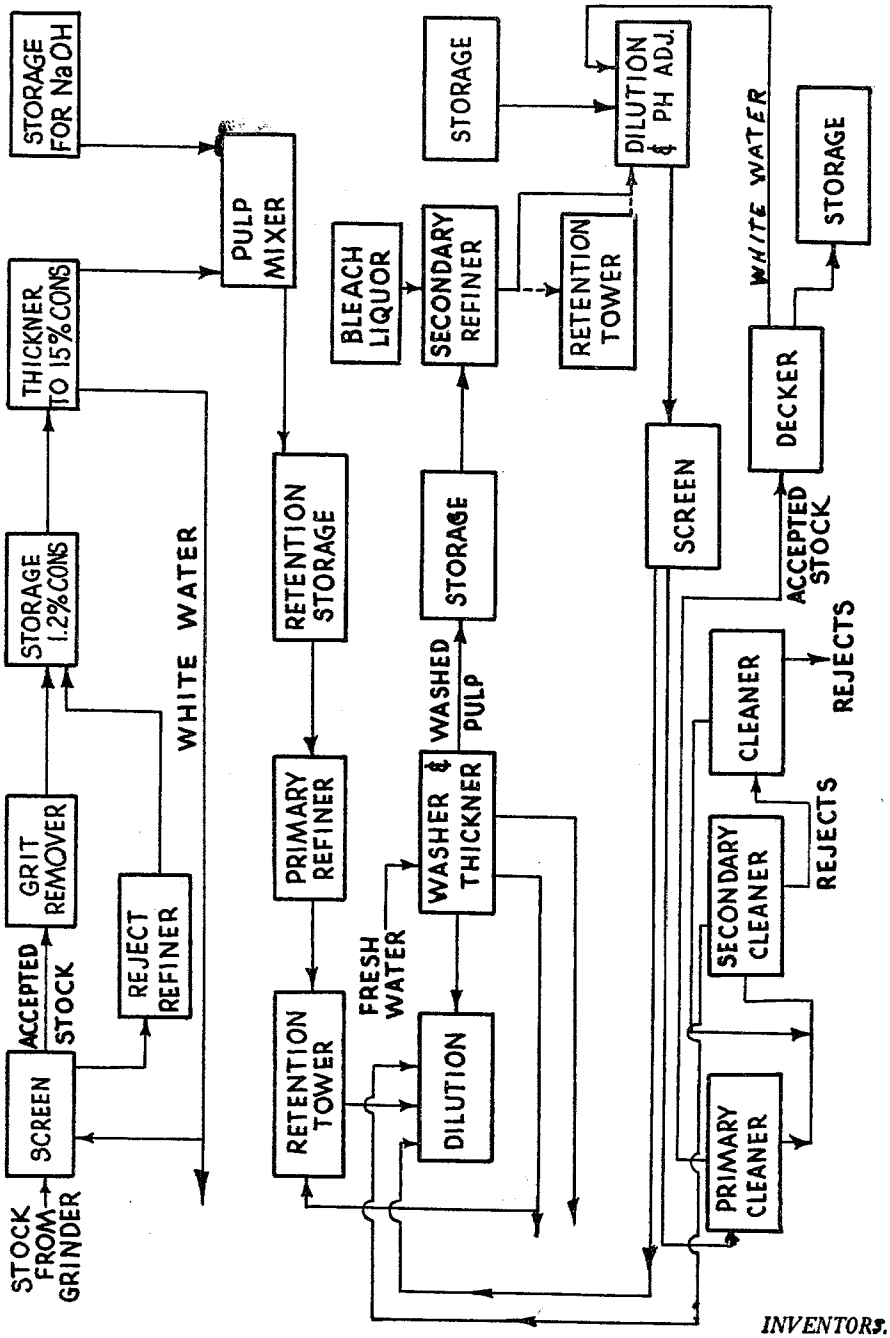
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GROUNDWOOD PULP

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GROUNDWOOD PULP

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The invention relates to treatment of wood for the formation of pulp. The invention relates more particularly to the production of a groundwood type pulp from hardwood. The invention relates to an alkaline treatment departing from the known methods in certain significant respects characterized by substantial economies.

Briefly, the process employs alkalies at atmospheric pressure, certain other conditions being appropriately controlled followed by a mechanical fiber separation to produce a superior groundwood type pulp. The process used in conjunction with already installed groundwood grinders can, with the addition of certain conventional additional facilities, triple the production of groundwood type pulp producible from the grinders.

For convenience of description the process may best be described in terms of the "cold soda" process developed by the U.S. Forest Products Laboratory at Madison, Wisconsin. The major stages in the cold soda process are (1) soaking chips in a solution of a swelling agent, sodium hydroxide, at atmospheric conditions or under moderate pressure and (2) fiberizing the softened chips in an attrition mill.

The power consumption in our process is materially less than that utilized in the familiar groundwood process. The brightness of the pulp has been found superior to conventional "cold soda" pulp.

We have found that the grinding of wood to produce a stock too coarse for the coarsest grade of paper and the chemical treatment of such coarse stock for a relatively short holding period of time and thereafter a two stage mechanical treatment with washing between stages will produce a superior pulp.

The process is especially suited to the treatment of hardwoods, for example, aspen. The aspen is reduced to coarse stock. This may be done with grinders of the type sometimes used in producing rigid fiber insulating board. The grinding should be controlled so that the coarse pulp will have a Canadian Standard freeness of between about 500 and about 750 cc.

The coarse stock to be used in this process is screened and the accepted stock from the screen passes over a riffler or through centrifugal cleaners to remove grit that may be in the stock. From the cleaners or rifflers the stock may be held at a low consistency before it is thickened to about 15% consistency. The pulp at this consistency is thoroughly mixed with about 3% to about 7% of caustic soda (NaOH) the amount depending upon the pulp characteristics desired as more caustic will increase strength but decrease opacity and vice versa. The NaOH treated stock is held for a short period of time (retention time about 4 to 30 minutes) before passing through a primary refiner. The pulp becomes heated as the result of the refining and this promotes the reaction of chemicals with the pulp. The warm stock from the primary refiner having a freeness of about 300 to about 400 Canadian Standard is passed to a reaction tower where it is held for about 20 to about 60 minutes. The stock from the reaction tower is diluted to about 3.5% consistency.

The diluted stock is then washed and the black liquor from the first stage of washing may be discharged into the reaction tower. The washed stock passes to suitable storage at a consistency of about 10% to 15%. From

this storage the stock passes to a secondary mechanical refiner. The pulp from the secondary refiner is diluted and the pH adjusted, for example, with H_2SO_3 to about 6. The pH adjusted stock is screened and the accepted stock passed through centrifugal cleaners. The cleaned pulp is now ready for storage.

Reference is made to the figure which is a flow diagram of the instant process graphically illustrating the stages through which the process proceeds.

The following is a table of comparative results:

	New Process 5½% NaOH—Aspen	Standard Groundwood Spruce
Brightness, G. E., Unbleached	55-62	58-66
Opacity	88-92	95-96
Bursting Strength	37-42	24-33
Wax Pick	11-12	5-7
Bulk (cc./gm.)	1.67-1.56	2.25-2.40
Tear Factor	.64-.75	.57-.70
Tensile Strength	36-40	20-26
Fold	113-141	14-50

If it is desired to bleach the pulp the bleach or chemicals may be added along with the stock fed to the secondary refiner, or it may be bleached with peroxides and/or hydrosulfites after the secondary refining stage by more common groundwood bleaching methods. The bleaching reaction is automatically speeded as the result of the pulp having become heated by the work done on it during the second refining stage.

The coarsely ground stock treated with caustic soda and defibrated, washed to reduce caustic contents and coloring matter, further mechanically refined to a freeness of about 100 to about 200 C.S., and diluted to about 4% consistency, and neutralized to pH of about 5.5 to about 6 with sulfur dioxide is thereafter screened and cleaned to produce pulp of superior strength. The pulp produced by this improved process at 140 to about 150 Canadian Standard freeness has substantially the same wire drainage rate as standard groundwood of about 75–85 C.S.

Some advantages of the process are:

(1) Superior strength pulp.
(2) Brighter pulp.
(3) Tripling the capacity of stone grinders with the addition of certain conventional facilities.

The pulp in the table under new process was mixed with about 5.5% of NaOH based on moist-free wood and was held for about five minutes before passing through the primary refiner, the refiner being double-disc mill. The warm stock from the primary refiner was held in the reaction tower for about 30 minutes. The amount per day produced by the new process was about three times that produced by standard production of groundwood pulp. Consistency as used herein is in terms of percentages of oven-dry pulp in water.

Having described the invention of producing improved groundwood type pulp it will be understood that the details are for illustration, not restriction.

What is claimed:

1. The method of producing wood pulp from hardwood which comprises stone grinding wood to a coarse pulp stock too coarse for the coarsest grade of paper and having a Canadian Standard freeness of about 500 to about 750 cc., mixing about 3% to about 7% of caustic soda with the stock in water, holding the stock with the caustic soda mixed therewith for a period not exceeding about 30 minutes and not less than about four minutes, disc refining the stock in the presence of caustic soda in water to about 300 to about 400 cc. Canadian Standard freeness storing the stock slurry from the mechanical refining for a period of about 20 minutes to about 60

minutes, then washing the stock with water and subjecting the washed stock to a second mechanical refining to provide a pulp of about 100 to about 200 cc. Canadian Standard freeness.

2. The method of producing wood pulp from hard wood which comprises stone grinding hardwood to pulp stock too coarse for the coarsest grade of paper, and having a Canadian Standard freeness of about 500 to 750 cc. adding to the coarse stock in a water suspension a caustic soda of about 3% to about 7%, holding the stock with a caustic soda mixed therewith for a period of about five minutes, then disc refining the stock in the presence of the caustic soda, to about 300 to about 400 cc. Canadian Standard freeness storing the mechanically refined stock for about 30 minutes thereafter washing the stock with water and then subjecting the washed stock to a second mechanical operation until a pulp having a freeness of about 100 to 200 cc. Canadian Standard freeness.

3. The method of producing wood pulp from hardwood which comprises mechanically separating wood by grinding to provide pulp stock too coarse for the coarsest grade of paper and having a Canadian Standard freeness of about 500 to about 750 cc.; adding to the coarse stock at a consistency of about 1.2% about 5% to about 6% caustic soda; holding the stock with the caustic soda mixed therewith for a period not exceeding 30 minutes; then mechanically refining the stock in the presence of the caustic soda to about 300 to about 400 cc. Canadian Standard freeness; storing the stock slurry from the mechanical refining for a period of about 20 to 30 minutes; thereafter washing the stock with water, and then subjecting the washed stock to a second mechanical operation until a pulp having about 100 to about 200 cc. Canadian Standard freeness is produced.

4. The method of producing wood pulp from hardwood comprising stone grinding of hardwood to pulp stock too coarse for the coarsest grade of paper, and having a Canadian Standard freeness of about 500 to about 750 cc. adding 5.5% of caustic soda to the ground stock having a consistency of about 15%, holding the stock slurry containing the caustic soda for about five minutes, then mechanically refining with disc grinders, storing the disc refined stock for about 30 minutes, thereafter washing the disc refined with water and refining the washed stock having a consistency of about 10% to 15% until a pulp having about 100 to about 200 cc. Canadian Standard freeness is produced.

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