Chapter III.

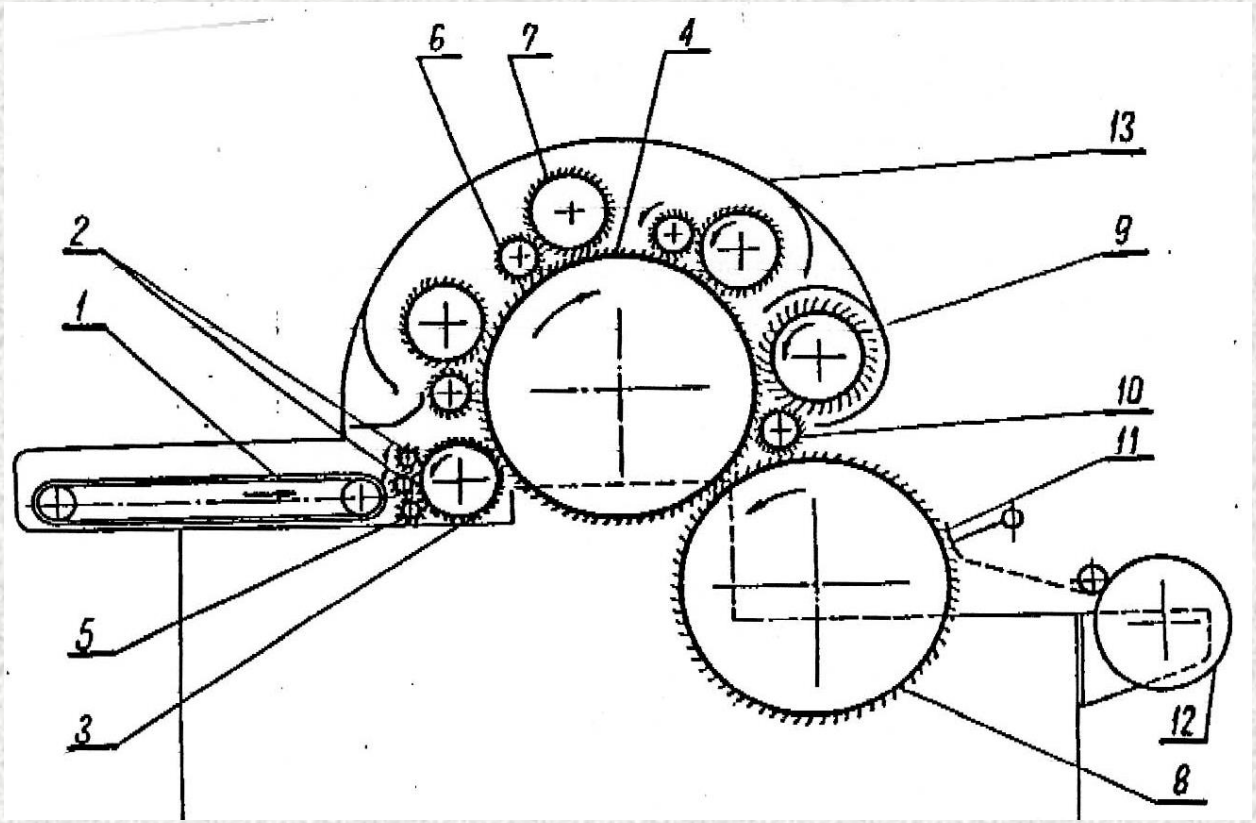
Card machines for nonwovens

Principle of carding

The aim of carding is to prepare uniform web from isolated fibers. Consequently are fibers mixed, cleaned and paralleled.

For nonwovens are used roller card machines, which are more productive than flat cards. Productivity of roller cards increased during forty years from 30-50 kg/h up to 1200 kg/h and the carded web width increased from 1 up to 4,5 metres. Nevertheless it is important that productivity depends on the type and quality of fibers and on the quality of fiber preparation.

Main principle is shown in fig. 1. The fibrous flocks are feeded due to feed conveyor 1 and feeding arrangement 2. Then the transfer roller 3 convey the fibrous material to main cylinder 4. A part of fibres is catched by worker 7 (carding point) and all catched fibers are removed from worker to stripper 6 and from stripper back to main cylinder (2 x stripping point). This action is repeated pursuant to the number of worker-stripper pairs. Then the fancy roller 9 jack up the fibers to the main cylinder clothing (jack up point) and fancy roller is cleaned by fancy roller stripper 10. After this opeation are fibers ready to be condensed and take off by doffer 8 (carding point) and from doffer is fibrous web take off for example by doffer comb 11.



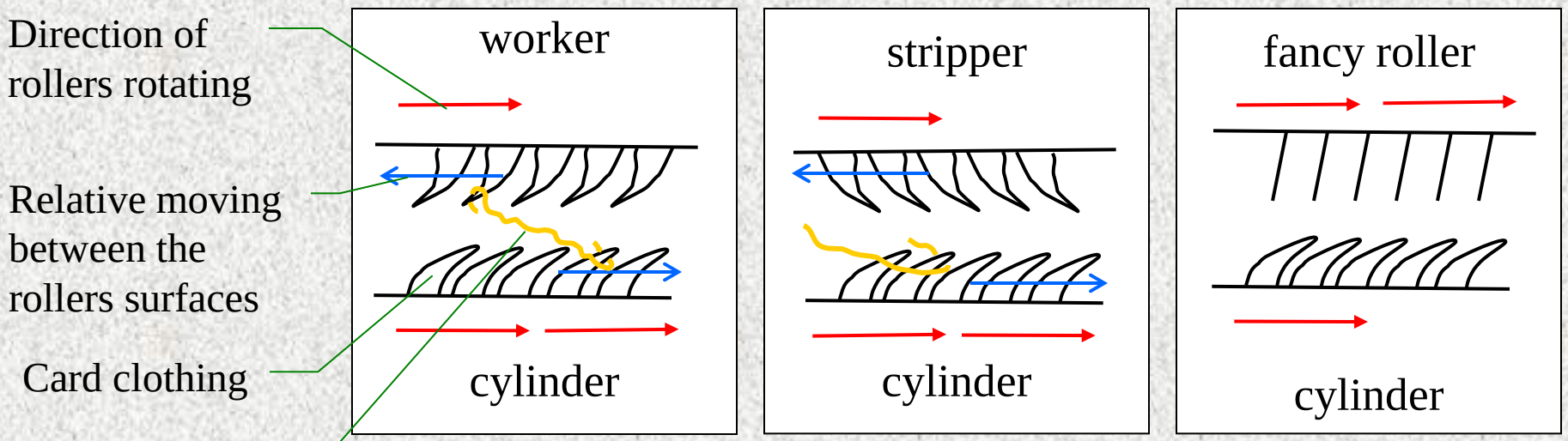
The carding action is higher when

- larger is number of carding elements per area
- greater is difference in speeds of opposing surfaces
- smaller is distance between opposing surfaces.

Other imporatnt inputs are lenght, linear density and surface properties of fibers

Points of carding machine I.

The card point means a place where the fibers are under mechanical action of card machine clothing. Three types of carding points we can found in card machine.



Carding point

cylinder/worker

cylinder/doffer

Stripping point

worker/stripper

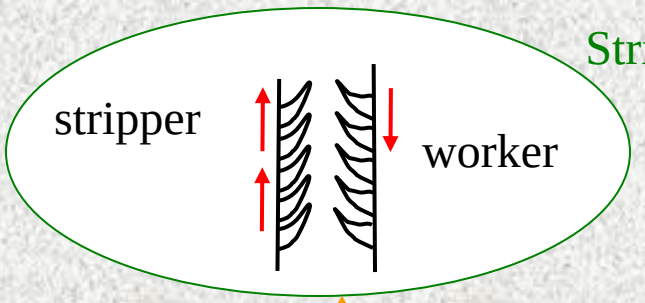
stripper/cylinder

Jack up point

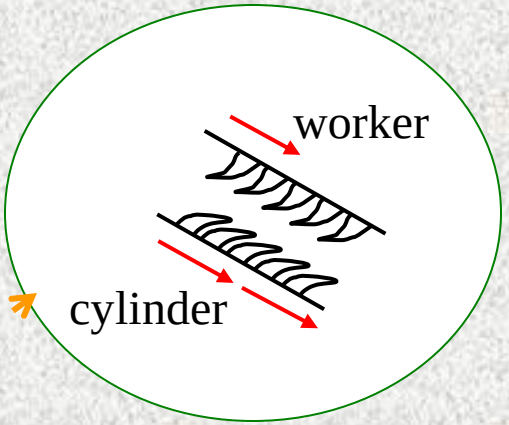
cylinder/fancy roller

Points of carding machine II.

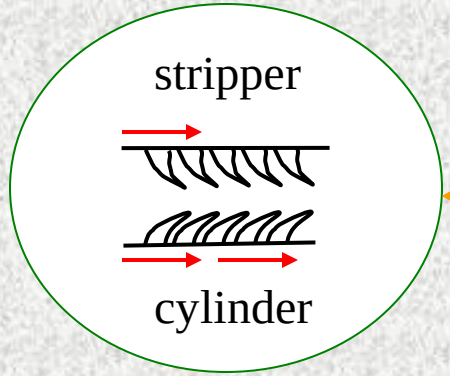
Stripping point

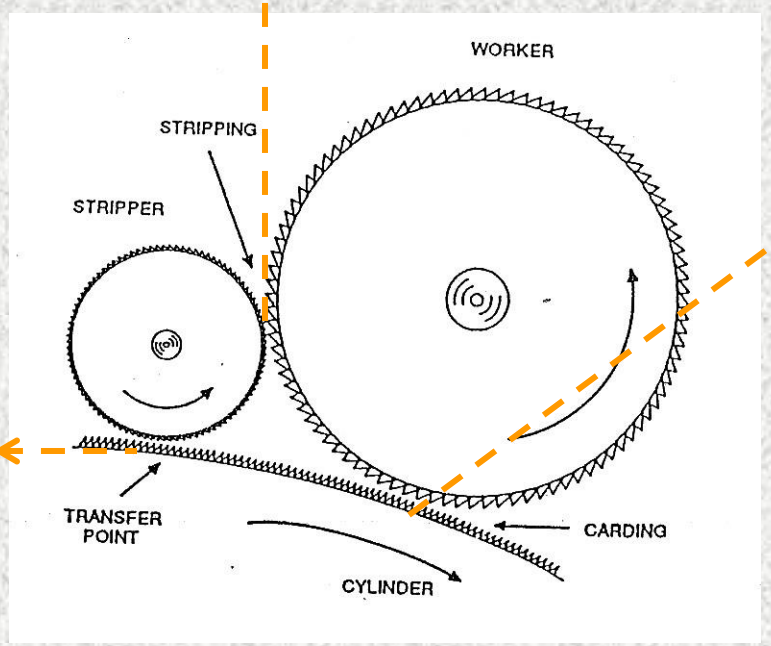


Carding point



Stripping point





Speed:

fancy roller (volant) →→→→

cylinder →→→ (2000 m/min)

stripper →→

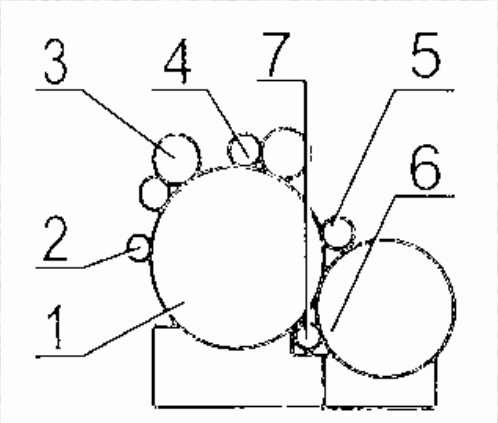
worker →

Card machine variants I.

Feeding arrangement of card machine

Breast apparatus

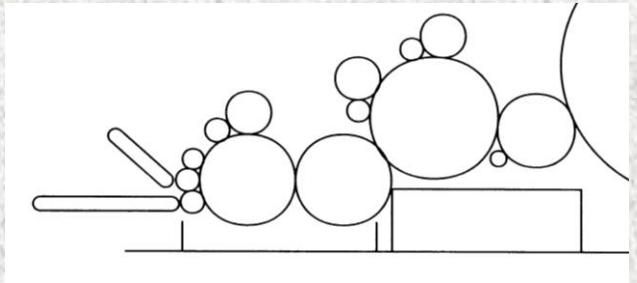
It works as a pre-card machine, which is used for fine openig and feedig of fibrous flocks to main cylinder



1. Tearing cylinder
2. Angle roller
3. Working roller
4. Stripping roller
5. Angle roller
6. Transfer roller
7. Supporting roller

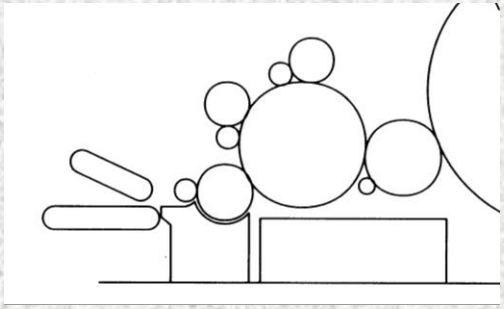
Roller feeder (with breast apparatus)

for fibers from 50 mm to 100 mm



Dish feeder (with breast apparatus)

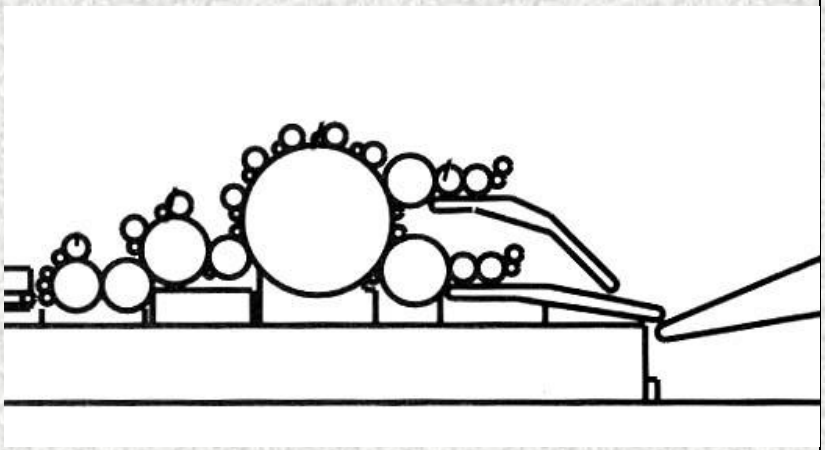
for fibers to 50 mm



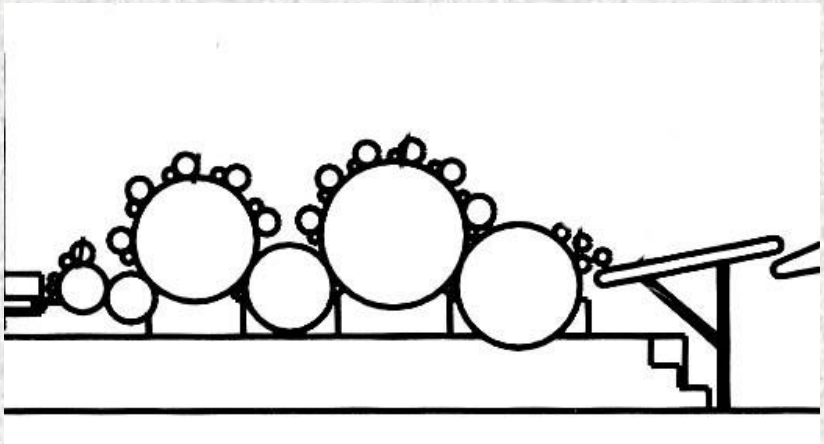
Card machine variants II.

Cylinders

Single cylinder card



Double cylinder card for higher productivity and quality of carded web



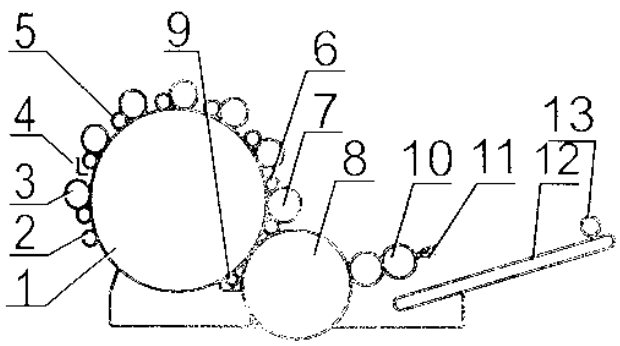
Card machine variants III.

Doffers

Single doffer card

for lower productivity (for example stitch bonded textile line)

1. Main cylinder
2. Angle roller
3. Working roller
4. Impurities removing device
5. Stripping roller
6. Fancy stripping roller
7. Fancy roller
8. Doffer
9. Supporting roller
10. Condensing rollers
11. Doffing comb
12. Conveyor
13. Pressing roller

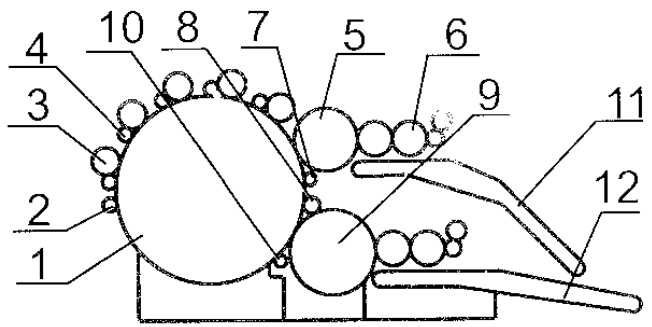


Single-doffer card type 3AWA

Double doffer card

for higher productivity (to produce webs for example for needling, thermal and chemical bondig)

1. Main cylinder
2. Angle roller
3. Working roller
4. Stripping roller
5. Top doffer
6. Condensing rollers
7. Supporting roller
8. Angle roller
9. Low doffer
10. Supporting roller
11. Upper conveyor
12. Collective conveyor



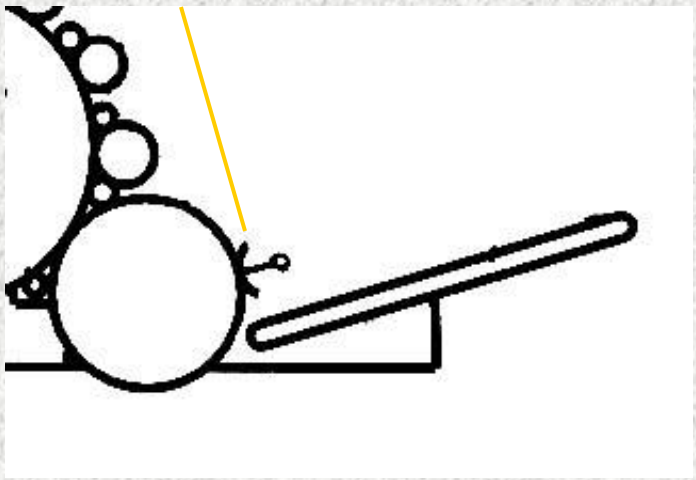
Double doffer card type 3BW

Card machine variants IV.

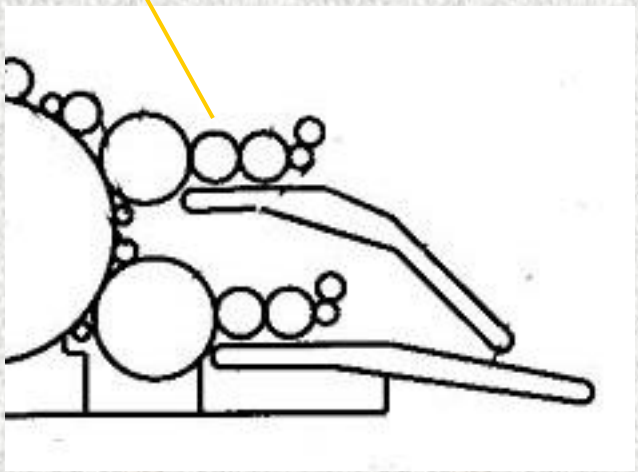
Doffers accessories

Web delivery from doffer can be aranged in two ways by doffing comb in case of parallel web to be processed or by condensing rollers in case condensed web is selected for nonwoven application

Doffing comb



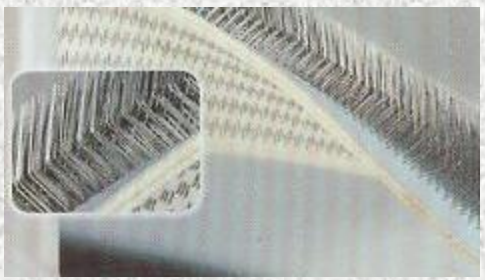
Condensing rollers

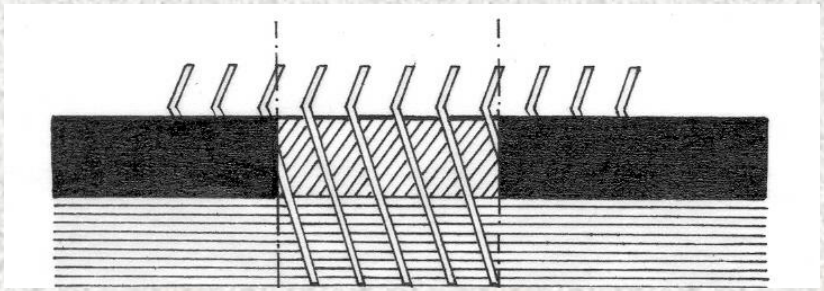


Card machine variants V.

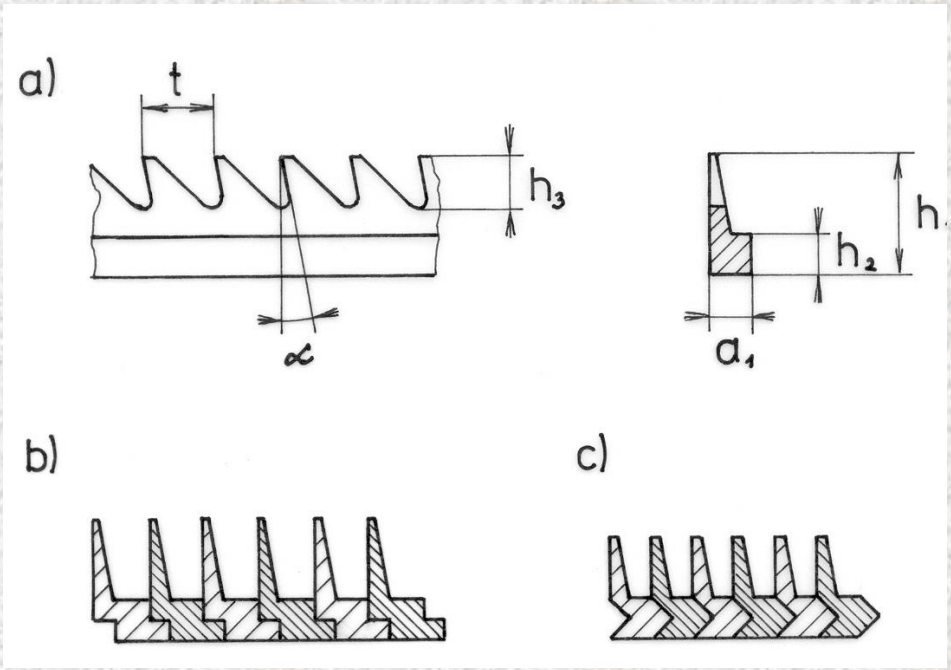
Card clothing

Two types of card clothing are known - flexible wire and metallic wire clothing. Advantage of the flexible wire clothing is more fine carding process without damage of fibers. Disadvantage is lower productivity and shorter working life. Therefore the metallic wire clothing is more common.





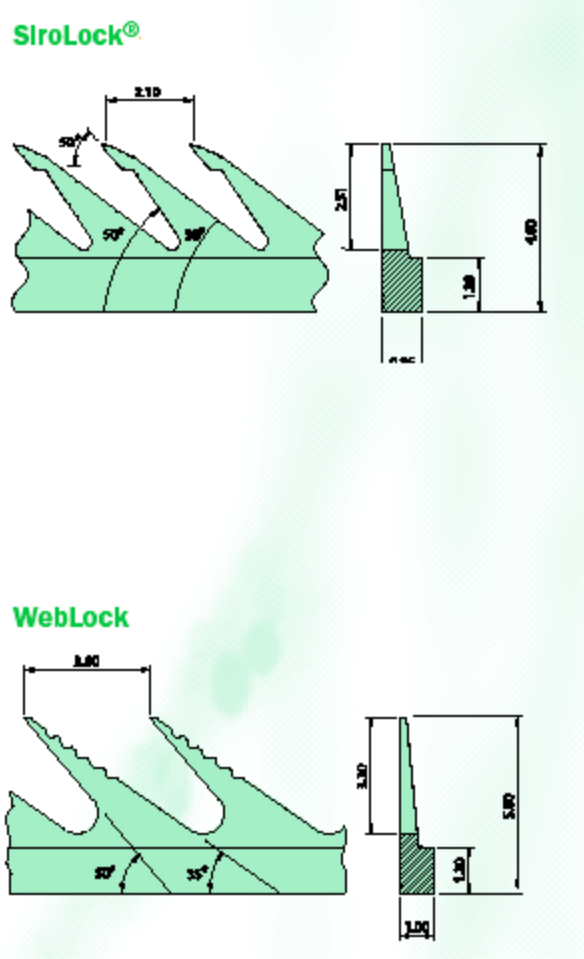
Flexible wire clothing

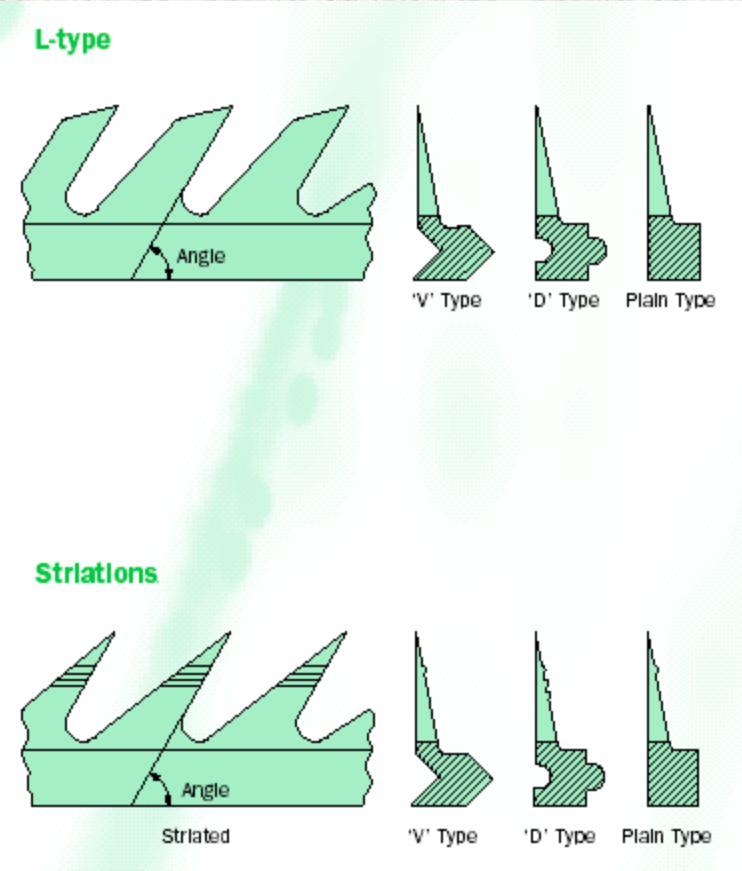


Parameters and three ways how the metalic wire clothing is reeled around the roller:

Card machine variants VI.

Metalic wire clothing types (ECC company)





Card machine variants VII.

Metalic wire clothing location (ECC company) I.

SiroLock® types (soon available – bientôt disponible – bald verfügbar) for Worker/Doffer – pour Travailleurs/Peigneur – für Arbeiter/Abnehmer

Type	Height (mm)	Rib (mm)	Depth (mm)	Pitch (mm)	Angle	PPSI
L10/100/SL2S	5.00	1.00	3.10	3.10	50°	208 (2 Steps)
L10/100/SL1S	5.00	1.00	3.10	3.10	50°	208 (1 Step)
4532/SL1S	4.00	0.95	2.50	2.10	50°	323 (1 Step)
4632/SL1S	4.00	0.95	2.50	2.10	60°	323 (1 Step)

WebLock (Pat) types (soon available – bientôt disponible – bald verfügbar) for Condenser – Condenseur – Stauchwalze

Type	Height (mm)	Rib (mm)	Depth (mm)	Pitch (mm)	Angle	PPSI
4527/WL	4.00	0.95	2.45	2.50	50°	272
9513/WL	5.00	1.25	3.35	4.20	50°	123
9517A/WL	5.00	1.00	3.30	3.60	50°	179

Lickerin/Transfer – Briseur/Communicateur – Vorreiser/Übertrager

Type	Height (mm)	Rib (mm)	Depth (mm)	Pitch (mm)	Angle	PPSI
V5/LAR	8.50	5.08	5.93	9.90	65°	13
V6B/8.5/70	5.50	4.23	3.43	8.50	70°	18
V8BS/6.5/60	5.50	3.17	3.52	6.50	60°	31
V8BS/6.5/70	5.50	3.17	3.19	6.50	70°	31
V10B/5.5/50	4.70	2.54	2.68	5.50	50°	48
V10B/5.5/60	4.70	2.54	2.80	5.50	60°	48
V10B/5.5/70	4.70	2.54	2.65	5.50	70°	48
V12B/4609	4.70	2.12	2.82	3.60	60°	85
V12B/5.0/60	4.70	2.12	2.70	5.00	60°	61
V12B/5.0/70	4.70	2.12	2.78	4.80	70°	61
V16B/4612	4.50	1.59	2.54	3.60	60°	113

Card machine variants VII.

Metalic wire clothing location (ECC company) II.

Cylinder – Tambour – Haupttrommel

Type	Height (mm)	Rib (mm)	Depth (mm)	Pitch (mm)	Angle	PPSI
V12B/TCF	4.70	2.12	2.61	4.00	75°	76
V16B/TCF	4.50	1.59	2.61	4.00	75°	102
A16B/512	3.80	1.59	1.74	4.25	75°	96
A20B/506	3.80	1.27	1.51	3.00	70°	169
A24B/501A	3.80	1.06	1.46	3.20	80°	191
A24B/504	3.80	1.06	1.77	3.20	70°	191
A24B/615	3.80	1.06	1.84	2.50	75°	244
D28B/4739	4.00	0.90	1.30	1.83	70°	392
D30/205/85	4.00	0.85	1.40	1.80	75°	423
D30/619	4.00	0.85	1.85	2.70	75°	282

Stripper – Balayeur – Wender

Type	Height (mm)	Rib (mm)	Depth (mm)	Pitch (mm)	Angle	PPSI
V16B/TCF	4.50	1.59	2.61	4.00	75°	102
V16B/4512	4.50	1.59	2.53	3.60	50°	113
A16B/512	3.80	1.59	1.74	4.25	75°	96
A16B/176	3.80	1.59	1.23	4.10	76°	99
A24B/501B	3.80	1.06	1.82	3.00	75°	203

Worker/Doffer – Travailleur/Peigneur – Arbeiter/Abnehmer

Type	Height (mm)	Rib (mm)	Depth (mm)	Pitch (mm)	Angle	PPSI
V16B/4512*	4.50	1.59	2.53	3.60	50°	113
V20B/4515*	4.50	1.27	2.53	3.60	50°	141
V20B/4522*	4.50	1.27	2.44	2.50	50°	203
D20/9514*	5.50	1.27	3.30	3.60	50°	141
D24/9517A*	5.50	1.06	3.30	3.60	50°	169
D24/9523*	5.50	1.06	3.10	2.50	50°	244
PPS/0.95*	4.00	0.95	2.42	2.50	55°	272
D28A/4527*	4.70	0.90	2.44	2.50	50°	287
D28A/4532*	4.70	0.90	2.51	2.10	50°	341
9525	5.00	1.00	3.10	2.50	50°	258
4619*	4.00	0.95	2.53	3.60	60°	199
8360*	4.00	0.90	2.33	2.00	65°	358
L9S/100*	5.00	1.00	3.43	3.00	60°	215
L10/100*	5.00	1.00	3.10	3.10	50°	208
84516	4.00	0.95	2.22	4.20	45°	162

Card machine variants VII.

Metalic wire clothing location (ECC company) III.

Condenser – Condenseur – Stauchwalze

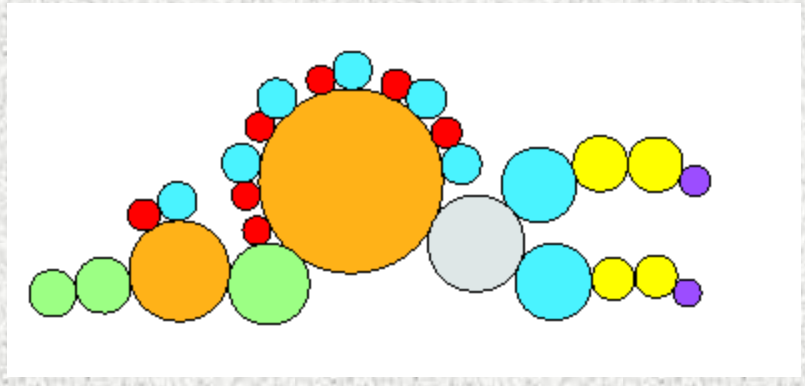
Type	Height (mm)	Rib (mm)	Depth (mm)	Pitch (mm)	Angle	PPSI
0750/F4	7.00	1.50	5.07	6.00	50°	72
1150/F4	5.50	1.40	3.35	4.20	50°	110
1350/F4	5.50	1.20	3.35	4.20	50°	128
9510/F4	5.50	1.30	2.94	5.00	50°	99
9517A/F4	5.00	1.00	3.30	3.60	50°	179

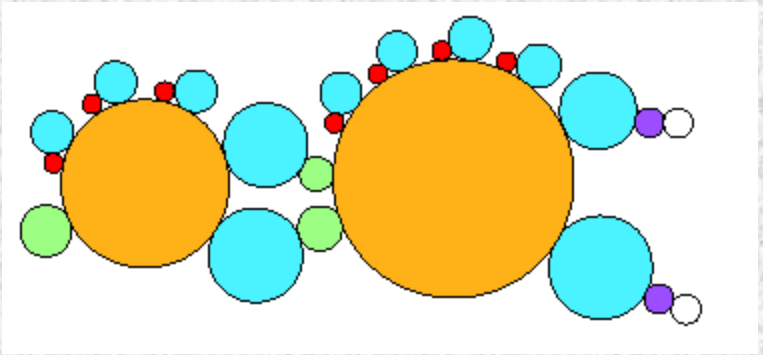
Take-off – Détacheur – Abnahmewalze

Type	Height (mm)	Rib (mm)	Depth (mm)	Pitch (mm)	Angle	PPSI
CS5/F4	2.80	1.80	0.85	3.85	115°	93
CS4/F4	4.06	1.80	1.90	3.15	117°	114

Random Roller – Rouleau Pêle-mêle – Wirrwalze

Type	Height (mm)	Rib (mm)	Depth (mm)	Pitch (mm)	Angle	PPSI
8055/F4	3.18	0.90	1.02	1.30	80°	551
5870/F4	3.18	0.90	1.14	1.30	70°	551
5880/F4	3.18	0.90	1.13	1.30	80°	551





Card machine variants VIII.

Other accessories

Air cleaning of card machine