Illustrated

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CREAMERIES IN TEXAS.

Agricultural and Mechanical College.

COLLEGE STATION, BRAZOS COUNTY,

TEXAS.

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Creameries for Texas.

In considering this subject the first question which naturally arises is :

Will it pay to attempt the manufacture of cheese, or shall we confine operations entirely to the making of butter?

We believe that for the present at least, and probably for some years to come, the manufacture of cheese will not be profitable in this State, and the belief is based on the following reasons :

First. The factories in the Southern States east of the Mississippi river, with the exception of a very few that were able to catch and hold a small demand for purely "fancy" cheese, have not proven successful.

Second. The manufacture of "whole" cheese (cheese made from whole milk) at the present relative prices and demand for milk, butter and cheese is out of the question. The only argument that can be used is that the skimmed milk can be made up into "skim" cheese. In meeting this argument it is only necessary to refer to any reliable wholesale house which supplies Southern grocery trade. The verdict is uniform that only first-class whole cheese, and not a large quantity at that can be sold to the Southern trade.

In view of these facts we can not at present advise the extra cost of a cheese equipment in connection with the butter factory. When the conditions shall have changed somewhat, as they doubtless will in time, it may be profitable to make cheese, and an addition may then be made to the Creamery building at a moderate cost, which will answer the purpose and save interest on investment.

BUTTER FACTORIES, OR CREAMERIES PROPER.

As compared with the average farm dairy, the Creamery system means a great saving of time and labor which is apt to fall upon the weaker portion of the household in making butter at home.

The question of time and labor required in the home dairy should be counted in the cost of butter product, and, when so counted, there will be found a much smaller net profit to the producer of home-made butter than is generally supposed. Concentration of purpose and combination of dairy supply, as in case of Creameries, allows the manufacture of butter at a less cost per pound and secures a double advantage by reason of making a more uniform and a better product, which commands a better price.

The fact that Creameries, if successfully developed, will create a demand for milk, and that this demand will stimulate the breeding of better cows, and must ultimately result in a more profitable system of farming generally is, in itself, a potent argument in favor of a full development of Creameries in Texas.

The advantage to any town and to its merchants is readily seen. In the cotton-growing country, especially, for a considerable portion of the year there is little or no money in circulation among farmers. Creameries, if successfully developed, will largely change this condition of things and keep money in circulation throughout the year.

Merchants can well afford to subscribe liberally for Creamery stock, knowing that the enterprise will add to the general prosperity of the town and bring increased custom on cash basis to themselves. Where Creameries in the South have been in successful operation for several years, leading merchants no not hesitate to say that they could afford to build a Creamery every three years rather than lose the increased business and prosperity which the Creamery has brought to their doors.

As a financial investment small dividends should be expected for the first year or two. It will take some time to develop confidence and secure a supply of milk large enough to be handled with profit, and those who invest in Creameries in Texas should do so with a determination to stand their ground until this trying period is successfully passed.

Admitting the value of Creameries to the whole country, it is only necessary to consider :

First. The plan of organization and control, and

Second. The different systems of creaming, with a view to selecting that most economical and best adapted to our climate and conditions.

PLANS OF ORGANIZATION AND CONTROL.

There are three main plans of organization and control: Co-operation in full, co-operation in part, and purely private or corporate enterprises.

FIRST PLAN—CO-OPERATION IN FULL.

Those who have milk to furnish combine capital and erect a Creamery plant to make up their product. The profits go entirely to the farmers who are not only patrons of the Creamery but financially interested in its welfare. In other words, the capital stock necessary to erect the plant is taken by the men who will furnish the milk or cream. The co-operative plan for Creameries is no experiment in the South. It has been tried and found successful in the Southern States east of the Mississippi river, and there is no reason why it should not prove successful here.

SECOND PLAN—CO-OPERATION IN PART.

Next to co-operation in full, and sometimes necessary when farmers will not venture to invest any cash in the plant, this second plan will give the largest share of profits to the patrons of the Creamery.

The surrounding country should be thoroughly canvassed with a view to forming at least an approximate estimate of the amount of milk to be furnished the first year. This point cannot be urged too strongly. It is a great mistake to establish a Creamery without a fairly close knowledge on the part of the projectors of the enterprise of the present actual and future probable dairy resources of of the community.

The capital may be furnished by any responsible man or company who will construct and own the building and equipment, receive milk (or cream) from the patrons, make it into butter, sell it to best possible advantage and divide the net proceeds among their customers according to amount and quality of milk or cream furnished by each. In this case the owners of the Creamery will deduct as their share of the profits a certain fixed amount for each pound of butter made. This amount, which is in the nature of "toll" should be agreed upon beforehand, and should be large enough to cover the actual cost of operating, including wages of man in charge, wear and tear of machinery, and a fair interest on investment.

Or, stated in another way, out of the gross earnings of the Creamery must come :

First. A fair interest on investment to the owners.

Second. Running expenses, including wages of man and wear and tear on entire plant.

Third. The balance to be divided among the patrons in proportion to quantity and quality of milk (or cream) furnished by each.

The patrons and owners of the plant will be equally concerned to secure as man in charge one who is thoroughly competent and reliable.

In operating such Creameries it may be found advisable to relieve the butter-maker of all outside business by having books kept and sales made by some reliable clerk or business man who will attend to all details of shipping and correspondence at a moderate charge. To explain this point more fully it may be said that good business ability and knowledge of books and accounts may not always be found combined with skill in butter-making in the same individual. When such a combination of qualities is found in one man it takes, as a rule, more salary to secure his services than a newly-started Creamery can afford to pay. In such cases there is nearly always some one to be found who can spare an hour or two each day from his own work to devote to the Creamery accounts and business, and can afford to do so at a modest charge for his services.

THIRD PLAN—PRIVATE OR CORPORATE ENTERPRISE.

Under this plan the entire plant is built, equipped and operated by an individual or company, and milk or cream is bought outright for the Creamery at prices supposed to be regulated by market price of butter.

In well established dairy localities this plan will operate successfully, but in a new country where the dairy interests have been neglected it is found that patrons are more or less suspicious of capital invested in this way and do not readily submit to reduction in price of milk or cream made necessary by depression in the butter market. If the proprietors are men well and favorably known in the community there is less trouble in this respect, but it has been found advisable to introduce the co-operative feature, at least in part, whenever possible to do so.

DIFFERENT SYSTEMS OF OPERATING CREAMERIES.

There are three main systems in vogue at present.

FIRST SYSTEM.

The milk is brought direct to the Creamery, once or twice daily, at prices fixed by the company, is there set—usually in deep cans—in a pool of cold water, skimmed, the cream churned and the skimmed milk and butter milk taken back by the patrons—each taking an amount proportionate to the quantity of whole milk furnished by himself.

This system is only profitable where ice is abundant and cheap, or cold spring or well water readily accessible. With our climate and conditions this system would certainly be a failure.

SECOND SYSTEM.

The milk is set at home, in cans furnished by the Creamery, and the cream is bought at a certain price per standard inch (supposed to make a pound of butter) and is skimmed and hauled to the Creamery by one of the Creamery men.

This system is far better than the first, and under proper conditions may be made successful. There are however,

MANY DIFFICULTIES IN THE WAY OF SETTING MILK FOR CREAM IN THE SOUTH.

A few of which may be mentioned :

(a.) Few farmers are prepared to handle the milk properly without ice, and ice is out of the question.

(b.) Where springs of cold water or very cold wells can be had the above objection would be overcome in part or wholly, but springs or wells of cold water are found on comparatively few farms in the State. The average temperature of well water in the Western States during summer is not above 50 or 55 degrees Fahr., while the average temperature of well water in this latitude will not fall below 60 or 65, and more commonly approaches 70 degrees.

(c.) Sub-earth or outdoor cellars will help, but require an investment from each farmer individually which will materially lessen his profits. A mere earth box with double walls and top, which is so effective in higher latitudes is here of little use, for the reason

that our long continued summer heat gives a much higher temperature of the ground within digging distance of the surface at all times than is noted under similar circumstances farther North.

(d.) It is practically impossible to secure uniform results among patrons as to care of and cleaning cans. Milk vessels require the most scrupulous nicety in cleaning, and it is a very difficult and delicate matter to exact this nicety of our patrons who have to contend with the unfavorable conditions noted.

(e.) There is a great difference in the value of equal measures of cream, depending on the food, the animal, the length of time after calving, weather, the length of time the milk is set before skimming, etc., so that, to do justice to all, the cream should be tested and prices made in accordance.

(f.) As a result of the difficulties noted the cream may not all be secured from the milk, and the patrons may thus incur an actual loss of more or less moment.

The system has proven a grand success in the Western States, and we shall watch the experiment here with interest, hoping that it may prove successful.

This much must be stated, however: That the failure of one creamery, no matter what system is followed, will greatly retard the development of our dairy interests. Care should be exercised, therefore, that investment and expense be kept at the lowest possible limit consistent with efficiency, and that all energies be bent towards making the experiment a success.

THIRD SYSTEM.

This system involves the use of the centrifugal cream separator, and has been thoroughly tested in the South and found satisfactory.

The use of the centrifugal does away with all trouble and expense incident to setting milk for cream; avoids all necessity for cellars, cold water, or ice, except for churning and storage; gets all the cream regardless of weather, and makes a uniform butter product by reason of more uniform conditions than are possible under any other system. In short, the centrifugal separator has done and is now doing successfully for the South what the natural dairy advantages of climate, feed and cows have always done for the North.

The centrifugal system can be used under any one of the three plans of organization and control, and is especially adapted to the

co-operative plan in combination with invested capital, as described under plan No. 2.

To those who are not familiar with centrifugal separators we may say briefly that separation of cream from the milk is effected on the principle of difference in specific gravity as influenced by centrifugal force. The machine takes up little space, is strong, durable, simple in construction, and when set up can be operated by any one possessed of ordinary skill and intelligence.

There are three different makes of centrifugal separators now in operation in this country: The Danish-Weston, the De Laval, and the Backstrom. Of the three the De Laval and the Backstrom have given the most general satisfaction. All work on the same principle, whatever difference there is being due to different ways of accomplishing the same thing.

PRICES OF CENTRIFUGAL SEPARATORS COMPLETE.

De Laval Power Separator,				capacity	600 to 700	lbs.	of milk	per hour	$290 00
"	"	"	"		1200 to 1300	lbs.	"	"	350 00
"	Steam Turbine		"		1200 to 1300	"	"	"	425 00
"	Hand (horizontal)		"		350 to 400	"	"	"	200 00
"	" (vertical)		"		250 to 300	"	"	"	150 00
Backstrom Power Separator,				capacity	600 to 700	lbs.	of milk	per hour	195 00
"	"	"	"		1200 to 1300	"	"	"	325 00
"	Hand		"		200 to 300	"	"	"	85 00
Danish-Weston Power Separator,				capacity	600 to 700	lbs.	milk	per hour	250 00
"	"	"	"		900 to 1000	"	"		325 00
"	"	"	"		1200 to 1300	"	"		350 00

All the above are catalogue prices and a very small discount is allowed. The "intermediate" and fixtures necessary to the operation of each machine are included in the prices named. Duplicates of parts most liable to wear should be secured at time of purchase and always kept on hand to prevent loss of time when any part is broken or worn out. Full instructions are always sent out with each machine purchased, which enables any one of ordinary intelligence to have it properly set up. If desired a man will be sent to place the machine in shape for running and give such instruction as may be desired concerning its operation; expenses to be paid of course by the parties benefitted.

The advantages of the centrifugal may be stated as follows:

(a.) It has been found by repeated tests that by centrifugal separation of cream from 2 to 6 per cent. more butter is obtained than from any other method of obtaining cream.

(b.) The testimony of practical dairymen who have adopted the centrifugal system is that this increased amount of butter obtained

by using the centrifugal has, in some cases, paid for the machine in a single year.

(c.) The advantage of the centrifugal is shown most clearly during the fall and winter, when a majority of the cows are near the drying-off period. At such times set milk is liable to be "heavy," as it is called—that is, there is so little difference between the specific gravity of milk and cream that the latter rises imperfectly, and it is frequently impossible to see any line of demarkation between them. When milk of this character is run through a separator the centrifugal force is sufficient to compel a perfect separation and thus secure all the cream regardless of conditions.

(d.) The sweet skimmed milk can be returned immediately to patrons for such use as desired.

(e.) As previously noted, it avoids all necessity for cellars, cold water, or ice, except for churning and storage.

(f.) It saves the labor of cleaning a large number of small gauge cans in which milk has been set for cream.

(g.) The use of the cream separator is not an experiment in the South, and not only has it proven successful in creamery work, but the smaller size hand-separators have been very largely adopted by private dairymen for creaming the milk from their own herds.

In starting Creameries on this plan one centrifugal separator, ordinary power size, at the main factory can cream 650 to 700 pounds of milk per hour; run four hours morning and four hours evening it will handle 4,500 to 5,000 pounds (562½ to 625 gallons) daily.

A gallon of milk is counted 8 pounds and the number of pounds of milk required to make a pound of butter varies from about 26 to as low as 16 pounds. A fair average with ordinary cows during the grass season would be a pound of butter to 23 or 24 pounds of milk. If cows are well fed the quality af milk improves.

Taking this estimate 5,000 pounds of milk should produce at least 200 pounds of butter.

If it is found desirable to run the separator a less number of hours daily it may be found necessary to use two machines, in which case the same amount of milk (5,000 pounds) could be creamed by running not over two hours in the morning and two hours in the evening. It will not be advisable to haul milk farther than five miles on account of bad roads or heat at different seasons of the year, and arrangements can be made for one man to haul the milk for all patrons living along the same road.

As soon as the dairy interests have been sufficiently developed it will be found profitable for each patron whose herd numbers 25 or more fairly good cows to purchase a hand separator and furnish his cream only to the main factory.

In this way the scope of the Creamery can be enlarged, gathering from an extended territory, and instead of increasing the capacity of the main plant for creaming, the cream can be received and the churn capacity enlarged.

Cream thus separated by hand machines can be carried long distances while fresh without damage, and in this way the cream gathering system may be utilized to the best possible advantage.

To sum up briefly: The system which gives the largest net returns to all concerned is the one to adopt, and that, other things being equal, must be found in the system which, at a moderate cost, separates the cream most perfectly, saves most labor, and is least affected by changes of temperature, food or conditions.

PRICES OF CREAMERY BUTTER.

The price of creamery butter, like other commodities, is regulated by the quality of the article, amount of competition and reputation of the Creamery producing it.

Under certain conditions, where a strong and appreciative local market is to be supplied, it is not unreasonable to expect a gross price per pound of 40 or even 50 cents, but when placed on the market in any quantity, not over 30 or 35 cents per pound should be expected.

It must be remembered that the development of Creameries in Texas will probably open the way for an influx of creamery butter from the Western States. This will come in legitimate competition with our home creamery product, and while it will certainly tend to a larger consumption of, and hence demand for, good butter, it may also tend to reduce the market price.

COST PER POUND OF MAKING CREAMERY BUTTER.

The actual cost per pound of manufacture, not counting interest on investment, will vary from 4 to 10 cents, and will depend upon the amount of milk furnished by patrons. Thus, if an amount of

milk sufficient to make 100 pounds of butter a day is furnished to a Creamery equipped with machinery and working force to handle 200 pounds daily the cost per pound will be exactly double what it would be if run up to its full capacity. This is another strong point in favor of co-operation—all will be interested to secure as nearly as possible the full amount of milk which the Creamery can handle.

The actual cost of manufacture under average conditions should not exceed 5 or 6 cents per pound exclusive of interest on investment, and here will be seen the effect of a large or small investment on the ultimate failure or success of a Creamery plant.

An investment of $5,000 means an annual interest at 10 per cent. of $500. If the Creamery makes 50,000 pounds of butter annually the investment alone adds 1 cent per pound to the cost of manufacture. Lessen the investment to $2,500 and, while appearances may be sacrificed somewhat, the Creamery will make just as much butter of just as good quality, and the investment adds but ½ a cent per pound to the cost of manufacture.

We have already mentioned the great advantages of Creameries to merchants and towns generally by reason of keeping money in circulation during that portion of the year when money is scarce, and this fact may in some measure excuse a too lavish investment by subscription on the part of merchants. Under present prices for labor and material there is no necessity for an investment of more than $2,500, or at the outside $3,000, in a Creamery plant, and whatever is added to this amount may be set down as in no wise adding to its efficiency.

In earnest of this we submit the following plans and specifications in full for a Creamery with a capacity of 200 to 250 pounds of butter daily.

Experience in operating the Creameries in the Gulf States indicates the necessity of modifying the plants which have been found desirable in a higher latitude.

The plan we present of Creamery with machinery is similar to that which has been in operation since June, 1888, at the A. & M. College, with such modification as it is believed will add to its efficiency without increasing the cost.

The plans presented are further based upon a careful study of Creameries in successful operation in other Southern States.

With one separator this outfit will make 200 to 250 pounds of butter per day; with two separators and larger churns 400 to 500

pounds, while by increasing the size of separators and churns the capacity may be increased to 800 or 1000 pounds before it will be necessary to enlarge the building and the power.

An itemized bill of lumber and other material is given, with drawings showing location of machinery and specifications explaining method of construction and approximate cost.

EXPLANATION OF CUTS.

FIGURE C. Ground plan main part 20 feet by 40 feet, shed-room 10 feet by 30 feet, front of shed office 8 feet by 10 feet.

DD. Doors.

W.W. Windows.

P.P. Piers.

S. S. Shaft showing pulleys to belt to churn and intermediate pulleys in shed room to belt, to engine and pump.

Sp. Separator.

Bottom of wash tank should be a little higher than bottom of drain.

FIG. A. Section through center showing separator (Sp.) intermediate pulley, churn pulley, on main shaft with belts to churn and intermediate pulley. Water tank supported by studding and braces over door leading to shed room.

At the rear is shown cool room with steps leading down, foundation wall, window above and ventilator window below.

Receiving platform (E) is shown in front, outside, weighing can stands on platform (F) inside.

Milk is drawn from weighing can into milk heater or to separator.

FIG. B. Shows back end of building looking from the rear. Siding is out to show ventilator shaft (T) and cross ties in roof.

FIG. D. Shows front with double sliding doors on platform, and swing doors into work room and office (D.D.D).

LUMBER AND MATERIAL.

BRICKWORK.

	Estimated Cost.
7 M. brick (standard size)	$ 63 00
7 cubic yards clean, sharp sand	6 00
5 bbls. quick lime	6 25
2 " good hydraulic cement	8 00

WOODWORK BUILDING.

		Lumber—Feet.
3 pcs. 6 x 6 in. x 12 ft. 3 " 6 x 6 " x 14 " 1 " 6 x 6 " x 20 "	Sills for work room	294
2 " 4 x 4 " x 20 " 2 " 4 x 4 " x 16 "	Sills for cool room	97
3 " 4 x 4 " x 20 "	—Sills for shed	80
18 " 2 x 10 " x 20 "	—Joists for work room	600
1 " 2 x 10 " x 20 "	—Bottom of drain	33
3 " 2 x 8 " x 12 "	—Stringers for platform	48
7 " 2 x 6 " x 12 "	—Joists " "	84
2 " 2 x 6 " x 14 "	—Brace supports " outside.	28
1 " 4 x 4 " x 16 "	—Post " " inside..	21
60 " 2 x 4 " x 14 "	—Studding main part	560
6 " 4 x 4 " x 16 "	—Corner posts, main part	112
10 " 2 x 4 " x 18 "	—Studding for shed	120
2 " 4 x 4 " x 18 "	—Corner posts for shed	47
30 " 2 x 4 " x 20 "	—Plates and joists	400
45 " 2 x 4 " x 14 "	—Rafters, main part	420
24 " 2 x 14 " x 12 "	— " shed	192
8 " 2 x 10 " x 16 "	—Steps, cut to fit	214
3 " 2 x 10 " x 12 "	—Risers for steps	80
15 " 2 x 8 " x 16 "	—Joists over cool room	320
2 " 1 x 6 " x 20 "	— " supports, cool room	20
6 " 2 x 6 " x 20 "	—Rafter ties	120
10 " 1 x 6 " x 16 "	— " " over cool room	80
6 " 1 x 6 " x 16 "	—(to cut) Rafter collar ties	48
4 " 1 x 6 " x 14 "	—Facia boards, ends main part	28
2 " 1 x 6 " x 12 "	— " " " shed	12
9 " 1 x 6 " x 16 "	— " "	72
135 " 1 x 12 " x 14 "	—Siding, main part	1890
135 " 1 x 3 " x 14 "	—Battens "	470
20 " 1 x 12 " x 18 "	—Siding, shed (to cut)	360
20 " 1 x 12 " x 12 "	— " " ends	240
20 " 1 x 3 " x 18 "	—Battens " (to cut)	90
20 " 1 x 3 " x 12 "	— " " ends	60
2 " 2 x 12 " x 20 "	—Hanger supports	80
4 " 2 x 6 " x 12 "	—Brace "	48
68 " 1¼ x 6 " x 18 "	—Matched and dressed flooring for main part	765

	Lumber—Feet.	Est. Cost.
26 pcs. 1 x 6 in. x 12 ft.—Matched and dressed flooring for platform	156	
42 " 1 x 6 " x 20 " —Matched and dressed flooring over cool room	420	
1 x 6 " x —Matched and dressed ceiling for cool room	1300	
12 " 1 x 6 " x 14 " —Matched and dressed flooring for doors	84	
14 " 1 x 6 " x 12 " —Matched and dressed flooring for doors	84	
1 x 3 " x —Sheeting, roof	770	

OFFICE.

12 pcs. 1 x 12 in. x 12 ft. partition	120	
10 " 1 x 3 " x 12 " battens	30	
3 " 2 x 6 " x 20 " joists	60	
13 " 1 x 6 " x 16 " matched and dressed flooring	104	
Total lumber for building 12,342 ft. at $19.00		$234 50
16 M. shingles, to be laid 5 in to weather		64 00
280 sq. yards building felt for cool room and refrigerator		16 00

WATER TANK.

See section of tank, last plate, and location in building, Fig. A. Size 2x2x8 ft. inside.

2 pcs. 2 x 14 in. x 18 ft.—Sides	42	
1 " 2 x 12 " x 18 " —Bottom	36	
1 " 2 x 14 " x 8 " —Ends	19	
1 " 2 x 4 " x 16 " —Cross pieces	11—	2 00
6 bolts ⅝ x 33 in., iron		1 00
6 " ⅝ x 29 " "		90
24 washers, ⅝ in., "		25

WASH TANK.

Size 12 in. deep, 2 x 4 ft. inside.

1 pc. 2 x 15 in. x 16 ft.—Sides and ends	40	
1 " 2 x 12 " x 9 " —Bottom	18—	1 00
5 bolts ⅝ x 29 in., iron		75
10 washers ⅝ " "		10

REFRIGERATOR.

See plate.

66 pcs. 1 x 6 in. x 18 ft., (to cut) matched and dressed flooring	594	
3 " 2 x 4 " x 18 " —Shelving and ice box	96—	13 00
Zinc for bottom of ice box		3 00

FRAME TO SUPPORT CHURNS.

2 pcs. 4 x 6 in. x 16 ft	64	
1 " 2 x 6 " x 16 "	16	
1 " 2 x 4 in. x 16 "	11—	1 75

WINDOWS AND FRAMES.

	Estimated Cost.
4 window sash, double, 12 lights, 10 x 16 in.	10 00
4 frames for same	8 00
6 window sash, 6 lights, 10 x 16 in.	7 50
3 frames, single sash (2 sash placed one before the other)	3 00
3 window sash, 3 lights (ventilators)	3 00
3 frames for same	3 75

DOOR FIXTURES.

4 pairs 4 in. roller hangers	3 00
25 feet roller track	1 25
6 pairs 9 in. strap hinges	2 25
3 " 6 x 12 in. T hinges	90

NAILS.

50 lbs. 4d shingle nails	2 00
50 " 8d common	2 00
50 " 10d finishing nails	2 50
25 " 10d common	1 00
25 " 20d spikes	1 00

CREAMERY MACHINERY.

1 8-horse power boiler and 6-horse power engine, complete	$ 450 00
20 feet 1 11-16 in. shafting, two pieces with coupling fitted	20 00
2 1 11-16 in. collars	2 40
5 adjustable drop-hangers, 14 x 1 11-16 in.	32 50
1 pulley, 28 in. diameter, 4 in. crown face, for separator	7 80
2 " 5 " " 8 " flat face, for churns	6 00
1 " diameter to give shaft 125 revolutions per minute, 6 in. crown face, to belt to engine	6 00
1 pulley, 7 in. diameter, 6 in. crown face, for pump	3 00
1 pump, suction and force, tight and loose pulleys 18 in	30 00
All pulleys bored to fit 1 11-16 in. shaft, and fitted with set screws.	
1 250 gal. revolving box churn, 14 in., tight and loose, pulleys	40 00
1 150 " " " 14 " " " " "	32 00
1 Eureka or Lever, factory size, butter worker	15 00
1 DeLaval or Backstrom power separator, with intermediate and feed regulator	300 00
1 80-gallon weighing can, with gate	12 00
1 milk heater, 100 gallons	30 00
1 800 lb. 5 beam platform scale	50 00
1 400 lb. single beam platform scale	17 00
1 Union scale	10 00
6 30-gallon cans at $6.75 each	41 00
1 1-gallon dipper	50
2 ½-gallon dippers	80

	Estimated Cost.
6 14-quart iron clad pails at 75c each	4 50
1 butter spade, long	50
2 butter ladles, curved	50
2 " " straight	50
1 " tamper	25
2 nickle plate dairy thermometers	80
4 floating glass "	2 40
1 cream strainer, creamery size	2 25
2 butter trays, Nos. 1 and 2	7 00
2 rubber mops	1 50
½ dozen extra rubbers for mops	3 00
½ " scrubbing brushes	1 00
1 curd scoop	1 00
1 flat side curd pail	1 50
Pipe, valves and fittings	25 00
Chair and desk for office	10 00
Tin lined tank, 2 x 2 x 4 feet, for skimmed milk and butter milk	10 00
30 feet 3-inch leather belt, for pump, at 33c	9 90
21 " 3½-inch leather belt, for separator, at 39c	8 29
30 " 4-inch leather belt, for churns, at 45c	13 50
25 " 6-inch leather belt, for engine	17 25
100 " ¼-inch cut lacing	1 00
25 10-gallon shipping cans, for patrons	75 00

SUMMARY—MATERIAL.

Lumber, 12,342 feet at $19.00 per M		$234 50
16 M. shingles, pt $4.00 per M		64 00
Building paper, 280 square yards		16 00
Windows, 13 (different sizes)		20 50
Frames, for same, including lumber and labor		14 75
Hardware, (exclusive of machinery) heaters, pipes, valves, desk, milk tank, etc		100 00
Brick, 7 M standard size		63 00
Sand, 7 cubic yards		6 00
Cement, 2 barrels		8 00
Quicklime, 5 barrels		6 25
Creamery machinery		1,302 64
Making refrigerator	15 00	
Making wash tank and water tank	10 00	

LABOR.

	Estimated Cost.
Making excavation for piers and cool room	$ 12 00
Brick and cement work, entire, including floor of cool room	60 00
Carpenter work on building, entireg, includin hangers, shaft and churn supports	185 00

	Estimated Cost.	
Work of tinner and machinist making ice box in refrigerator, and steam and water connections in full, ready for operation	25 00—	307 00
Total estimated cost, exclusive of water supply (which can be easily estimated for any locality)		$2,140 64
Allow for extras, mishaps and changes which may be made		59 36
Making a total cost, at outside limit of		$2,200 00

For the entire plant equipped and ready for work.

To the above total add $50.00 for two coats of paint, if thought best to paint the building.

SPECIFICATIONS.

FOUNDATION.

Back part of building (cool room) to have sub-cellar extending full width of building, 16 feet lengthwise of building, with 9-inch brick wall, four sides, carried down 4 feet below level of floor of work room. First course two bricks in width, second course one and one-half brick, and wall above one brick in width. Floor of cool room to be covered with one course of brick, laid on one inch of sand level with second course of brick in the wall, and to be grouted with cement mortar and floated smooth.

Front part of building (work room) to rest on brick piers, as shown in Figs. A. and C., piers 9 inches by 18 inches, carried one foot below ground surface with the usual footing.

Shed room to rest on brick piers 9 inches by 9 inches similar to the other piers or upon durable blocks set in the ground.

SILLS.

Sills of work room, as shown in ground plan, to be 6 inches by 6 inches, if made of two pieces to have lap splices, halved together at corners, bottom of sill to be 6 inches above surface of ground, ends next to cool room to be bedded into wall of cool room, as shown in sectional drawing.

Sills of cool room 4 inches by 4 inches bedded in cement on the wall, upper surface level with top of back joist in cool room.

Sill of shed room 4 inches by 4 inches halved together on out-

side corners, ends towards main part carried into wall and pier not less than four inches for support.

Cool room sill and wall to make tight joint, room to be ceiled all around with matched and dressed 3-4 inch or 1 inch seasoned ceiling. Joist above, studding on four sides of room and door to have building felt (not tarred felt as odor of tar would affect milk) tacked on outside and inside of joists, studding and door frame so there shall be a complete double covering of felting entirely around the cool room except the brick wall and windows, and felt must be put on so that there shall be no openings at any joint; all corners windows and door frames must be thoroughly connected with the wall to exclude passage of air.

WINDOWS.

Windows in work room, office and shed room to have 10 inch by 16 inch panes, twelve lights each. Windows in cool room to have same size lights and sash, but sash are set double in frame size of single sash and fitted snug with air space between.

Ventilator windows single sash hung from above on hinges and a wire gauze screen in frame set in outside of sash.

Ventilating shaft 12 inches square to extend from ceiling up through roof of building not less than eight feet, with cap, as shown in drawing.

JOISTS.

Joists of floor in work room to be 2 inches by 10 inches by 20 feet, 18 inches centers, cut out from under edge to give floor fall of two inches from front of building to drain, one inch from above sill of cool room to drain, level crosswise of building.

Joists forming two sides of the drain to be of heart timber free from knots, inside and upper edge surfaced and well spiked to plank forming bottom of drain, the latter to have upper side and bottom edges surfaced also to be of heart timber, the bottom half inch above sill at outlet, the sides and bottom to extend at least three inches beyond siding of building and have two and a half inches fall from wash tank to opposide side of building.

Joists over cool room 2 inches by 8 inches, 18 inches center, to run lengthwise with building, back end supported on a 1 inch by 6 inch piece set up edgewise and let into studding three-fourths of an inch and well nailed to same.

Studding 2 inches by 4 inches toenailed, corner posts 4 inches

by 4 inches, mortised into sills, studding doubled at windows and doors, plates 2 inches by 4 inches, corners halved together, spiked on top of posts and studs, two girt strips of 2 inch by 4 inch to be carried around wall of main part flush with studding, equal distances between sills, girts and plate, to nail siding to strips, to be firmly toenailed to studding *Fig. A. shows but one girt half way between sill and plate, where there should be two, each one-third distance from sill and plate.*]

Studding in front of cool room to have 2 inch by 4 inch plate, on which joists over cool room rest.

ROOF.

To be shingled and braced as shown in plan, cross ties of 2 inch by 6 inch by 20 feet to run from plate to plate spiked to every other pair of rafters and toenailed to plates, supported in middle, with strips nailed to rafters; 1 inch by 6 inches by 8 feet collars to be nailed to alternate rafters; hanger supports of 2 inches by 12 inches by 20 feet to be firmly supported at ends by the studding, bridged by solid pieces between, every three feet, cross braced to plates front and back to prevent swaying and supported by truss framing at center to prevent sagging.

DOORS AND WINDOWS.

As shown in plan, doors on platform double, hung on rollers inside, door between work and shed rooms and between work room and office single, also hung on rollers, doors to be made of two thicknesses of 1 inch matched and dressed flooring nailed together at right angles. Door to cool room to be made of two thicknesses of 1 inch matched and dressed flooring running horizontally and nailed to vertical 2 inch by 4 inch strips, with beveled edge to fit beveled jam to exclude air, hung as shown in drawing with three 9 inch hinges.

Shed room doors to be simply battened doors of same material as sheeting of shed and hung with two 9 inch strap hinges; work room front door three 6 x 12 T hinges, office door, two 4 inch butts.

Floor of work room of extra seasoned clear heart 1 1-4 inch flooring matched and dressed to be put down in dry weather after sunning and well driven up, nailed with 10 penny finishing nails in every joist; floor above cool room 1 inch matched and dressed flooring.

MACHINERY.

One De Laval or Backstrom power separator, two rectangular churns, one butter worker, one boiler and engine; the separator to rest on 4 inch by 4 inch pieces bedded solid on brick pier built up from ground as shown in plan (pier large enough for two separators), churns to be supported on 4 inch by 6 inch posts, iron boxes bolted to posts as shown in drawing; engine and boiler to stand in shed room, pulley belted to pulley on shaft running across work room; pump to be connected with water tank and steam pipe with connections to boiler to heat water in wash tank and separate pipe with stop-cock to heat water, scald cans, etc ; steam pipes also to heat coils in cool room and work room.

Shaft to be supported by five hangers firmly bolted to hanger supports shown in plan.

FINISH.

Building to be covered with either rough or dressed lumber painted or not to suit wishes of owner. [The estimates are for dressed.]

STEAM CONNECTIONS.

Pipe to water tank to warm water if necessary.

Pipe to wash tank to heat wash water.

Pipe to milk heater.

Pipe to extend down to two and a half feet from floor in work room near wash tank and drain for scalding cans, or by attaching hose to scald churn. All half inch pipe, globe valve to each pipe.

Three-quarter inch pipe to steam radiators with globe valves.

WATER CONNECTIONS.

One inch or 1 1-4 inch pipe from pump to water tank.

Three-quarter inch pipe from water tank to wash tank.

Half inch pipe from water tank to inspirator on boiler.

Short 3-4 inch pipe from water tank to attach hose to carry water to churns and wash floor.

One inch pipe from water tank to drain.

Half inch drip pipes from milk heater and radiators extending to outside of building.

All pipes to have globe valves size of pipe.

Two vertical 3-feet radiators 12 tubes at $5.00 each, $10.00; to be placed one in work room and one in cool room for warming rooms in cold weather.

SOME POINTS IN BUTTER MAKING.

The best cow will give little milk with insufficient feed.

Handle the cows quietly and carefully—it will pay.

See that the cows have access to an abundance of good water.

Salt regularly at least once a week, twice is better, or place lump salt where they can have access to it whenever desired.

Milk regularly at a certain time morning and evening.

Do not let the milk stand where it can absorb odors from the stable or barn yard filth. Milk is very sensitive in this respect and good butter can not be made from foul milk.

When the Centrifugal is Used.

You will get best results by separating at about 80 to 85 degrees Farenheit. If the milk has fallen below that point warm it before admitting to the bowl. In late fall and winter, when milk is from cows nearly dry, it will be found desirable to warm it by adding warm water; at other times warming by outside heat will answer equally well.

When the Centrifugal is Not Used.

If you have cool spring or well water set the milk as quickly as possible in deep cans, not over six or seven inches in diameter, in a trough or tank filled with cold water to a depth equal to the depth of milk in the cans. The best results will be reached by using water at 40 to 45 degrees Fahrenheit, but fairly good work can be done with water as high as 65 degrees.

If no cold spring or well water is at hand better results will be reached by setting milk as quickly as possible in shallow pans, not over four or five inches deep, in a well made cellar.

LENGTH OF TIME BEFORE SKIMMING.

Skimming should be governed by the condition of the milk and cream, 18 to 24 hours in summer and 24 to 36 hours in winter will be found approximate.

The finest quality of butter comes from centrifugal separating, or 12 hours setting in very cold water, or in shallow pans in a cold room.

Churn when the cream is nicely acid—do not let it get too sour.

If different skimmings of cream are to be churned together mix

them thoroughly and let the whole stand for at least six hours before churning.

The most popular churns among expert butter makers are the square or rectangular makes with neither "dash" nor "paddles" inside.

For small dairies the barrel churn revolving endwise, or rocking like the Buckeye patent, gives equally good results.

When coloring is used add quantity, according to directions sent out by manufacturers, to cream when in churn.

When the cream is thick add water. Much better results will follow from thinning, and the temperature of water may be so controlled as to give proper temperature to cream for churning.

The best temperature for churning in this latitude we have found to be 63 to 65 degrees in summer and 69 to 70 in winter, occasionally going as high as 75 degrees Farenheit with good results.

The time required should be about 25 to 40 minutes. If cream is one or two degrees too cold the churning may require several minutes longer.

Stop churning when the granules are about the size of small peas, draw off the butter milk through a small hole near bottom of churn and thoroughly remove all trace of it by successive washing with pure cold water. This is the best plan also for small dash or crank churns.

When the butter milk is all out the water runs clear.

Take up the butter in the granular form, weigh it, add salt of the finest quality at the rate of seven-eighths to one ounce salt for each pound of butter, or in amount to suit customers. The salt should be evenly distributed and the granules firmly pressed together—not worked. Set it away in a cool place for 6 to 12 hours, then work just enough to make the mass uniform and compact and print or pack for market.

Some good butter makers practice working twice, others work but once and that as soon as taken from the churn.

The least working of butter consistent with uniformity, even distribution of salt and removal of surplus moisture, will give best results.

For special trade print butter in pound or half pound prints neatly wrapped in parchment paper will bring highest price. For the general market it will be most economical to pack in ash tubs —sizes to suit churnings. Before using a tub fill it with hot brine and let it soak for at least 24 hours, reheating the brine when cool.

Immediately before using scald with clean hot water and cool quickly with a rinsing of cold water. Put a circle of parchment paper in bottom of tub to fit closely. Press in butter firmly and when full cover with a second circle of parchment paper and fasten on the top.

If not shipped at once keep in moderately cool place, say about 55 or 60 degrees Farenheit if possible. If kept in a refrigerator or ice box at a temperature of less than 45 degrees butter deteriorates rapidly when handled afterward in higher temperature.

Practice the most scrupulous cleanliness in handling all vessels for either milk, cream or butter; use hot water always, and if greasy use washing soda. For all tinware it may be best to use warm water first with or without soda, as seems best, and then rinse with hot water or steam. In cleaning churns no soda should be used unless very carefully removed by thorough rinsing.

Dry all tin or metal ware in the sun if possible.

Do not rely upon guess work as to temperature. Use the thermometer.

Temperature of cream when too high may be lowered by adding pounded ice direct to the cream. Less ice will be needed if used in this way than is required when ice water is used, and, unless more water is needed for thinning, as already noted, it wil give equally good results.

If temperature is too low the cream must be warmed, either in a vat properly constructed for use of outside heat, usually steam, or by adding warm water. The latter plan will be found very satisfactory when the temperature is only a few degrees out. If much too cold the vat (outside heat) will be necessary.

A revolving churn of any make, swinging churn, or rocking churn without dash or paddles, should not be filled more than half full of cream for one churning—better not fill it more than about two-fifths to four ninths full.

Don't fail to use the best quality of dairy salt.

F. A. GULLEY, Director.

GEO. W. CURTIS, Agriculturist.

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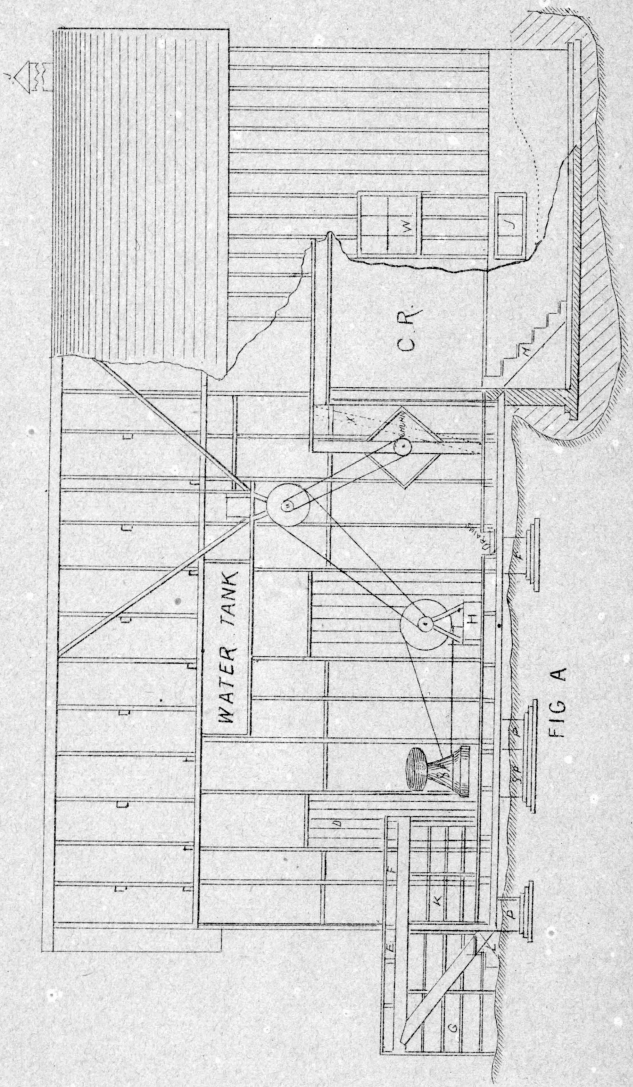

FIG A

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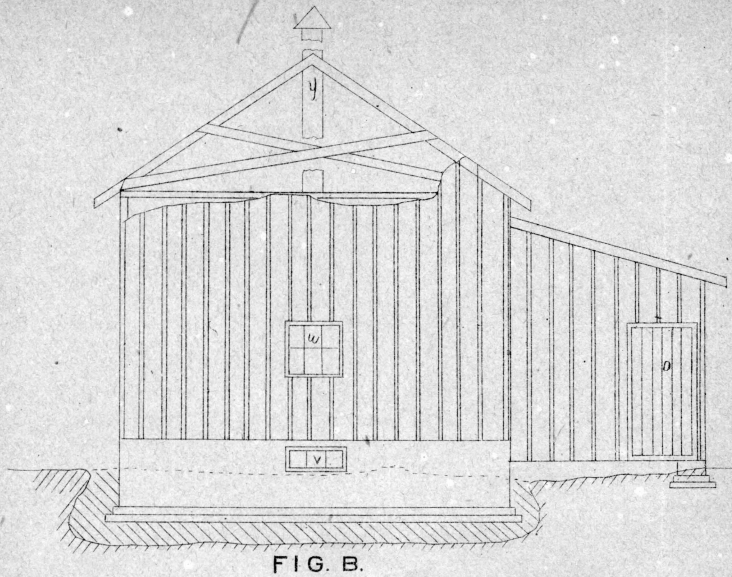

FIG. B.

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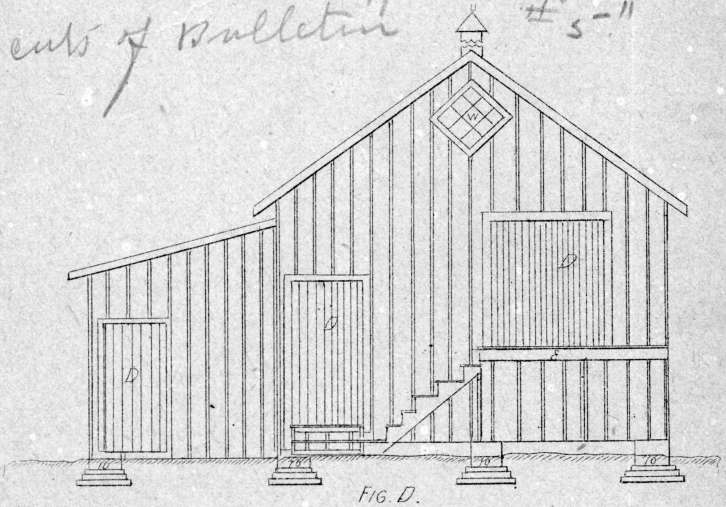

FIG. D.

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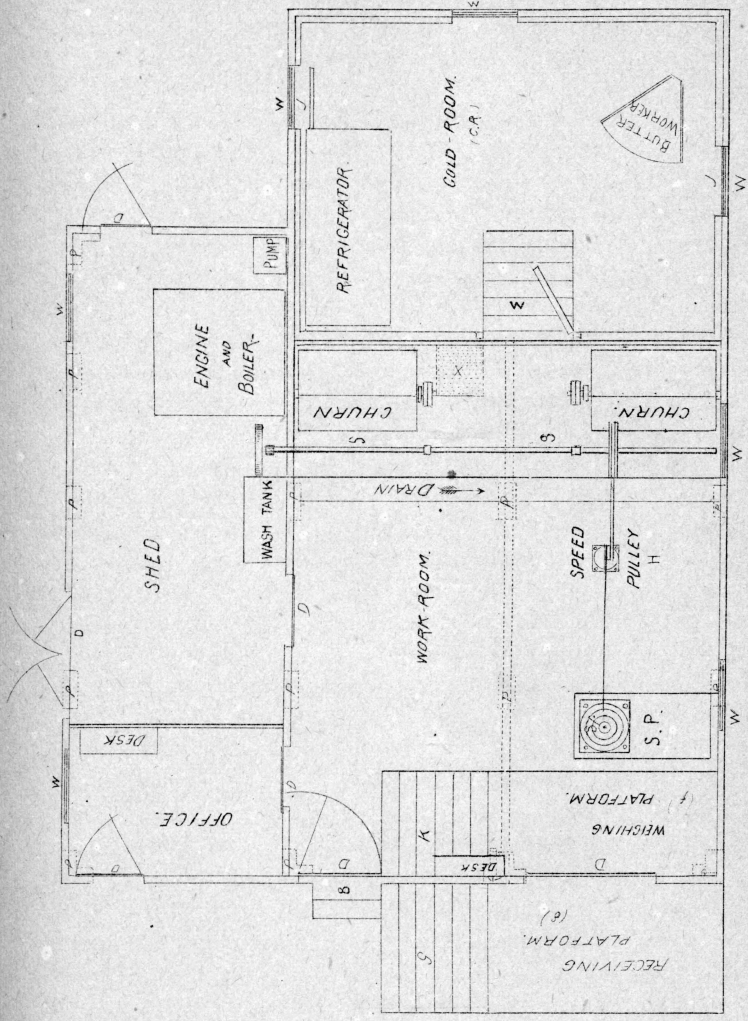

FIG. C.

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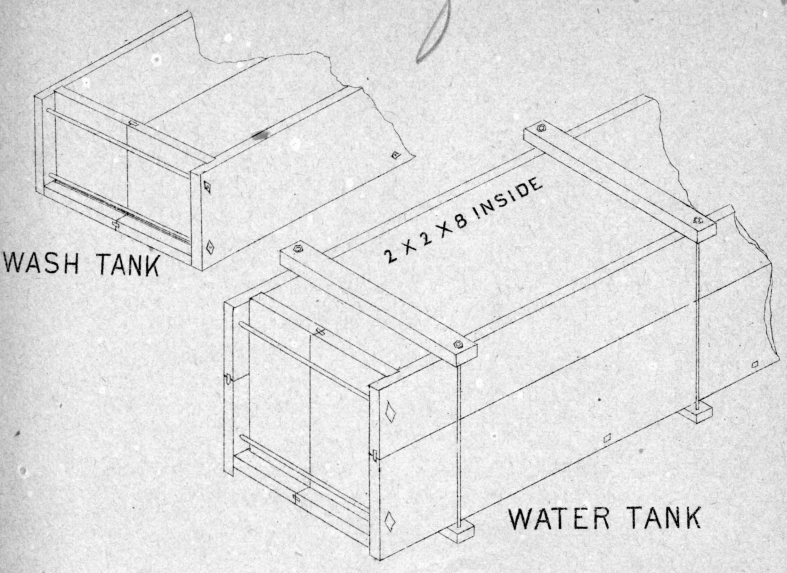
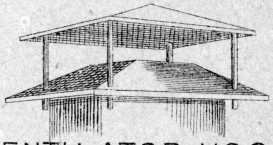
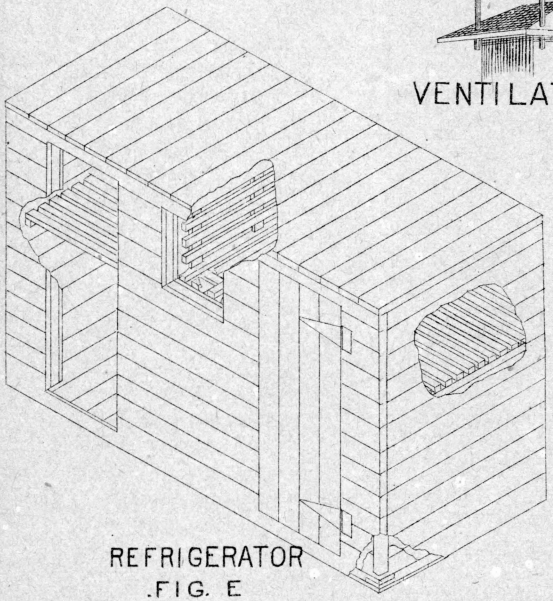


WASH TANK

WATER TANK



VENTILATOR HOOD



REFRIGERATOR

FIG. E