

Stock Preparation and Additives for Paper making

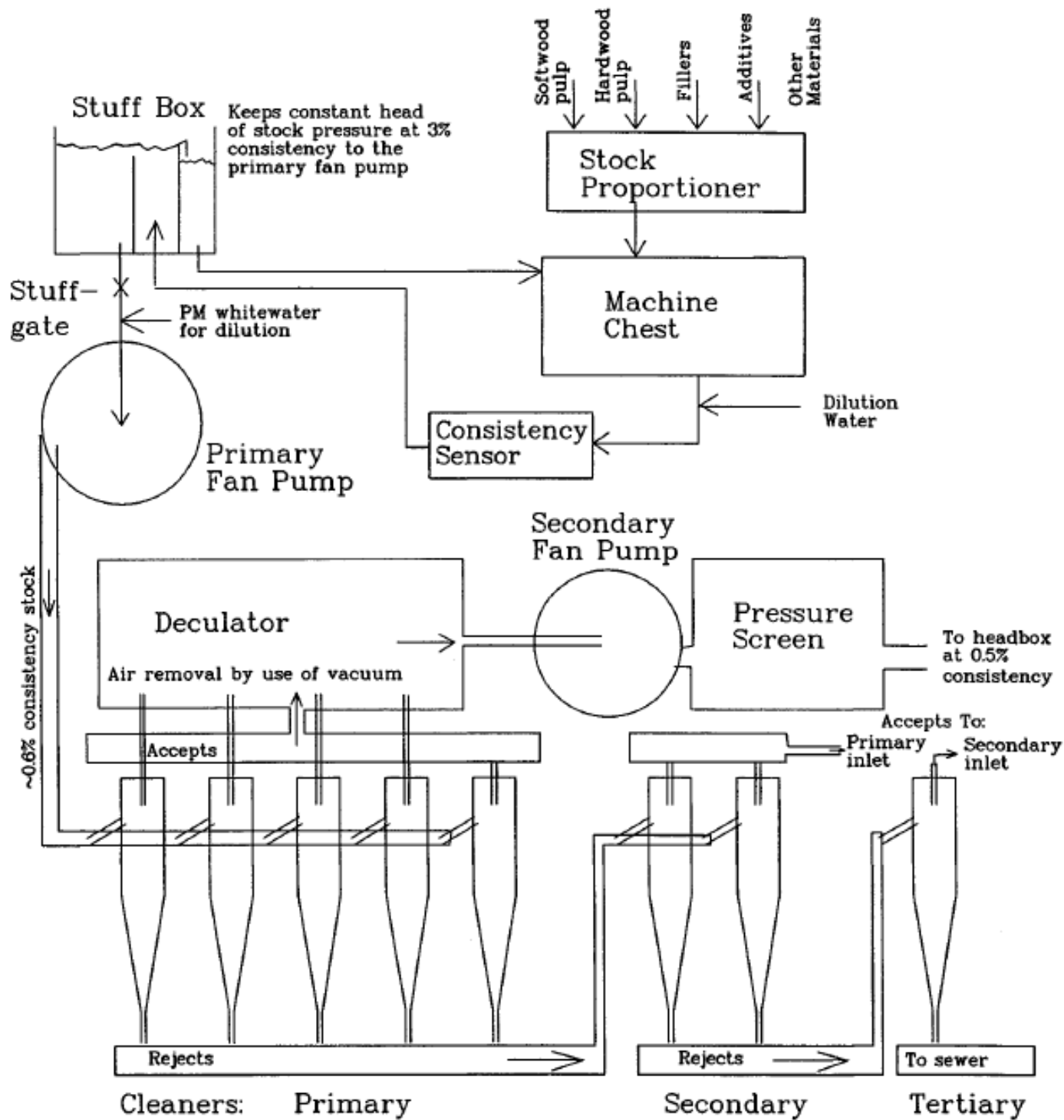


Fig. 8-1. Stock preparation system to the headbox feed.

Functional Additives

- **Filler**
- **Dyes and brighteners**
- **Internal sizing:** Hard sized, slack sized and no-sized. rosin at 2-9 kg/t.
- **Alkaline paper:** longevity high since no residual acid is present to degrade carbohydrates; calcium carbonate (an inexpensive, bright filler) can be used; stronger and less brittle; less corrosion on the paper machine; fewer problems using recycled fiber containing calcium carbonate filler.

- **Starch:** It is used as a retention aid, dry strength agent, surface sizing agent, coating binder, and adhesive in corrugated board and other converting operations.
- **Dry strength additives:** Polyacrylamides are used to increase the dry strength of papers by hydrogen bonding.
- **Wet strength resins:** Wet strength agents are thermosetting resins that are added to stock to impart wet strength to the paper. Urea-formaldehyde (UF), (MF),
- **Specialty chemicals:** Flame retardant, anti-tarnish chemicals.

Table 8-1. Summary of the properties of paper fillers and coating pigments.

Name	Index of Refract.	Bright. 457 nm	Spec. Grav.	Particle Size, μm^1	Remarks
Clay, filler	1.56	82	2.58	0.5-10	abrasive, very cheap
Clay, No. 2 coating	1.56	86-92	2.58	80-82%	most common type used
Clay, No. 1 coating	1.56	86-92	2.58	92%	better gloss and opacity
PCC	1.65	97-98	2.65	0.1-2.5	cheap, bright pH > 7
Ground CaCO_3	1.65	94-97	2.65	0.1-0.4	cheap, bright pH > 7
Anatase TiO_2	2.55	97-98	3.9	0.15-0.30	excellent opacity, bright
Rutile TiO_2	2.70	97-98	4.2	0.15-0.30	excellent opacity, bright
Talc	1.57	96	2.7	0.5-5	Used in Europe
Cell wall material	1.53		1.50	10 \times 1000	

¹A percentage indicates the percentage of particles that pass through a 2 μm mesh.

CONTROL ADDITIVES

- **Retention aids** : Alum
- **Drainage aid**
- **Formation aid:** bean gum, de-acetylated karaya gum, and guar gum have been shown to be effective dispersants for fibers.
- **Defoamers, antifoamers:** oligomers, ethylene oxide (EO) or polypropylene oxide (PO) etc.
- **Biocides**
- **Other additives:** pH control agent, corrosion inhibitor etc.

PAPER MANUFACTURE

The steps are as follows:

- **Forming** - applying the pulp slurry to a screen.
- **Draining** - allowing water to drain by means of a force such as gravity or a pressure difference developed by a water column.
- **Pressing** - further dewatering by squeezing water from the sheet.
- **Drying** - air drying or drying of the sheet over a hot surface.

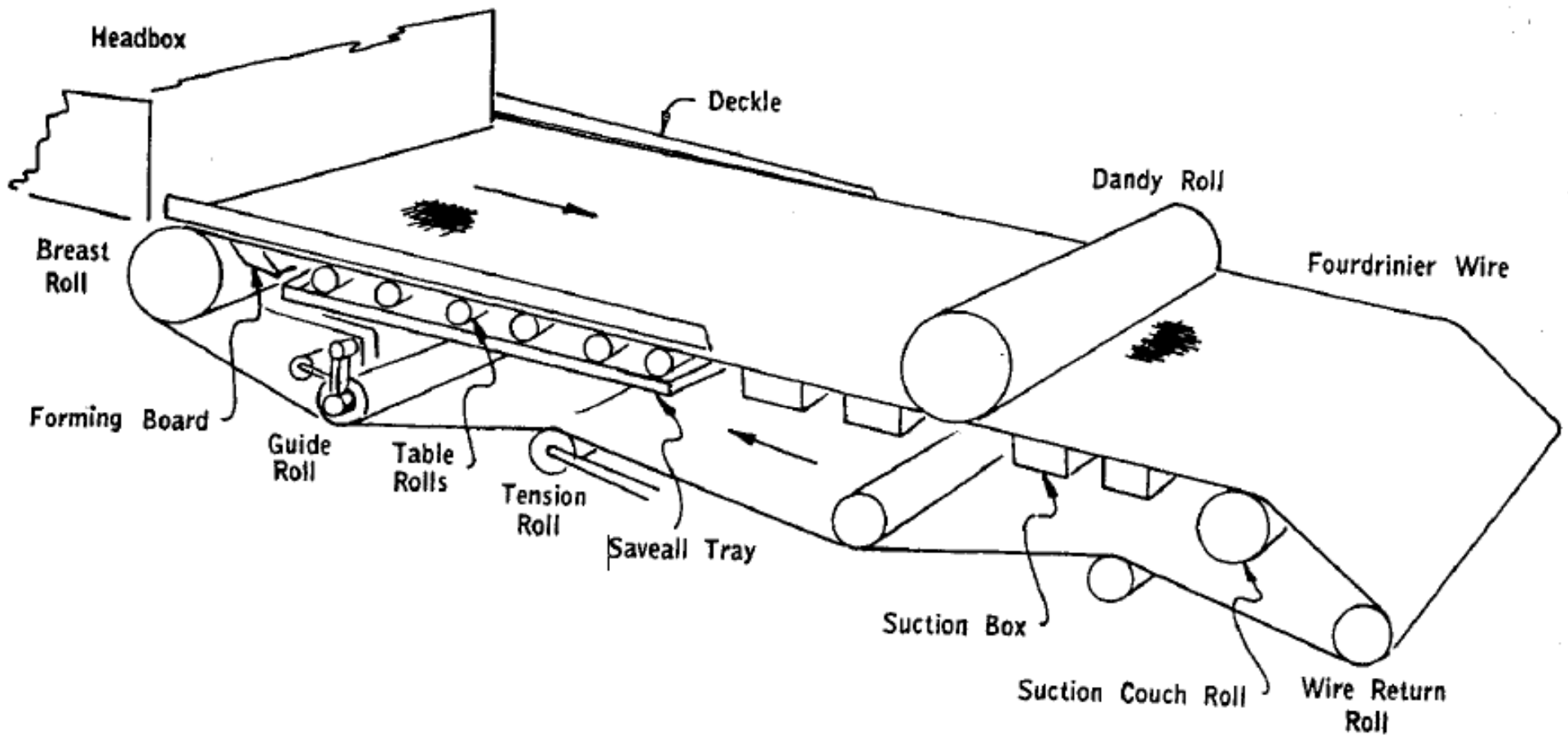


Fig. 9-8. A fourdrinier wet end. Reprinted from *Making Pulp and Paper*, ©1967 Crown Zellerbach Corp., with permission.

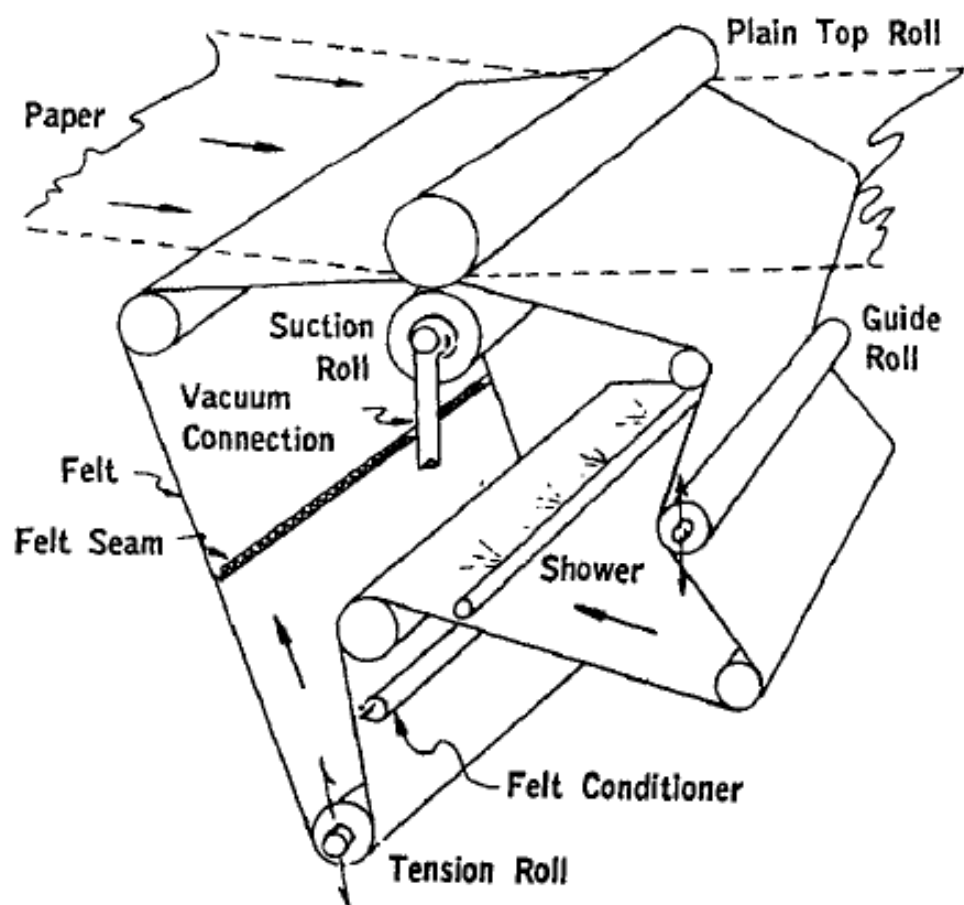


Fig. 9-40. Diagram of a press. Reprinted from *Making Pulp and Paper*, ©1967 Crown Zellerbach Corp., with permission.

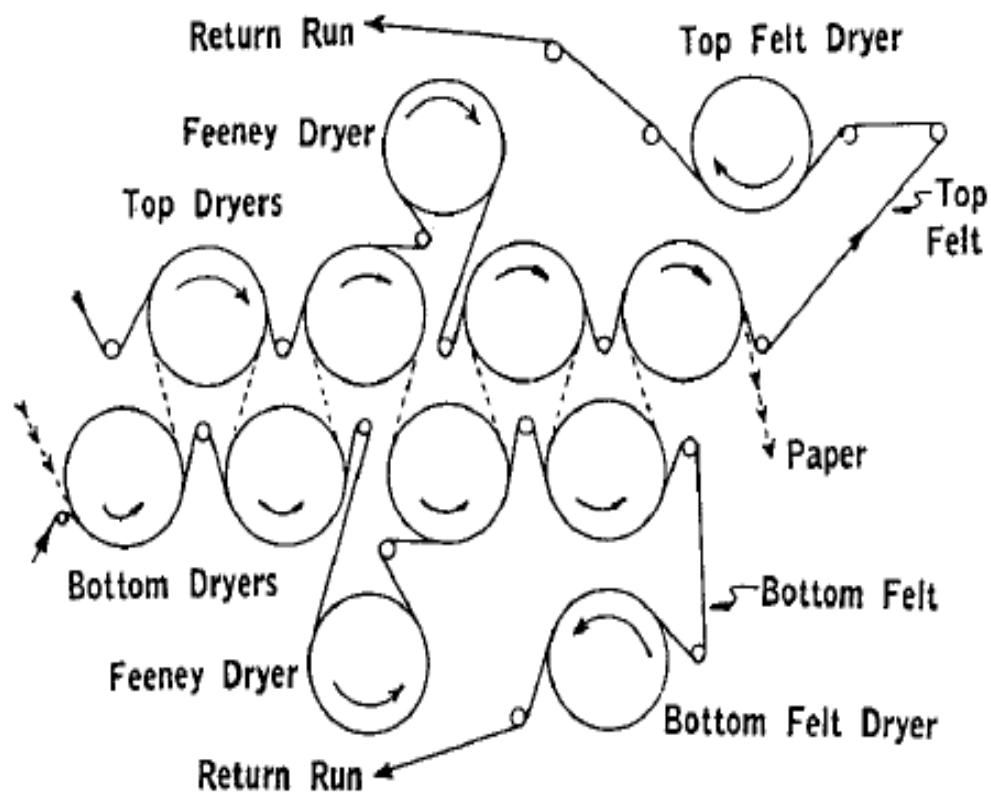


Fig. 9-51. An arrangement of dryer felts. Reprinted from *Making Pulp and Paper*, ©1967 Crown Zellerbach Corp., with permission.

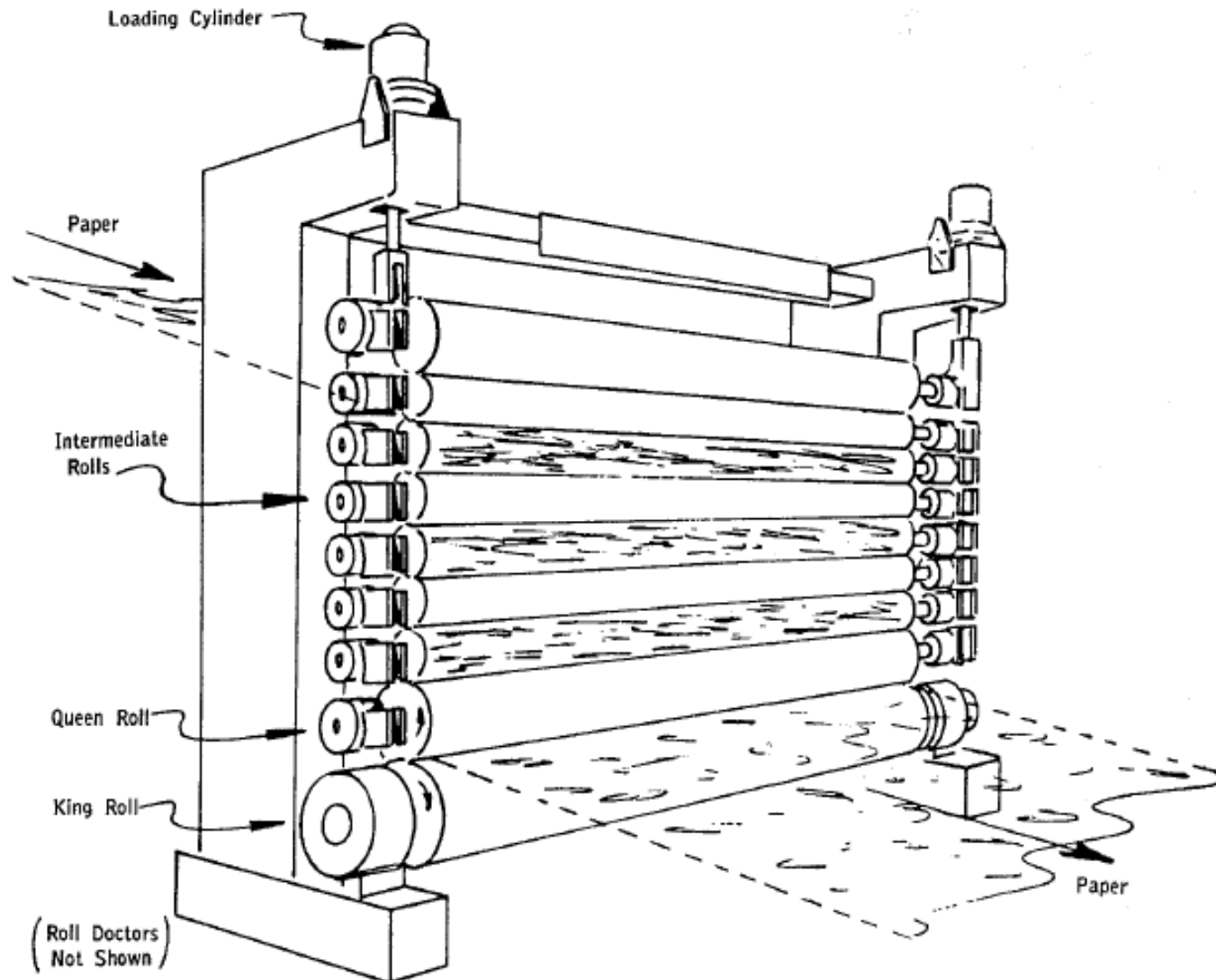


Fig. 9-59. Paper machine calender stack. Reprinted from *Making Pulp and Paper*, ©1967 Crown Zellerbach Corp., with permission.

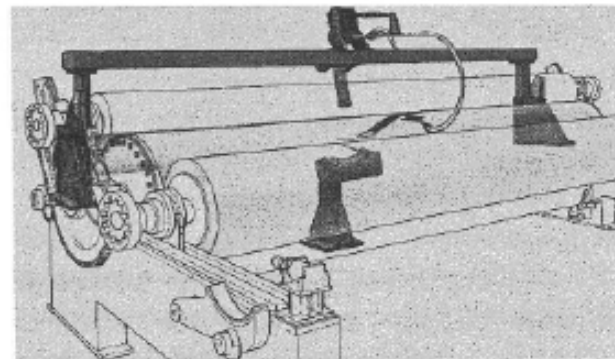
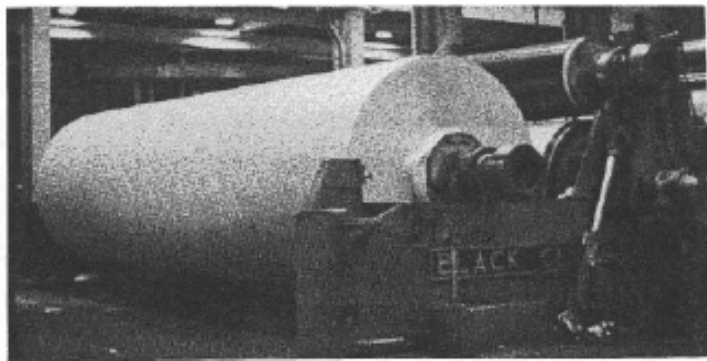
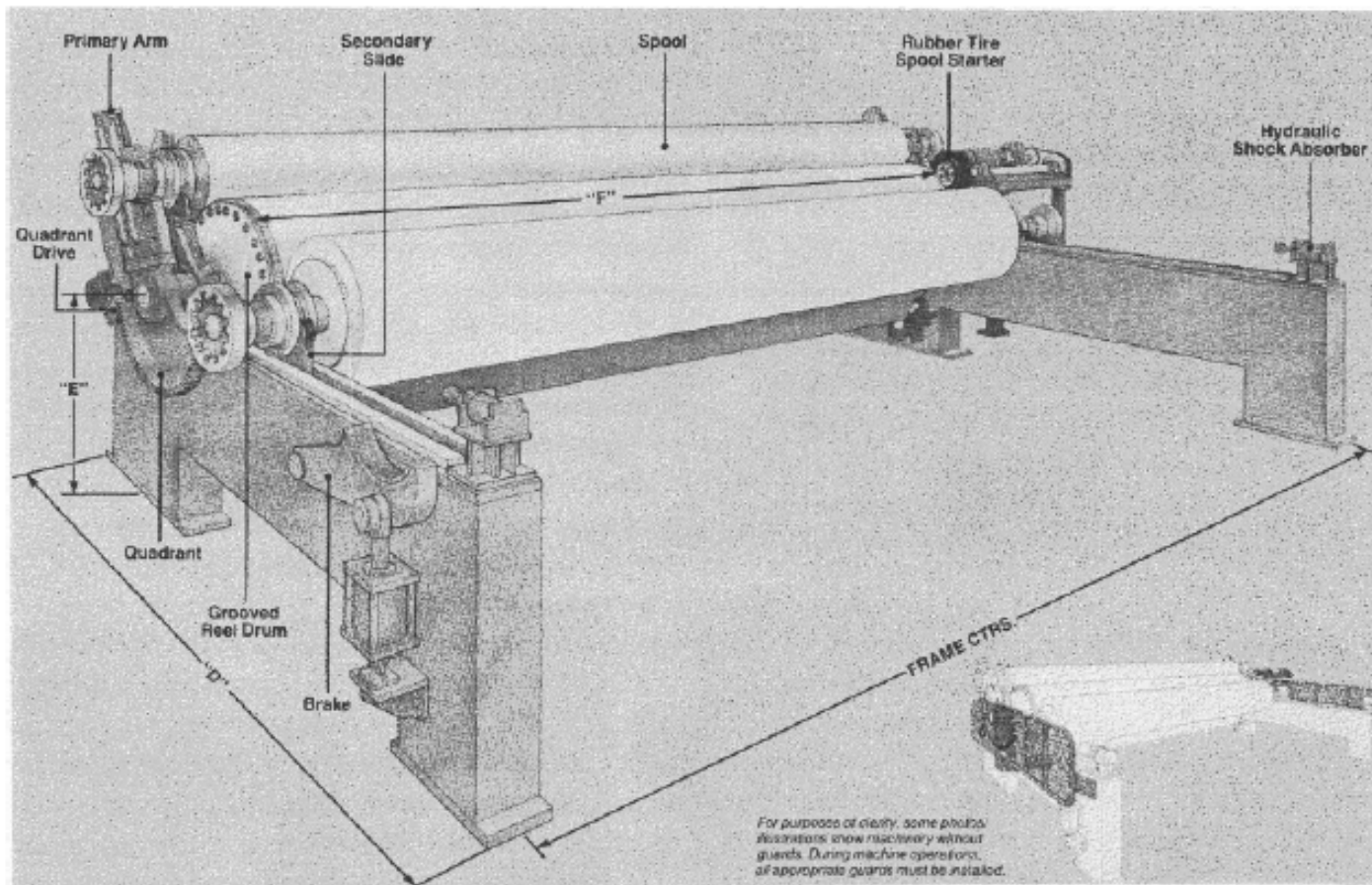
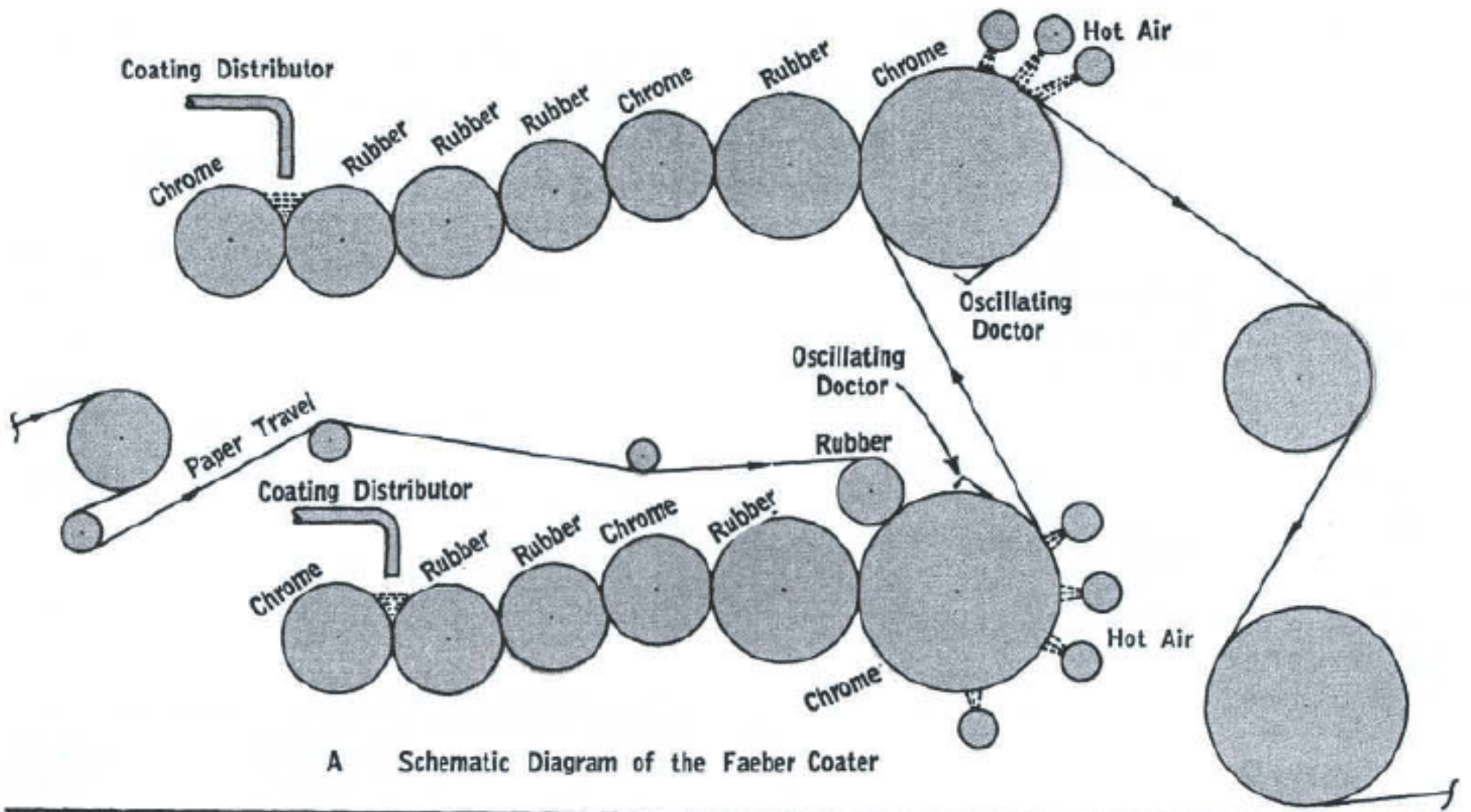


Fig. 9-63. Autoflyte reel. The gooseneck and cutter knife (lower right) are used for positive



A Schematic Diagram of the Faerber Coater