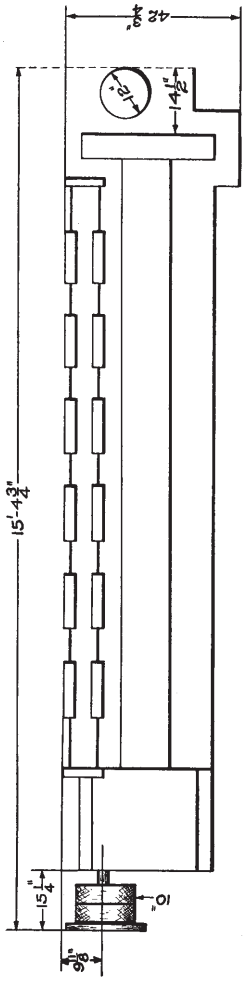
Power: Machine equipped with waste condenser consumes approximately $\frac{5}{8}$ horse power when running 95 nips per minute. Without the condenser, the power consumption is $\frac{3}{8}$ horse power.

Floor Space: 15 ft. $4\frac{3}{4}$″ by 3 ft. $6\frac{3}{4}$″ overall, including 12-inch coiler can.

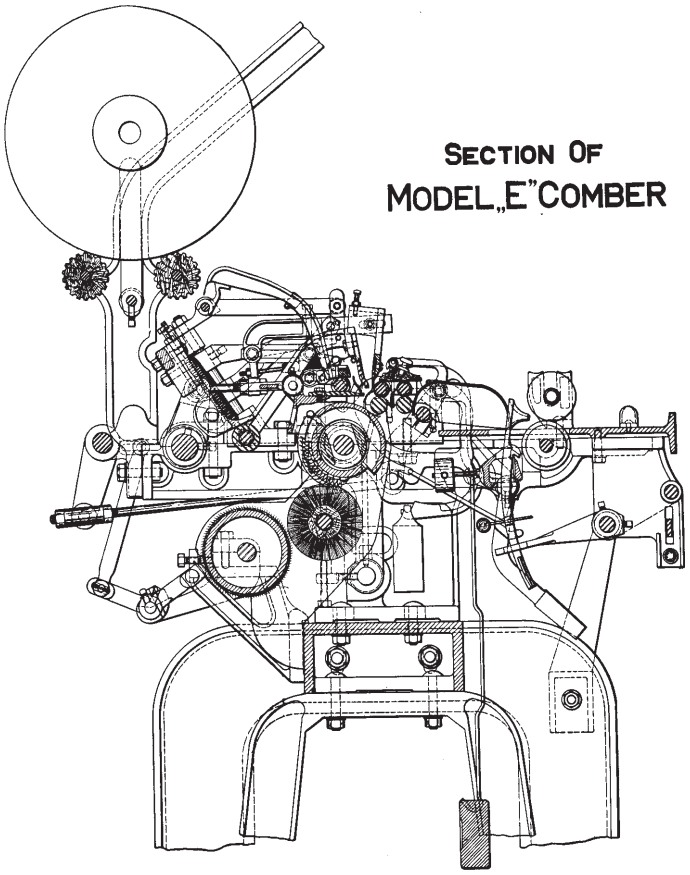
Car Load: Four machines, set up.

Weights:

Domestic:	**Export:**
Net, 4300 pounds,	Gross, 5300 pounds,
Gross, 4700 pounds.	Cubic Feet 150.



Floor Plan, Model E Comber



SECTION OF
MODEL „E" COMBER

Detailed Instructions for Setting Model E, Combing Machine

Nasmith Type

The Index Plate is divided into 40 parts, every fifth mark being numbered 5, 10, etc., up to 40.

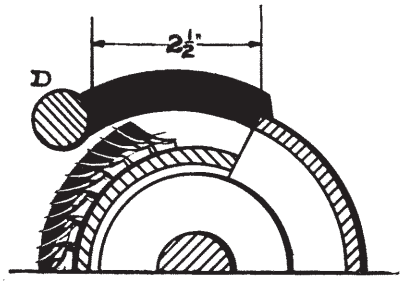


FIG. 1.

THE CYLINDERS. SETTING No. 1.

At index 2½, set the cylinders in the middle of each head and screw them tightly on the shaft so that the front edge of the plain segment is to finger gauge (2½″) from the back of the steel detaching roller (Fig. 1).

Note 1.—The bearings of the roller D, if disturbed, should be set to the mark on the stands; it will then be at the proper distance from the plain segment. The set screws for fastening the cylinder are discovered by removing the tin strip behind the last row of needles.

Note 2.—After setting the cylinders, put on the front calender and the table and set the brush tins to clear the cylinders equally at the back and front and at the ends, so that the top edge of the tin is $\frac{1}{16}''$ from the underside of the inner steel detaching roller.

THE NIPPERCRANK STUD. SETTING No. 2.

Screw up the stud M in the slot in the index plate so that its center is radially opposite mark 37 (Fig. 2). Put in the slide bar R and bolt it up with the set screws *a* and *b* bearing on it and each projecting equally.

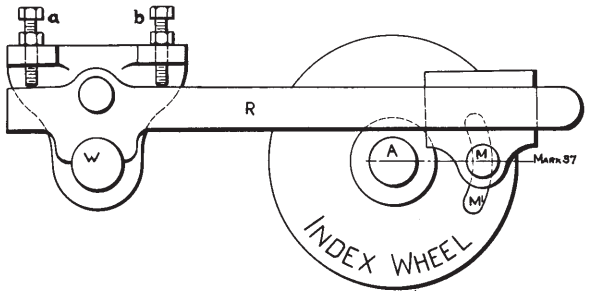


FIG. 2.

Note 3.—The stud M should always be in this position when setting, but may be moved a little either way to make a good piecing, according to the cotton worked, without affecting any other setting.

Note 4.—The position of this stud determines the **time** when the nipper reaches the detaching roller, on which a good piecing mainly depends. Generally speaking, it should be as early as possible, but if too early, the tips of the fibres composing the nipper tuft are curled

slightly by touching the roller before its forward motion has commenced. Also the roller continues to turn too long after the nipper has withdrawn and the end is carried too far into the rollers, which is especially undesirable with short cotton. On the other hand, if it is too late, a straggling separation and useless waste is made.

THE NIPPER. SETTING No. 3.

At index 19, the nipper being at the forward end of its stroke, set the bottom jaw (cushion plate) parallel to the steel detaching roller by means of the nuts V^1 V^1 (Figs. 3 and 4) and at the required distance from it (see Notes 5 and 7). The pivot set screws Z must be loose when this is done.

SETTING No. 4.

At index 33, loosen the screw S^2 (Fig. 4) and with the raising screw T, set the nipper (with springs on and without cotton in) $\frac{25}{100}$ of an inch from the needles. The screws Z must be fast when this is done and the bowl N^5 clear of the incline J.

Note 5.—Step gauge is $\frac{1}{2}$-in. thick, and the numbers on the stepped flats, from 8 to 15, represent thirty-seconds of an inch.

Note 6.—In setting for the first time proceed as follows:—After setting No. 2, turn till the plain segment on the cylinder is uppermost. Put the nipper in and, the springs being off, turn backwards to No. 33. Then press the top knife gently on the bottom one and see that it clears the needles. Loosen the forked levers on the shaft W by driving out the keys (Fig. 4). Couple the connecting rod by the screws V^1 V^1 to the nipper swivel and key the levers up again on the shaft W, so that the nipper is exactly in the middle of the cylinder, the **screws Z being loose**. Turn to index 19, and by means of the

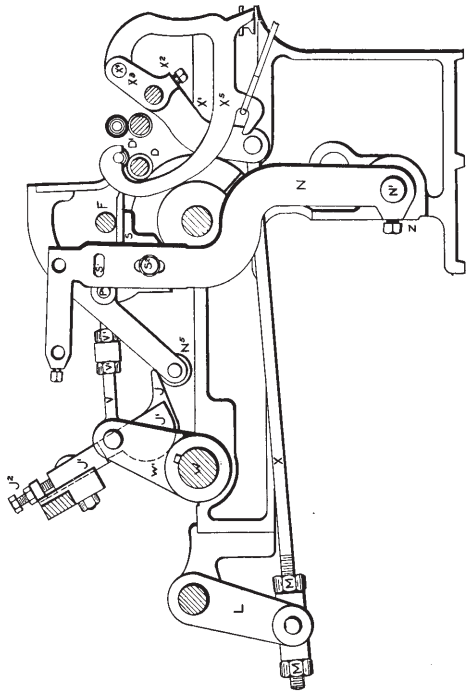


FIG. 3.

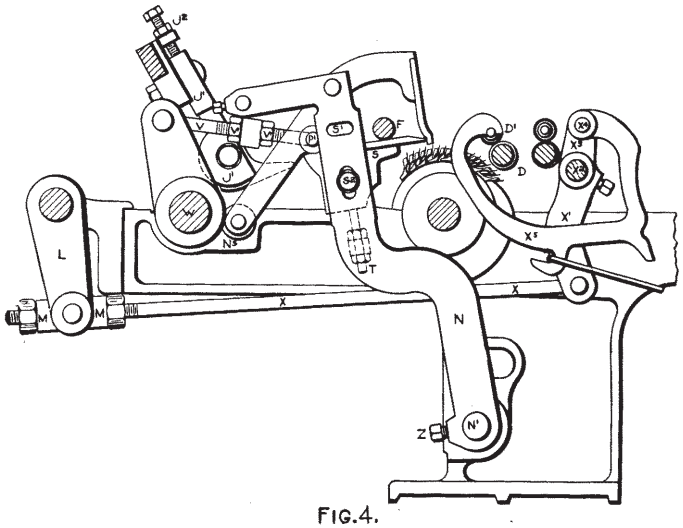


FIG.4.

nuts V^1 V^1, set the nippers temporarily, say to flat 12, on step gauge, from the steel detaching roller. Then turn to index 27, put the nipper springs on and adjust the nuts so that there is no tension on the springs beyond what is necessary to keep the nuts in the grooves. Then turn backwards to index 33 and perform Setting No. 4, always tightening afterwards the screws S^2 before proceeding. Turn again to index 19 and perform Setting No. 3 exactly, securing the nuts V^1 V^1. Tighten afterwards the set screws Z. Finally, turn again to index 33, and, if necessary, re-perform Setting No. 4. The nippers are then all in line with the cylinder and with the steel detaching roller. Their distance from the latter may be varied simultaneously as required (Note 7) by the set screws *a* and *b*, Fig. 2, without disturbing any other

setting except that of the top comb, unless a large change is made. (See Notes 8 and 10.)

Note 7.—The distance of the bottom nipper plate from the steel detaching roller D (Fig. 5) at index 19, is the main factor in determining the length and consequently the amount of **waste.** Theoretically it is the only way, and should always be used if any considerable alteration in the amount of waste is to be made. The nearer the nipper comes to the roller, the shorter and the less will be the waste, and *vice versa*. For short cottons and low waste, it may be as near as flat 8, on step gauge; and for long Sea Island and Florida cottons, flat 15, and for high percentages of waste, even $\frac{1}{2}$ in. may be used. For good Egyptian, use flat 11 or 12, which will give 14 to 16 per cent. of waste, unless there is an unusual amount in the cotton. Further information on waste is given in Notes 9, 10, 11, and Setting 11.

OPENING THE NIPPER.
TIME. SETTING No. 5.

At index 27 set the leg J^1 down till the incline J (Fig. 3) just touches the bowl N^5.

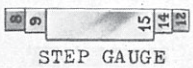
Note 8.—The nipper should, in general, open as late as possible, but if too late, it will, in closing, strike the lap out of the top comb before the separation is completed, which must always be avoided.

AMOUNT OF OPENING. SETTING No. 6.

At index 19, place step gauge on the steel detaching roller and with flat 12 ($\frac{3}{8}$ in.) between the nipper jaws, loosen the bolt that secures the incline J to the leg J^1 and dip the point of the incline till it touches the bowl N^5 (Fig. 3).

Note 8a.—If the nipper does not open wide enough, a poor piecing may result. For very short cotton flat 14

GAUGES FOR MODEL E, NASMITH TYPE COMBER

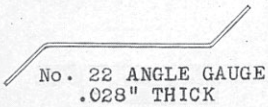


STEP GAUGE

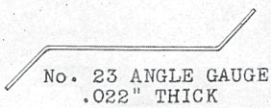
FINGER GAUGE

1/16" FINGER GAUGE

1/32" FINGER GAUGE



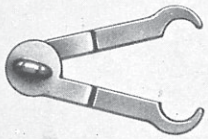
No. 22 ANGLE GAUGE
.028" THICK



No. 23 ANGLE GAUGE
.022" THICK

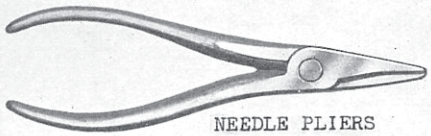
No. 25 RIBBON GAUGE
.025" THICK

No. 6 RIBBON GAUGE
.010" THICK



BRUSH GAUGE

LEATHER DETACHING ROLL
GAUGE, .890" DIAMETER



NEEDLE PLIERS

may be used. A slight alteration in the distance of the nipper from the detaching roller at index 19 will not greatly affect Setting 5 and 6, but if a large change is made, it is advisable to reset them.

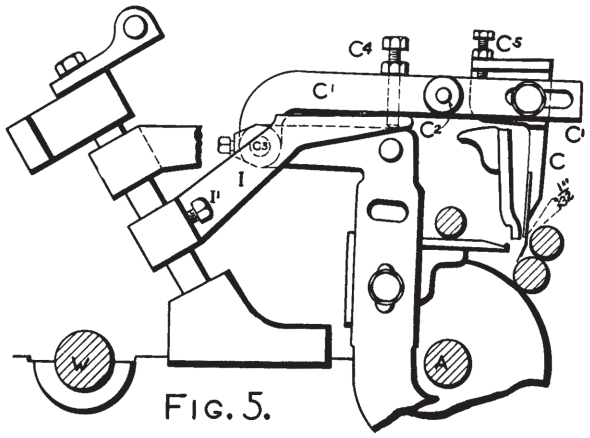
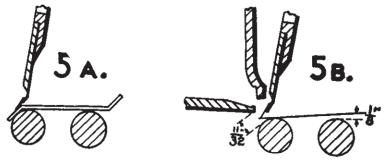


FIG. 5.



THE TOP COMB. SETTING No. 7.

At index 19, the points of the top comb needles **must always** be $\frac{1}{16}$ in. (See Fig. 5a) from the inner steel detaching roller. The slots in the comb arm C^1, in conjunction with the angle screw C^5, permit this adjustment. A medium angle is to let the arm C^1 project $\frac{5}{8}$-in. beyond the comb bridge C. Use only one angle screw when setting and run the other back till all is fixed.

Depth of the Comb.

Insert the end of a $\frac{6}{1000}$-in. doctor gauge below needle points, letting it rest on the steel roller. Then by means of the screws C^4 lower the comb till the doctor rises from the front steel roller $\frac{1}{16}$ in. (See Note 9 and Fig. 5b.)

Note 9.—It is not advisable to lower the comb more than indicated above, and it may more frequently allow the doctor or even a $\frac{25}{1000}$-in. gauge to rest on the front roller. If, when the doctor is $\frac{1}{16}$ in. above the front roller, the waste is insufficient, move the nipper back (Setting No. 3 and Note 7) moving the comb to the same position as before (Fig. 5a). This puts the comb into the lap further forward, increases the length and amount of waste and improves the cleanliness. Dropping the comb or increasing the angle to make more waste is a drastic method, pulling the waste out by main force without improving the cleanliness, and can only be employed with long cotton, light laps, and when the nipper is set well back.

Note 10.—If less waste is required and the nipper is to be brought **nearer** the detaching roller, the top comb must be first set back **lest it touch the roller** and when the nipper is adjusted the comb must be reset as indicated in Setting 7.

THE TOP COMB LIFTERS. SETTING No. 8.

At index 11, set up the lifters I (Fig. 5) to touch the bowls C^2.

Note 11.—In working short cottons with low waste, Setting 8 may be done as late as index 13. It must not be too late, otherwise the comb fails to do its work and is lifted out before the separation has been completed, which is undesirable. This is specially to be guarded against in long cottons.

THE FEED ROLLER. SETTING No. 9.

For Egyptian and Sea Island cottons set the roller back as far as the slots S^1 (Figs. 3 and 4) will allow. For short cottons and less waste, the roller may be brought $\frac{1}{4}$ in. further forward. Set the feed roller springs to put **as little tension as possible on the roller.** The amount of feed is regulated by the position of the pin in the feed roller ratchet lever, five teeth (equivalent to $\frac{1}{4}$ in. of lap per stroke) is usual, four and six being also provided for. The lap roller ratchet must take as many teeth each stroke as the feed roller ratchet and should be set to take half-a-tooth more than the required number.

Note 12.—Too much weight on the feed roller puckers the lap and gives a cloudy fleece. A 42 change pinion is sent on the lap roller ratchet and a 41 is sent for use with short soft cottons to keep the lap tight between the lap and feed rollers.

TO TIME THE DETACHING ROLLERS SETTING No. 10.

Loosen the cam and turn it back as far as it will go. Then turn to index 1 and move the cam forward till the **roller** begins to turn backward. Test this setting by turning the machine by hand, as it is important that the roller begins to move precisely at index 1.

THE TOP LEATHER-COVERED DETACHING ROLLER. SETTING No. 11.

Time. At index 20, set the eccentric O^1 (Fig. 6.), by means of the screw G^1 and the slot G, so that the

lever L^1 just begins to move inward in the direction of the arrow.

Position. At index 19, the leather roller should be

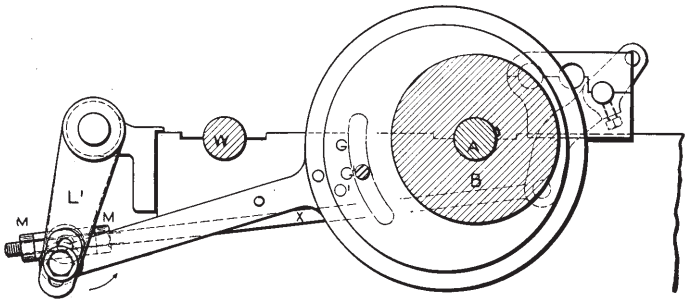


FIG. 6.

as near the top comb blade as it will work without rubbing. (Say, $\frac{1}{32}$ in., Fig. 5.) If further away, useless waste is made.

Note 13.—In early machines, the lever L, Fig. 3, was fastened on the shaft W and the roller rocked exactly in time with the nipper. In such machines set the lever L vertically below the shaft W at index 34.

Note 14.—In machines of four heads there is one, and in machines of 5 and 6 heads two levers X1 (Fig. 3) cast together with the forked levers X3 and keyed on the shaft X2, the remaining forked levers X3, carrying the weight hooks X5, can be clipped on the shaft in any position. The leather rollers are to be first set all parallel with the bottom roller and each equidistant from the top comb blade at index 19. Commence with the compound levers X1, X3 and adjust by means of the nuts MM and then clip the short forked levers X3 on to

the shaft in proper position. When this is done, the rollers operated by each compound lever X1 may all be set simultaneously to the proper distance from the top comb blades by means of the nuts MM (Figs. 3 and 4).

Note 15.—In almost every case the 25 lb. weights are sufficient to put the necessary pressure on the leathec roller. Two separate 5 lbs. weights are sent with each 25 lb. weight in case they are required for very heavy work. The leather rollers of the front and back lines are interchangeable. They should be carefully covered, ground and varnished with suitable varnish and kept in good order. Keep the pivots lubricated by oiling frequently, but very little at a time.

THE DETACHING ROLLER CLUTCH. SETTING No. 12.

Set the ring on the coupling so that the clutch begins to move at index 38. Then loosen the stud on which the clutch fork pivots and turn to index 10. Move the stud along its slot, away from the pulleys as far as it will go without forcing and fix it there, thus ensuring that the clutch will be held properly home. Turn them till the clutch is fully out (index 28) and set up the holding peg against the clutch and in the centre of a tooth, to prevent the accidental displacement of the clutch whilst out and to hold it in the proper position to go right in.

Note 16.—The carrier wheel connecting the two steel rollers must be as deeply geared with both wheels as possible without binding. Backlash is undesirable between the rollers and the cam.

This concludes the setting and the following may be found useful:

GENERAL OBSERVATIONS

Preparation of Laps. Heavy laps are more liable to be irregular than light ones unless care is exercised in drafting and roller setting in the lap machines. Testing a yard at a time gives no reliable indication of regularity. Laps should be rolled out on a board having transversal grooves every 6 inches, and should be cut into exact 6-inch lengths with scissors.

Weight of Laps. The 12 in. laps may weigh:

For superfine work from Sea Island cotton, 300 to 400 grains per yard.

For medium work from Florida cotton, 400 to 550 grains per yard.

Egyptian and American cottons, 550 to 750 grains per yard.

For Sea Island and light laps a fine cylinder is recommended, with 33 top combs, 81 needles to the inch.

For Egyptian and Long American, the standard cylinder, with 28 top combs, 66 needles to the inch is used. In all cases the top comb needles should project $\frac{3}{16}$ inch from the comb stock.

Amount of Feed. Four or five teeth of feed may be taken, the former for the finer work, but six teeth are rarely practicable. It is better to work with a heavy lap and light feed, than a light lap and heavy feed.

To pass the Laps through, bring the nipper to its forward position, lift the end of the feed roller by the knob on the left and point the end of the lap below it. It may then be turned by the knob until the end of the lap is in the nipper. Owing to the weight of lap worked, care should be taken in putting a new lap on that the two ends do not overlap more than is necessary, so as not to

damage the needles by a long length of double lap. The feed roller may be taken out by lifting the top comb and top nipper after unhooking the springs. Keep the nipper plate below the roller bright by cleaning it occasionally. The hard waste that may collect at the nipper ends should be removed weekly.

To brush out the Cylinders lift the feed roller and lap roller ratchet catches. Then run the machine when no cotton will go forward. It is unnecessary to break out the laps.

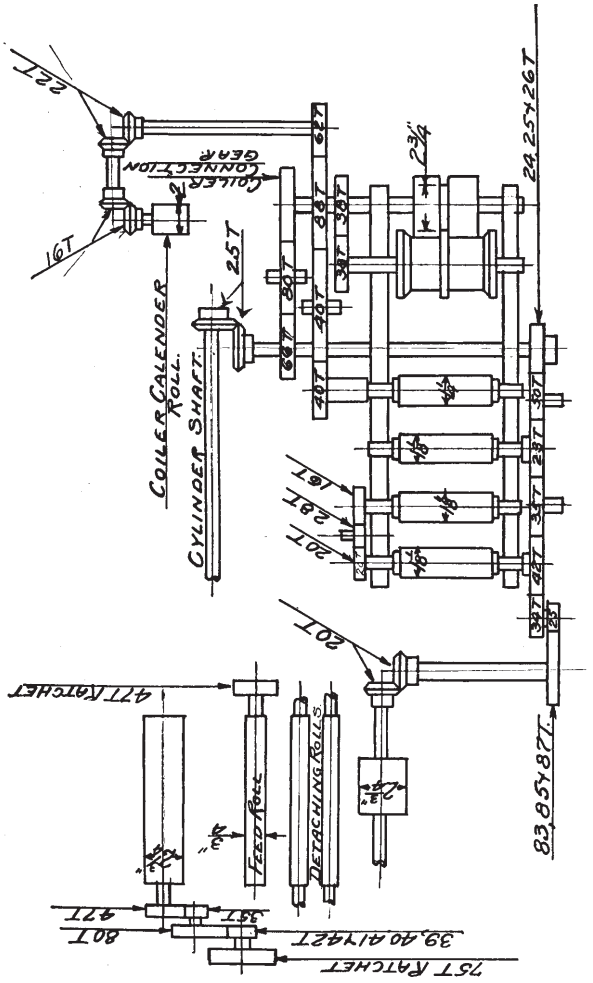


Diagram of Gearing of Model E Comber

Draught Table Model "E" Comber

TABLE GIVES TOTAL DRAUGHT BETWEEN 2¾″ LAP ROLLS AND 2″ CALENDER ROLLS

DRAUGHT CONSTANT FORMULA:

Let R = No. Teeth Taken On Lap Roll Ratchet Wheel Per Nip

Let D = No. Teeth In Coiler Connection or Draught Gear

Let X = No. Teeth In Lap Roll Change Gear

$$\frac{47 \times 80 \times 75 \times 66 \times 88 \times 2}{35 \times X \times R \times D \times 62 \times 2.75} = \frac{548925}{X \times R \times D} = \text{Total Draught. } D = \frac{548925}{X \times R \times T.D.}$$

TOTAL DRAUGHT TABLE FOR MODEL "E" COMBER

	R=4				R=5				R=6			
	No. of T in Change Gear X				No. of T in Change Gear X				No. of T in Change Gear X			
D	39	40	41	42	39	40	41	42	39	40	41	42
35	100.54	98.02	95.63	92.67	80.43	78.42	76.50	74.68	67.03	65.35	63.75	62.21
36	97.74	95.30	92.97	90.10	78.19	76.24	74.38	72.61	65.16	63.53	61.98	60.50
37	95.10	92.78	90.46	87.66	76.08	74.18	72.37	70.65	63.40	61.81	60.30	58.87
38	92.60	90.28	88.08	85.36	74.08	72.23	70.45	68.79	61.73	60.19	58.72	57.32
39	90.22	87.97	85.82	83.17	72.10	70.37	68.66	67.02	60.15	58.65	57.22	55.85
40	87.92	85.77	83.68	81.09	70.38	68.61	66.44	65.35	58.65	57.18	55.28	54.45
41	85.82	83.92	81.64	79.11	68.66	66.94	65.30	63.75	57.22	55.79	54.42	53.12
42	83.78	81.69	79.69	77.23	67.02	65.35	63.75	62.19	55.85	54.46	53.13	51.86
43	81.83	79.79	77.83	75.43	65.47	63.83	62.27	60.79	54.55	53.19	51.89	50.65
44	79.97	77.75	76.07	73.72	63.98	62.38	60.85	59.41	53.31	51.98	50.71	49.50
45	79.13	76.24	74.38	72.08	62.56	60.99	59.50	58.09	52.13	50.83	49.58	48.40
46	76.49	74.58	72.76	70.51	61.19	59.66	58.21	56.82	59.96	49.72	48.51	47.35
47	74.87	73.00	71.21	69.01	59.89	58.40	56.97	55.62	49.91	48.66	47.48	46.34
48	73.31	71.47	69.73	67.58	58.64	57.18	55.78	54.46	48.87	47.65	46.49	45.41
49	71.77	70.02	68.30	66.19	57.45	56.02	54.64	53.35	47.87	46.68	45.54	44.45
50	70.38	68.62	66.94	64.87	56.30	54.89	53.56	52.28	46.92	45.74	44.63	43.56
51	68.99	67.27	65.62	63.60	55.19	53.81	52.50	51.24	45.99	44.85	43.75	42.71
52	67.67	65.98	64.36	62.38	54.13	52.79	51.49	50.27	45.11	43.98	42.91	41.89
53	66.58	64.73	63.15	61.20	53.11	51.78	50.52	49.32	44.26	43.16	42.10	41.09
54	65.16	63.53	61.98	60.07	52.13	50.83	49.58	48.41	43.44	42.17	41.32	40.34
55	63.97	62.40	60.85	58.97	51.18	49.99	48.68	47.53	42.65	41.59	40.57	39.60
56	62.47	61.26	59.76	57.92	50.27	49.01	47.81	46.68	41.89	40.84	39.84	38.90
57	61.73	60.19	58.72	56.91	49.38	48.11	46.97	45.86	41.15	40.13	39.13	38.21
58	60.67	59.15	57.70	55.92	48.53	47.32	46.17	45.07	40.45	39.43	38.47	37.55
59	59.64	58.15	56.73	54.97	47.71	46.52	45.38	44.30	39.76	38.77	37.82	36.92
60	58.65	57.18	55.78	54.06	46.91	45.74	46.29	43.56	39.09	38.12	37.29	36.31

Production Formulae

Let: A = Delivery Of Coiler Calender Roll In Yards Per Minute.
B = Time Run In Minutes (Allow 5% For Cleaning and Oiling.)
C = Weight Of Sliver In Grains Per Yard.
P = Production In Pounds, In 10 Hours.
N = Nips Per Minute. D = Coiler Connection Gear.

Then: $P = \frac{A \times B \times C}{7000}$ And $A = \frac{N \times 25 \times 66 \times 88 \times 22 \times 16 \times 2 \times 3.1416}{25 \times D \times 62 \times 22 \times 16 \times 36}$ or

$A = \frac{N \times 16.345.}{D}$ Then: $P = \frac{N \times 16.345 \times \left(\frac{570}{7000}\right) \times C}{D}$ or

$P = \frac{N \times 1.33 \times C}{D}$ and $D = \frac{N \times 1.33 \times C}{P}$ and $N = \frac{D \times P}{C \times 1.330}$

Then When Using Coiler Connection Gear "D" Of:

35T	Production	= N × .0380 × C		48	Production	= N × .0277 × C	
36	"	= N × .0369 × C		49	"	= N × .0272 × C	
37	"	= N × .0359 × C		50	"	= N × .0266 × C	
38	"	= N × .0350 × C		51	"	= N × .0261 × C	
39	"	= N × .0341 × C		52	"	= N × .0256 × C	
40	"	= N × .0333 × C		53	"	= N × .0250 × C	
41	"	= N × .0325 × C		54	"	= N × .0246 × C	
42	"	= N × .0317 × C		55	"	= N × .0242 × C	
43	"	= N × .0309 × C		56	"	= N × .0238 × C	
44	"	= N × .0303 × C		57	"	= N × .0233 × C	
45	"	= N × .0295 × C		58	"	= N × .0229 × C	
46	"	= N × .0289 × C		59	"	= N × .0225 × C	
47	"	= N × .0283 × C		60	"	= N × .0222 × C	

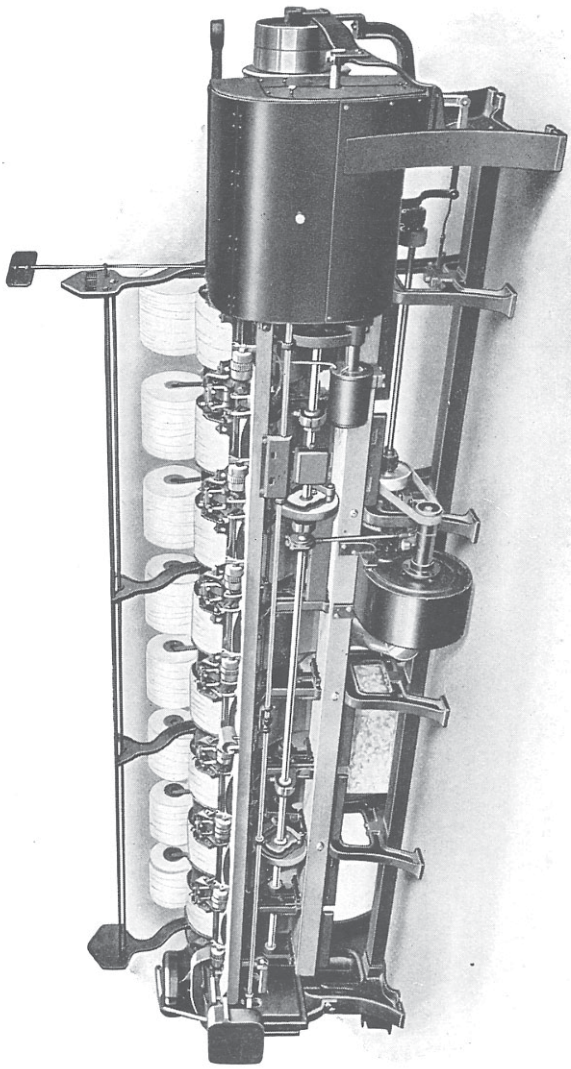
Production Table of Whitin Model E Comber

Showing the number of pounds of Combed Sliver produced in one day of ten hours, allowing 5% off for cleaning, oiling, etc.

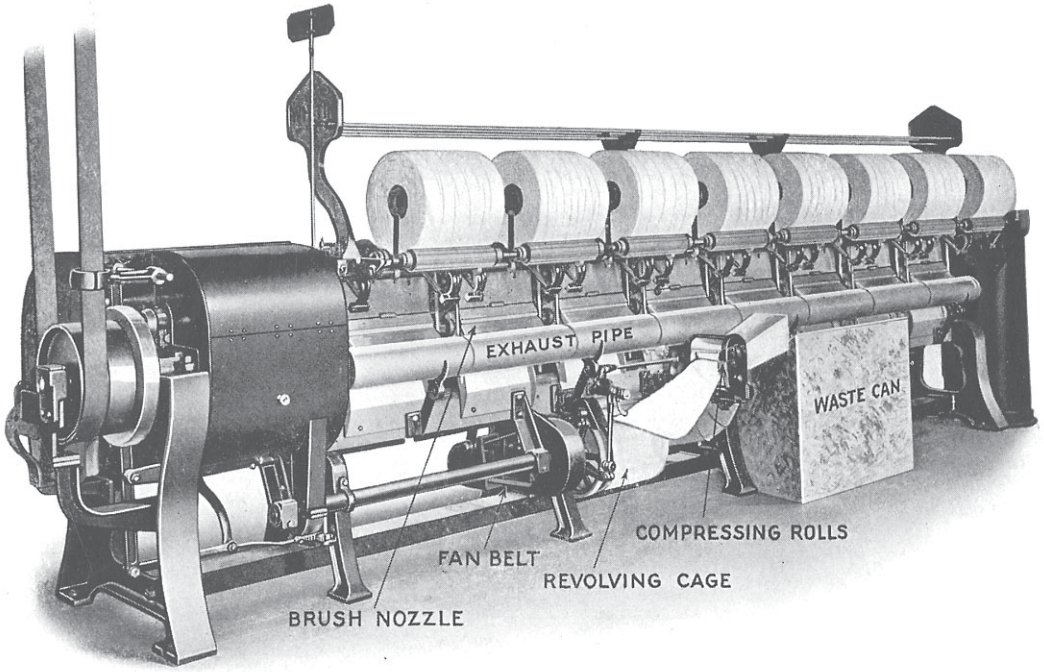
Coiler Connection Gear 50 Teeth

Nips Per Min.	Grains Per Yard of Combed Sliver									
	40	42	44	46	48	50	52	54	56	58
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
80	85.12	89.38	93.63	97.89	102.14	106.40	110.66	114.91	119.17	123.42
85	90.44	94.96	99.48	104.01	108.53	113.05	117.57	122.09	126.62	131.14
90	95.67	100.55	105.34	110.12	114.91	119.70	124.49	129.28	134.06	138.85
95	101.08	106.13	111.19	116.24	121.30	126.35	131.40	136.46	141.51	146.57
100	106.40	111.72	117.04	122.36	127.68	133.00	138.32	143.64	148.96	154.28

Nips Per Min.	Grains Per Yard of Combed Sliver								
	60	62	64	66	68	70	72	74	76
	Lbs.	Lbs	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
80	127.68	131.94	136.19	140.45	144.70	148.96	153.22	157.47	161.73
85	135.66	140.11	144.70	149.23	153.75	158.27	162.79	167.31	171.84
90	143.64	148.43	153.22	158.00	162.79	167.58	172.37	177.16	181.94
95	151.62	155.67	161.73	166.78	171.84	176.89	181.94	186.99	192.05
100	159.60	164.92	170.24	175.56	180.88	186.20	191.52	196.84	202.16



Model D-2 Comber with Waste Condenser (Front View)

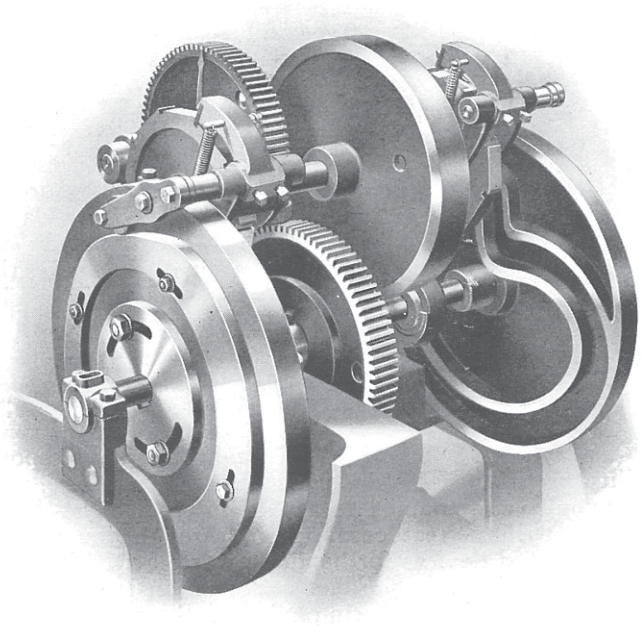


Model D-2 Comber with Waste Condenser (Rear View)

MODEL D-2 COMBING MACHINE
WHITIN TYPE

This machine is especially adapted for producing uperior quality of work from grades of cotton of $1\frac{3}{16}$ ıch or longer staple.

The machine comprises several patented features by neans of which it is possible to obtain very close adjust-



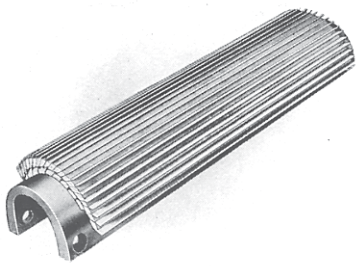
Detaching-Roll Mechanism

ments of the combing elements resulting in the stock being thoroughly cleaned and combed with the elimination of a low percentage of waste.

Special features noticeable in the construction of this machine are:

Absence of Vibration: Owing to the fixed position of several parts which formerly gave excessive vibration, as well as to the use of easy cam motions and **Patented** improvements, it has been possible to practically do away with the vibration of the machine and so obtain a much easier and simpler running mechanism, even at greatly increased speed.

Simplified Settings and Adjustments. Adjustments on the machine may readily and quickly be made for all lengths of staple from $1\frac{3}{16}$-inch to 2 inches.



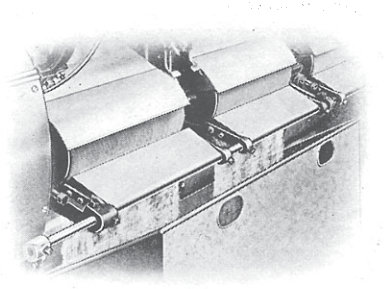
Needle Lap

Automatic electric stop-motions of simplified construction, easily understood and accessible cover every point where breakage of sliver is likely to occur. A telltale signal immediately communicates the stoppage of the machine to the operative. These stop-motions reduce to a minimum the responsibility of the operative in the care of the machine, and one operative is enabled to attend to eight eight- head combers with perfect ease. Also, through the use of our **Patented** devices for handling waste at the back of the comber, the extra yardage of cotton on laps, due to the increased size, the simplicity of the machine and system of gear covering, the care of the machines and handlings are reduced to a minimum; and it is possible

for the operative to attend a greater number of deliveries and handle the increased production with greater ease than heretofore.

Prevention of **"lap-ups"** of the top rolls in the draw-box is obtained by the use of the well-known Ermen type of clearer.

The use of our **Improved Sliver Pan** tends to produce a very smooth sliver on the table and also has eliminated the possibility of slugs being drawn into the work from the corners of the pan, which has always been a source of trouble on all combing machines.



Waste Packer

A Patented Weight-Relieving Motion releases the pressure on the leather detaching-rolls and also on the top rolls in the draw-box when the comber is stopped for any length of time.

Accuracy of Adjustment. The percentage of waste can be closely controlled between six and twenty-four per cent. with absolute accuracy on appropriate grades of cotton. The change from one stock to another is readily made and practically no adjustment is necessary.

The Machine is built with eight heads, the laps 12 inches in width. All parts are highly finished; gears and cams are cut, giving quiet and easy running, and are thoroughly guarded with covers, which are readily opened for cleaning and oiling. All parts are made on jigs and templates, so that no trouble is experienced in replacing parts, should occasion require.

The Production of the machine depends upon the grade of cotton used and the class of work desired: roughly speaking, anywhere from 650 to 750 pounds per week of

sixty hours of combed sliver. Coilers can be furnished 9 inches, 10 inches, 11 inches, and 12 inches in diameter.

Driving Pulleys: 12 inches in diameter by 3 inches face, running 2.66 revolutions to one nip of the comber. The machine may be arranged to be driven by electric motor if desired. The speed recommended is around 125 nips per minute on short stock and coarse work to 120 nips per minute on long stock, laps to weigh from 450 to 550 grains per yard.

Optional Equipment: Instead of the usual doffer and comb motion for disposing of the waste at back of machine our **Model B Waste Condenser** (see illustration on page 50) may be had which comprises the combination of the usual type of cylinder brushes with a tin pipe extending the full length of the machine with a nozzle for each head. A vacuum is generated at the nozzle mouths by a fan whereby the waste is drawn from the brushes, carried through the pipe and deposited on the surface of a revolving cage, then doffed by rolls and drawn by condenser rolls into a can at back of machine. By this method of handling waste, less cleaning of the machine is required, flying of dust about the machine is eliminated and the needle half-laps and brushes are maintained in a cleanly condition.

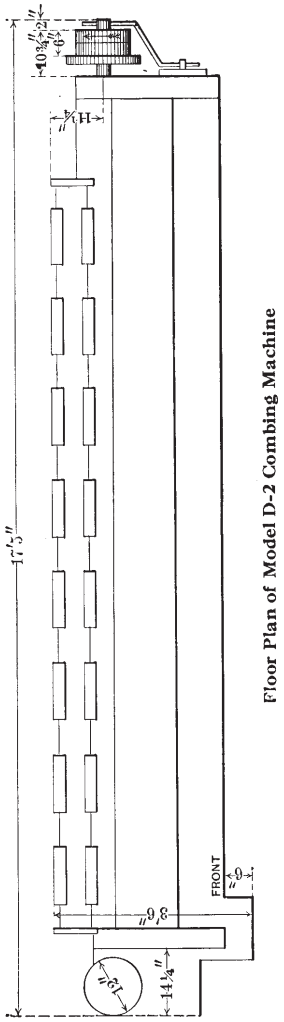
Power: $\frac{1}{2}$ horse power at 125 nips per minute without condenser; $\frac{3}{4}$ horse power with condenser.

Floor Space: 17 ft. 5 in. by 3 ft. 6 in.

Car Load: Four machines, set up.

Weights:

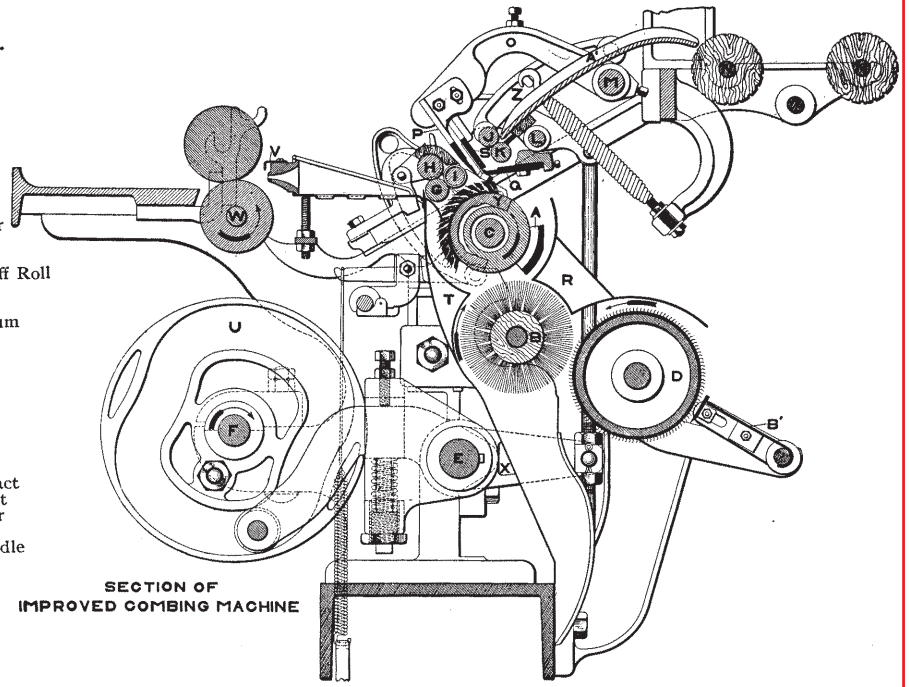
Domestic:	**Export:**
Net, 4500 pounds,	Gross, 5500 pounds.
Gross, 500 pounds.	Cubic Feet, 160.



Floor Plan of Model D-2 Combing Machine

REFERENCES.

A —Fluted Segment
B —Brush
C —Cylinder
D —Doffer
E —Nipper Shaft
F —Cam Shaft
G —Steel Drawing-off or Detaching Roll
H —Brass Piecing Roll
I —Leather Drawing-off Roll
J —Top Feed Roll
K—Bottom Feed Roll
L —Nipper Arm Fulcrum
M—Top-Comb Shaft
N—Lap Roll Shaft
O —Top-Comb Arm
P —Top-Comb
Q —Cushion Plate
R —Doffer Cover
S —Nipper Knife
T —Waste Chute
U —Nipper Cam
V —Stop-Motion Contact
W—Calender Roll Shaft
X—Nipper Shaft Lever
Y —Half-Lap
Z —Top Feed Roll Saddle
A′—Lap Plate
B′—Waste Packer



SECTION OF
IMPROVED COMBING MACHINE

SPECIFICATIONS OF STANDARD NEEDLE SEGMENTS

No. of Strips.	No. of Wire.	Indiv. Needle Space.	Total Needle Space Per Inch.	Needles Per Inch.	Indiv. Cotton Space.	Total Cotton Space Per Inch.	Projection of Wire.
1, 2	24	.0235	.681	29	.01098	.318	$\frac{3}{16}$″
3, 4	26	.018	.684	38	.00831	.316	$\frac{11}{64}$″
5, 6	28	.015	.690	46	.00674	.310	$\frac{5}{32}$″
7, 8, 9	30	.01325	.715	54	.00528	.285	$\frac{1}{8}$″
10, 11, 12	32	.01075	.731	68	.00395	.269	$\frac{7}{64}$″
13, 14, 15	32	.01075	.817	76	.00240	.183	$\frac{3}{32}$″
16, 17	32	.01075	.903	84	.00115	.097	$\frac{3}{32}$″
Top-Comb	28	.015	.960	64	.00062	.040	$\frac{1}{4}$″
Tin Strip	28	.016	.720	48	.00582	.280	$\frac{1}{4}$″

DIRECTIONS FOR SETTING

The Whitin Improved Combing Machine

Model D-2

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 these directions.

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 preservatives.

Assembling of the Combing Machine. Users will find it most convenient to replace the shafts in the following order: nipper shaft $1\frac{1}{2}$-inch 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; notched 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.

Setting the Actuating Cams. Put on the pawl arms with the cam rolls on them. Set the caps up hard, throw the 80-tooth gear out of mesh by sliding endwise and turn the cam shaft until the roller on the pawl arm is in the heel of the large cam on the end of the machine. Turn the index gear until No. 5 stands opposite the pointer and slide the 80-tooth gear into mesh and bolt it to its sleeve.

Fluted and Needle Segments. See that the fluted segments are screwed down firmly and then put on the needle half-laps and screw them down firmly. Be sure and have them thoroughly clean. Put small tin casings between the two segments and see that they fit closely.

Setting Steel Detaching Roll. Put brass bushing in detaching roll bearings and place the detaching roll in bushings. See that this roll is free after the caps are screwed on and that the $\frac{5}{8}$-inch shaft is tight. They are under the same cap. The detaching roll should be set to the segment with a No. 21 gauge.

Setting Cylinders. Put on the 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 until No. 5 is opposite the pointer. Then turn the cylinders on the shaft till they all stand with the front edge of the segment $1\frac{1}{8}$ inches from the back side of the detaching roll. Use the $1\frac{1}{8}$-inch gauge to caliper this distance. Screw the cylinders firmly to the shaft by the set screws at ends 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 bearings. Screw on the caps and set $6\frac{3}{4}$ inches 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 just touch the face of the brass needle bars. Do not set the brushes hard against the needles.

Setting the Leather Detaching Rolls. Put the leather detaching rolls in place. See that the flat side of the bushings on the ends of the rolls bear against the slides. Attach the roll weights to the stirrups and hang the stirrups in the bearings made for them in the bushings. Turn the combing machine until the segments come under the leather detaching roll or index gear stands at No. 8. Set so that No. 25 gauge will go between the flat side of the bushing and the adjusting slides. Make them all secure and see that there is no chance for them to slip back.

Setting Feed Roll. Set the feed roll from the detaching roll to the $1\frac{1}{2}$-inch gauge for short stock and $1\frac{7}{8}$ inches for long stock. Feed roll should start when the figure $7\frac{1}{2}$ is opposite the pointer. Set the cross shaft from the feed roll to the corrugated lap roll.

Setting the Nippers. Put on the nipper plates and adjust them by the small screws at the back so that the front edges of the plates are the thickness of the No. 22 gauge from the lip of the nipper knife. Be sure and have the nipper knife perfectly straight. Fasten the plates securely to place by the binding screws and try

the settings after tightening the binding screws. Always be sure that the nipper knife holds paper on the bite of the plate the full length of the plate. 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 arms (with the stop screws in them) so that the nipper knife will have about an angle of 34 degrees, by adjusting the stop screws. Then set the front edge of the plate $1\frac{3}{8}$ inches from the detaching roll for short stock, and for long stock the angle of the nipper knife should be about 34 degrees and the front side of cushion plate set to $1\frac{7}{16}$ inches. Use only one screw in each frame to make this setting, and when nipper plates are set, fasten the stop screws you have used with the check nut. After all the frames have been set in this manner, set the other stop screws with the one that is set with paper so that both screw points in each end of the frame will hit the stand at the same time. While gauging this distance, set the nipper frame up or down until the nipper plate is the thickness of the No. 19 gauge from the segment. This is to level the frame merely, as they are all reset to half-lap needles later. The nipper knife will now stand at about an angle of 34 degrees. In setting the nippers, it is always best to begin in the center of the machine and work each way.

Setting the Nipper Rods. Connect nipper frames to the nipper shaft. See that the rods enter the swivels freely. Turn the comber until the first row of needles on the half lap points to the center of the detaching roll or until pointer is $14\frac{1}{4}$ on the index gear. See that the roll is in high part of nipper cam under sliver plate. Put No. 25 gauge under the point of the stop screw and adjust the nuts on the connecting rods until the pressure is nearly taken off the gauge. At the same time set the nipper frames up or down until the nipper knife gauges No. 21 from the needles. Tighten lock bolts and check nuts and try gauges again to see if the setting has moved. Now tighten the stop screws in the other arms at the back onto the nipper stands and tighten the check nuts.

Timing the Nippers. Set the nipper cams so that the knives touch the plates at 11 on the index gear. Do this by moving the cams on their sleeves.

Setting the Top-Combs. Turn the comber until the segment is under the top-comb needles or index gear is at No. 8. Give

top-comb an angle of about 24 degrees and set it about $\frac{1}{32}$" from the leather roll for short stock. More angle should be used for long stock. Gauge combs so that they will stand No. 22 or No. 23 gauge from segment.

Setting Doffers. Put the doffers in place and set them about $\frac{1}{32}$ of an inch 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 $14\frac{1}{4}$ in making this setting.

Setting Top-Feed Rolls. Put the feed rolls in their bearings and adjust so the top-feed roll is parallel with the bottom-feed roll. Hook on the springs and give a tension of $\frac{1}{4}$ inch. Set the wooden corrugated lap rolls so that the laps will feed evenly with the aprons.

Timing the Detaching Roll. Adjust the actuating cam on the end of the 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. Then turn the comber over to No. 6 again, and set the inside actuating cam so that it will move the detaching roll forward at No. 6. Be sure to securely tighten these cams.

Setting Brass-Clearing Rolls. These rolls should be set parallel with the steel-detaching roll and quite clear from the leather-detaching rolls. Set the brass rolls the thickness of No. 18 gauge from the leather rolls.

Recapitulation of Timing of Parts of Combing Machine.

Nippers close at 11.
Detaching roll moves forward at 6.
Feed roll moves forward at $7\frac{1}{2}$.

To Increase Waste

By setting the top-comb closer.
By feeding later.
By putting more angle on the nipper knife and top-comb.

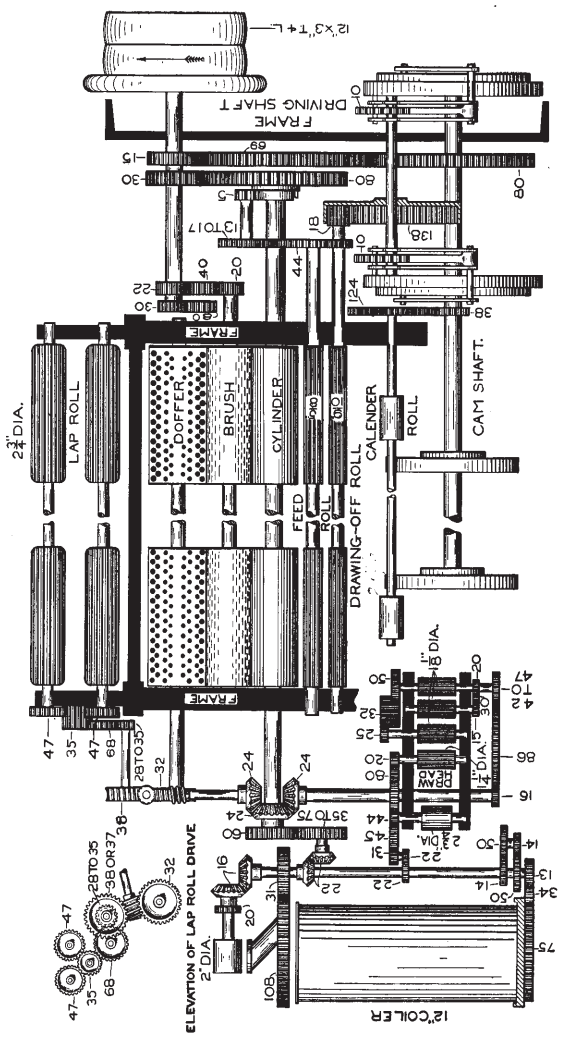


DIAGRAM OF GEARING OF WHITIN MODEL D-2 COMBER.

CALCULATIONS
for Model D-2 Comber

To find the total draught:

Let L = lap roll change gear, and C = the coiler connection gear, then the total draught between the lap rolls and the delivery rolls of the coiler is obtained as follows with reference to gearing diagram of D-2 Comber.

$$\frac{47 \times 38 \times 24 \times 60 \times 22 \times 16 \times 2''}{L \times 1 \times 24 \times C \times 22 \times 16 \times 2.75} = \frac{77934.54}{L \times C} = \text{Draught}$$

Example: If the coiler connection gear has 50 teeth and the lap roll change gear has 30 teeth, what draught is produced?

$77934.54 \div (50 \times 30) = 51.95$ Draught.

To find draught required to produce a given weight of sliver:

Multiply the weight of lap less waste by number of laps up and dividing by weight of required sliver gives draught required.

Example: Draught required to produce a 50-grain sliver on a machine having eight laps of 500 grains per yard each, taking out 20% waste? Also what is the coiler connection gear with 30-teeth lap roll change gear?

$$\frac{8 \times 500 \times .80}{50} = 64 \text{ Draught}$$

$77934.54 \div (64 \times 30) = 40$-teeth coiler connection gear.

To find the production of comber in a day of 10 *hours:*

Multiply the delivery of the coiler roll in yards per minute by the time run in minutes and weight in grains per yard and divide the product by 7000 grains, the quotient being the number of pounds produced.

Example: How many pounds per day of ten hours will a comber running 100 nips per minute produce of sliver weighing 50 grains per yard, allowing 5% off for stoppages, etc., and using a 50-teeth coiler connection gear?

$$\frac{100 \times 60 \times 22 \times 16 \times 2'' \times 3.1416}{50 \times 22 \times 16 \times 36} = 20.94 \text{ yards per minute.}$$

$$\frac{20.94 \times 570 \times 50}{7000} = 85.25 \text{ pounds per day.}$$

To find percentage of waste made:

After stopping the machine, clean away all the waste at the back, breaking it off evenly and close to each doffer comb. Also break off the sliver at the bite of the draw-box calender rolls. Then run the comber for about half a minute. Weigh the amounts of sliver produced and waste made during the run separately, then add the two weights together and divide the sum into the weight of waste and multiplying the result by 100 gives the percentage of waste made.

Example: Suppose that in making a percentage test on a comber it was found that 600 grains of good sliver were delivered and 100 grains of waste made, then $600 + 100 = 700$; $100 \div 700 = .14$; $.14 \times 100 = 14$ per cent. waste made.

DRAUGHT TABLE

MODEL D-2 COMBING MACHINE

Table gives total draught between $2\frac{3}{4}''$ lap rolls and $2''$ coiler calender rolls.

Draught Constant Formula:

Let L = number teeth in lap roll change gear,
" C = " " " coiler connection gear,

$$\frac{47 \times 38 \times 24 \times 60 \times 22 \times 16 \times 2''}{L \times 1 \times 24 \times C \times 22 \times 16 \times 2\frac{3}{4}''} = \frac{77934.54}{L \times C} = \text{Draught.}$$

Draughts with L = 30 teeth

C	Draught	C	Draught
35	74.22	55	47.23
36	72.16	56	46.39
37	70.21	57	45.57
38	68.36	58	44.79
39	66.61	59	44.03
40	64.94	60	43.29
41	63.36	61	42.58
42	61.85	62	41.90
43	60.41	63	41.23
44	59.04	64	40.59
45	57.72	65	39.96
46	56.47	66	39.36
47	55.27	67	38.77
48	54.12	68	38.20
49	53.01	69	37.65
50	51.95	70	37.11
51	50.94	71	36.59
52	49.96	72	36.08
53	49.01	73	35.59
54	48.11	74	35.11

Production Table of Whitin Model D-2 Comber

Showing the number of pounds of Combed Sliver produced in one day of ten hours allowing 5% off for cleaning, oiling, etc.

Coiler connection gear 50 teeth.

Nips per min.	Grains per yard of Combed Sliver.																		
	40	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74	76
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
100	68.22	71.63	75.04	78.45	81.86	85.27	88.68	92.09	95.50	98.91	102.32	105.73	109.15	112.56	115.97	119.38	122.79	126.20	129.61
105	71.63	75.20	78.79	82.37	85.95	89.54	93.12	96.70	100.28	103.86	107.44	111.02	114.60	118.19	121.77	125.35	128.93	132.51	136.09
110	75.04	78.79	82.54	86.30	90.05	93.80	97.55	101.30	105.05	108.80	112.56	116.31	120.06	123.81	127.57	131.32	135.07	138.82	142.57
115	78.45	82.37	86.29	90.22	94.14	98.06	101.98	105.90	109.83	113.75	117.67	121.59	125.52	129.44	133.36	137.28	141.21	145.13	149.05
120	81.86	85.95	90.05	94.14	98.23	102.33	106.41	110.51	114.60	118.70	122.79	126.88	130.98	135.07	139.16	143.25	147.35	151.44	155.53
125	85.27	89.54	93.80	98.06	102.33	106.59	110.85	115.12	119.38	123.64	127.91	132.17	136.44	140.70	144.96	149.23	153.49	157.75	162.02
130	88.68	93.12	97.55	101 99	106.42	110 85	115 29	119.72	124.16	128 59	133 02	137.46	141 89	146 33	150.76	155.19	159.63	164.06	168 50

2.66 revolutions of driving pulley to one nip.

Regulations for Supervising Whitin Lap and Combing Machines

1. The man having charge of the combing machines should carefully observe, the very first thing Monday and Wednesday mornings, that the tenders oil the machines properly, teaching them how it should be done and seeing that they do it.

2. At the same time, he should see that the tenders oil the backs and head ends in a proper manner. The backs should be oiled like the fronts twice a week, as before stated, Mondays and Wednesdays. The fast running parts and gearing should be oiled every morning.

3. Monday morning all half-laps and top-combs should be carefully inspected by the Third Hand, changing any if in poor condition.

4. It should be the duty of the Third Hands to respond quickly to the calls of the tenders, for if a machine is running poorly, it produces uneven work and is not getting out the production it should.

5. The Third Hands should see that the stop-motions are always in order, as they save a large amount of breakage and relieve the tenders of all responsibility.

6. The Third Hands should see that all weights are released every Saturday. Each combing machine is equipped with a weight-relieving device, which takes the pressure off of the top-rolls.

7. The Third Hands should see that the tenders do not cut roller laps from the steel rolls with a knife. A brass hook can be used to pick these laps off, and a little lever is very convenient for removing roller laps from the lower feed roll, and each tender should be provided with one.

8. The combing and lap machines should be scoured at least twice a year. In scouring the combers, the sliver pans, lap aprons, brass, steel and leather detaching rolls, top feed rolls, draw-box rolls, brass guides and doffer bonnets should be taken out and the hood taken off of the gearing end, and the comber given a general cleaning. The sliver and ribbon lap machine rollers should be taken out and thoroughly cleaned likewise.

9. The combers should be reset once a year to be kept in good condition. In resetting, the comber should be practically taken down to the upright stands. If any part should be worn, they should be replaced and the comber should then be thoroughly reset.

10. The Third Hands, upon starting up the machines after being reset, should see that the percentage of waste is just what is required. They should take the percentage of waste once a month, all around the room, thus insuring the evenness of noils and sliver.

11. Leather detaching rolls should be varnished and changed throughout the room each week. The best way to do this is to have a little truck that will go between the draw-box covers of the combers with a place for the varnish pot and varnish board, removing the rolls, varnishing and replacing them. This can be done at the noon hour while the machines are stopped, varnishing and changing all rollers each week.

12. It is the duty of the man in charge of the combers to see that the lap machine tenders produce good work, for if the laps contain bunches, breakages occur in the sliver pans and in consequence the top-combs and needle half-laps are damaged. The laps should be carefully handled and kept on the creels, which makes the room look tidy and saves a lot of waste.

13. It is the duty of the man in charge of the combers to strictly enforce these rules. Combers should not be cleaned while in operation, not only because many breakages occur from so doing, but the tenders are liable to be caught in the machinery and injured.

14. It is the duty of the man in charge of the combers to size the laps each day and on very fine counts twice a day, thus keeping them of a uniform weight.

Care of Combing Machines

1. Commencing Monday morning and Wednesday morning of each week, tenders should carefully oil combers under the personal supervision of the man in charge of same who should make it a point to pass back and forth between the machines and carefully observe that the tenders do not put too much oil on the machine, but see that they oil every place required, for if an unnecessary amount of oil is used, the machine becomes soiled and of course causes it to run poorly, while not enough oil will cause the parts to wear out, and the machine soon breaks down.

2. Tenders, after oiling, should wipe over all parts oiled (to clean up the oil that may have run out of the oil holes) with waste. This saves them an unnecessary amount of cleaning.

3. Tenders should clean around the rolls of the machines with a finger brush at 8.30 a.m. and at 2.00 p.m.

4. Tenders should clean the backs and fronts and wipe all lint from the machines at 10.30 a.m. and 5 p.m.

5. Tenders should sweep the floor around the machines at 8.30 a.m., 11.30 a.m., 2.30 p.m., and 5.30 p.m.

6. Tenders should clean the top-combs at 8.00 a.m., 11.00 a.m., 2.00 p.m. and 5.00 p.m.

7. Every morning the tenders should polish with whiting the sliver plates, coiler tops and draw-box covers.

8. Tenders should not allow tail ends of laps to pass through the combers, for every one that slips through the rolls breaks the needles out of the top-comb and the half-laps, while if the lap is put in at the proper time, the needles are kept in good condition.

9. If a tender finds anything out of order with any machine, it should be immediately reported to the boss comber who should see that it is attended to, for if a comber runs poorly, it must be reset and readjusted to insure satisfactory results.

10. Wednesday of each week at 1.00 p.m. tenders should clean thoroughly the draw-boxes, replacing the top-rolls with newly varnished rolls.

11. Tuesdays and Fridays of each week at 1.00 p.m., the tenders should clean gearing and cams.

Note. These directions insure cleanliness in the Comber Department, and should be carefully followed up by the man in charge of same to see that they are strictly enforced. Machines should be stopped while being cleaned.

12. Tenders should be responsible for two sets of combers, laid out in pairs. If a tender leaves the machines in her charge for anything whatsoever, another tender should be notified to look out for the machines while she is away.

RECIPES FOR TOP-ROLL VARNISH

No. 1. Dissolve 1 pint of acetic acid in a glass jar, with $\frac{1}{4}$ pound of the best carpenter's glue, to which is added 1 tablespoonful of the oil origanum and a piece of American isinglass the size of a walnut. Shake until liquified and add chrome green to give a body.

No. 2. Dissolve 2 ounces of Le Page's glue in 3 ounces of good vinegar, then add 400 grains of dry green, 12 drops of oil origanum, and 5 drops of alcohol.

No. 3. Dissolve 1 pound of glue in 4 pints of acetic acid, then add $\frac{3}{4}$-pound of burnt sienna, 4 ounces of red lead, and 1 ounce of oil origanum.

No. 4. Dissolve 1 ounce of glue, 2 ounces of borax, and 1 ounce of gum arabic in 48 ounces of acetic acid, then add 8 ounces of dry green, 3 ounces of lampblack, and 1 ounce of oil origanum.

Specifications for Combing Machinery

How many **Sliver Lap Machines?**
Width of Lap?
Right or Left Hand?
Weight of Sliver at Back?
How many Doublings into one?
Draft?
Driving Pulleys are 19″ Diam. x 2½″ Face
Belt from Above or Below?
Diameter of Bottom Rolls?
Safety Lap Guard?

How many **Ribbon Lap Machines?**
Number of Heads each?
Width of Lap?
Right or Left Hand?
Weight per Yard of Lap at Back?
Draft?
Driving Pulleys are 16″ Diam. x 3″ Face.
Belt from Above or Below
Safety Lap Guard?

How many **Combing Machines?** Model?
Number of Heads each?
Width of Lap?
Right or Left Hand?
Driving Pulleys are 12″ Diam. x 3″ Face
Belt from Above or Below?
Weight per Yard of Lap at Back?
Total Draft in the Machine?
Feed Gears?
Weight of Coiler Sliver?
Production per 10 Hours per Machine?
Percentage of Waste?
Nips per Minute?
Coiler Connection Gear?

Diameter of Coiler Can?
Length of Cotton to be used?
Are Ermen Clearers to be furnished?
Are Hank Clocks to be furnished?
Are Whitin Waste Condensers to be furnished?

NOTE:—Sliver Lap Machines are built with $1\frac{1}{2}''$ diameter Metallic Rolls and Derby Back, unless otherwise specified. We allow 1 Top Roll extra when Leather Top Rolls are furnished; also 3 Change Draft Gears.

We allow 1 Top Roll Extra for each delivery of **Ribbon Lap Machine** when Leather Top Rolls are furnished; also 3 Change Draft Gears.

We allow 1 Top Roll Extra for Draw Box on **Combing Machine;** also 2 spare Leather Covered Detaching Rolls; also 3 Change Feed Gears.

EXTRAS

The following list of details and accessories called "**Extras**" are furnished at an additional price in each case. **Prices** on application. **All Prices** are subject to change without notice.

Ermen Clearers
Hank Clocks
Whitin Waste Condensers

The following Supplies will be furnished with these machines, unless otherwise ordered, and will be charged at prices current at the time shipment is made.

Sliver Lap Spools, $9\frac{3}{4}''$ long x $4\frac{1}{2}''$ diam. x $1\frac{17}{32}''$ bore.
Ribbon Lap Spools, $11\frac{3}{4}''$ long x $4\frac{1}{2}''$ diam. x $1\frac{17}{32}''$ bore.
Galvanized Steel Waste Cans
Half Laps
Top Combs
Leather Covered Detaching Rolls

Repairs.

We have issued for the convenience of users of our machinery, **Illustrated Circulars of the Component Parts** of each machine which we build. The various pieces are illustrated in a clear manner, numbered and named, so that if the directions for ordering repairs, as stated in circulars, are followed there will be no doubt but what the orders will be correctly filled, with the least possible delay. Copies of these circulars have been sent to all our customers, and extra copies will be sent on application.

The Hands of Machines.

To determine the **Hands** of our **Machines**, face the delivery and note which hand side the driving pulleys are.

Shipping Directions.

We prefer our customers to furnish directions for shipping their orders, but if not given and the package is small, we send by express, if large by freight, selecting the most reliable routes and the lowest freight rates that can be secured.

WHITIN MACHINE WORKS

Established 1831

MANUFACTURERS OF THE FOLLOWING MACHINES

COTTON MACHINERY

Opening
Conveying
Distributing
Picking
Revolving Flat Cards
Sliver Lap Machines
Ribbon Lap Machines
Combing Machines
Drawing Frames
Roving Frames
Spinning Frames
Spoolers
Twisters
Reels
Quillers

COTTON WASTE MACHINERY

Cotton and Woolen Systems

Openers
Pickers
Willows
Card Feeds
Full Roller Cards
Condensers
Revolving Flat Cards
Derby Doublers
Roving Frames
Spinning Frames
Spoolers
Twisters
Special Spinning Frames

WOOLEN MACHINERY

Card Feeds
Full Roller Cards
Condensers
Wool Spinning Frames

WORSTED MACHINERY

Cone Roving Frames
Ring Twisters

SUPPLIES

Rings, Spindles, Rolls, Flyers, Roll Spreaders and Hank Clocks