



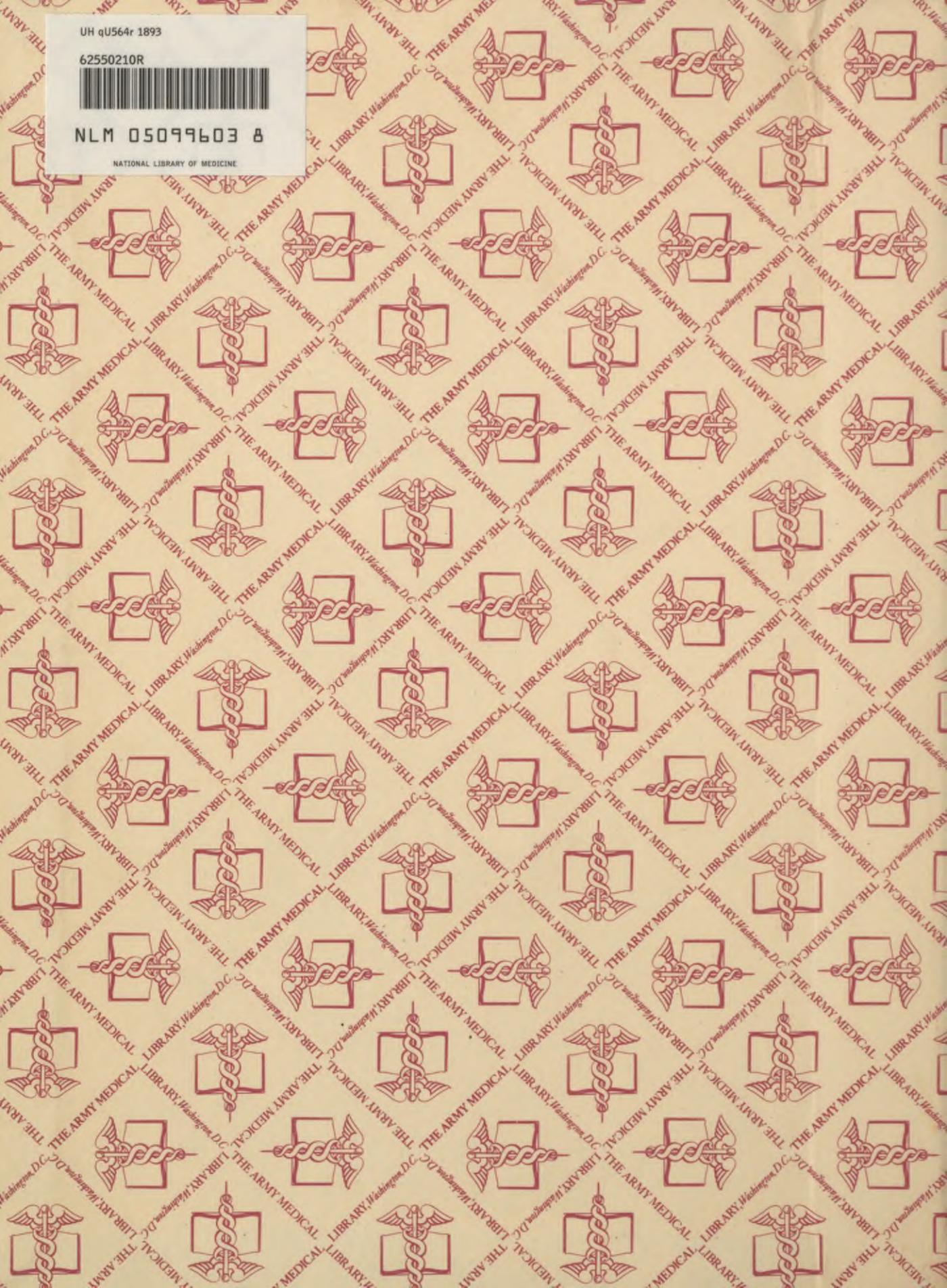
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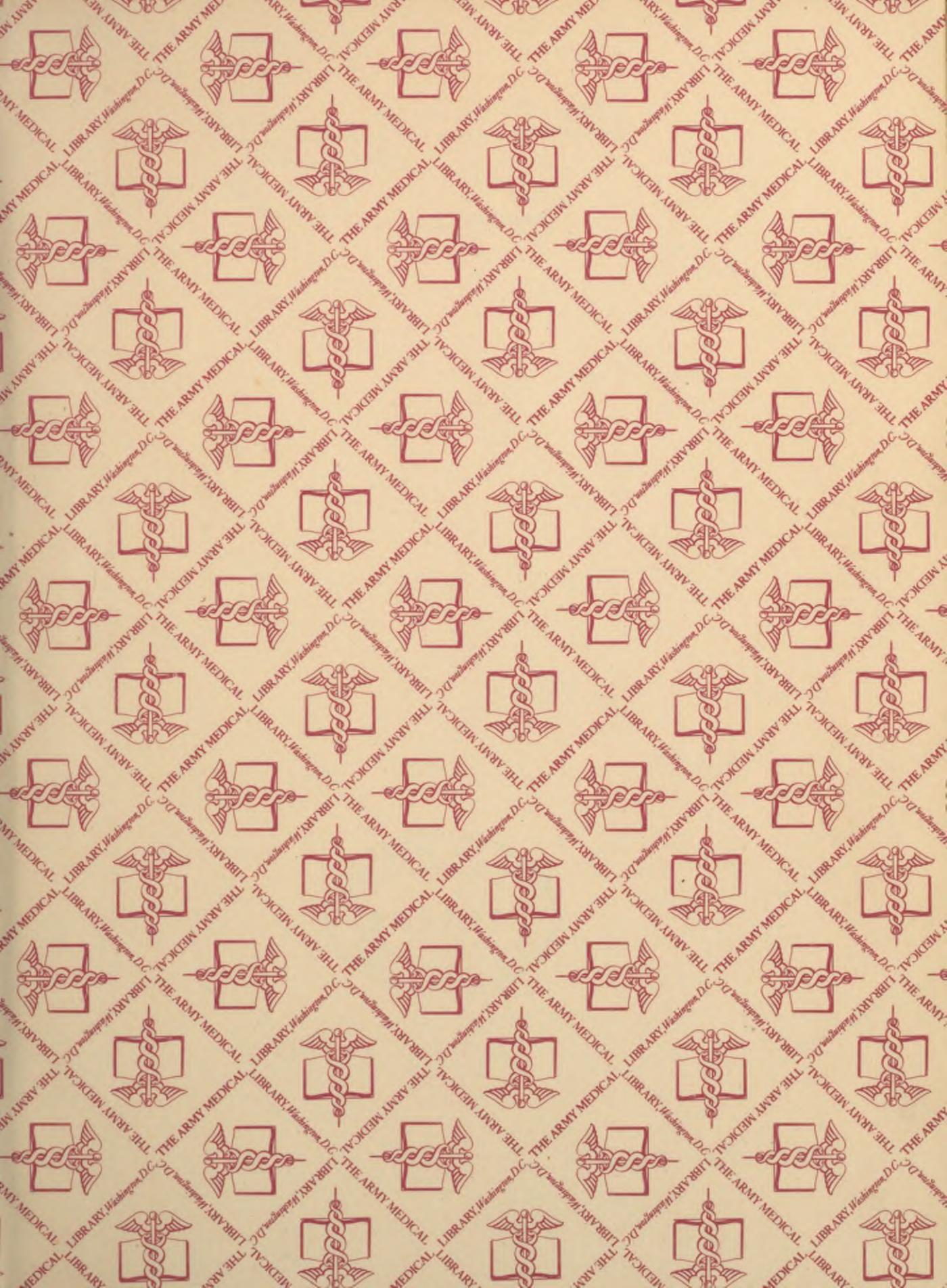
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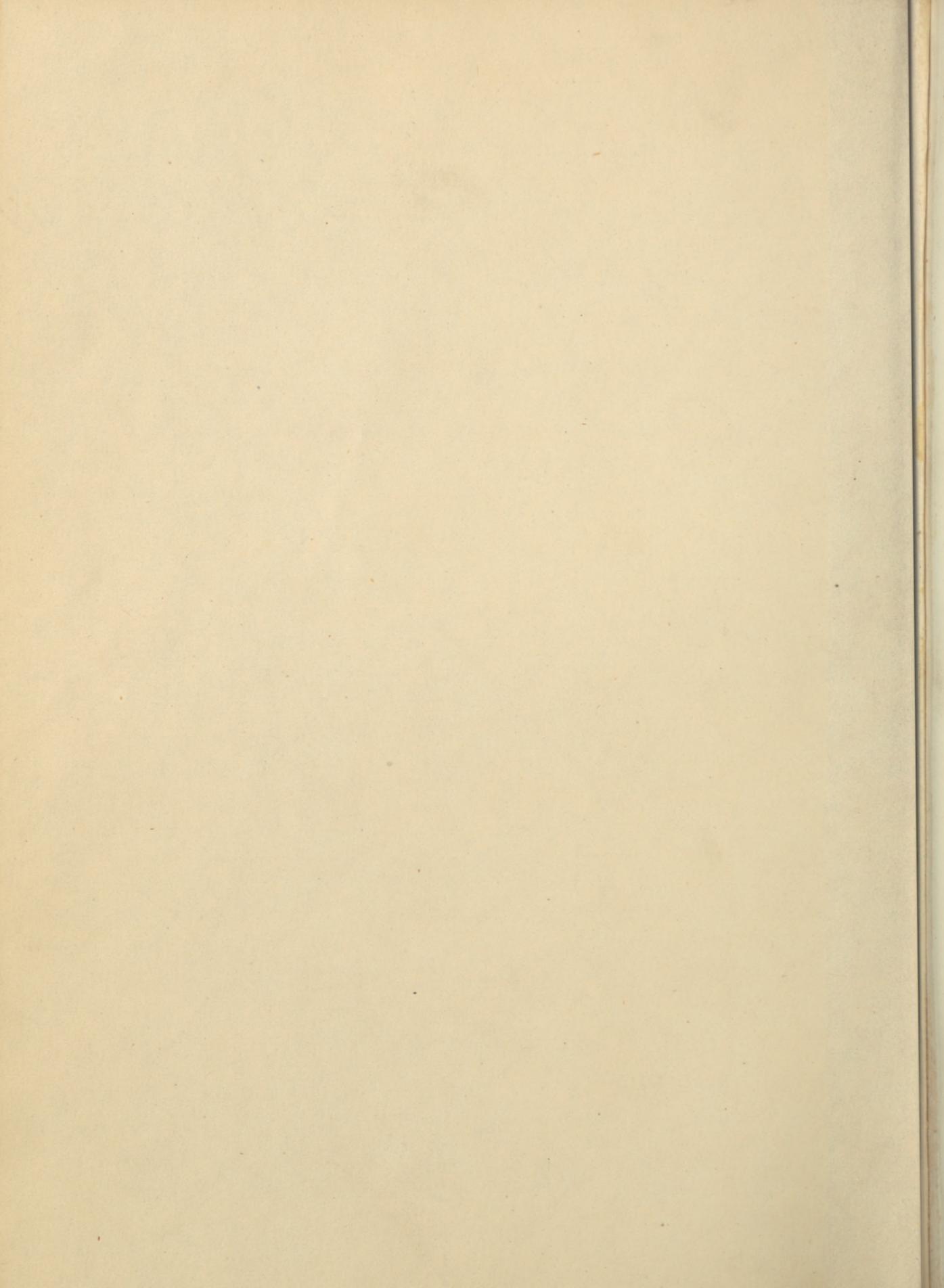


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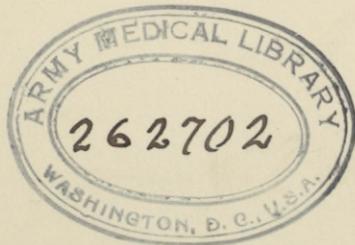






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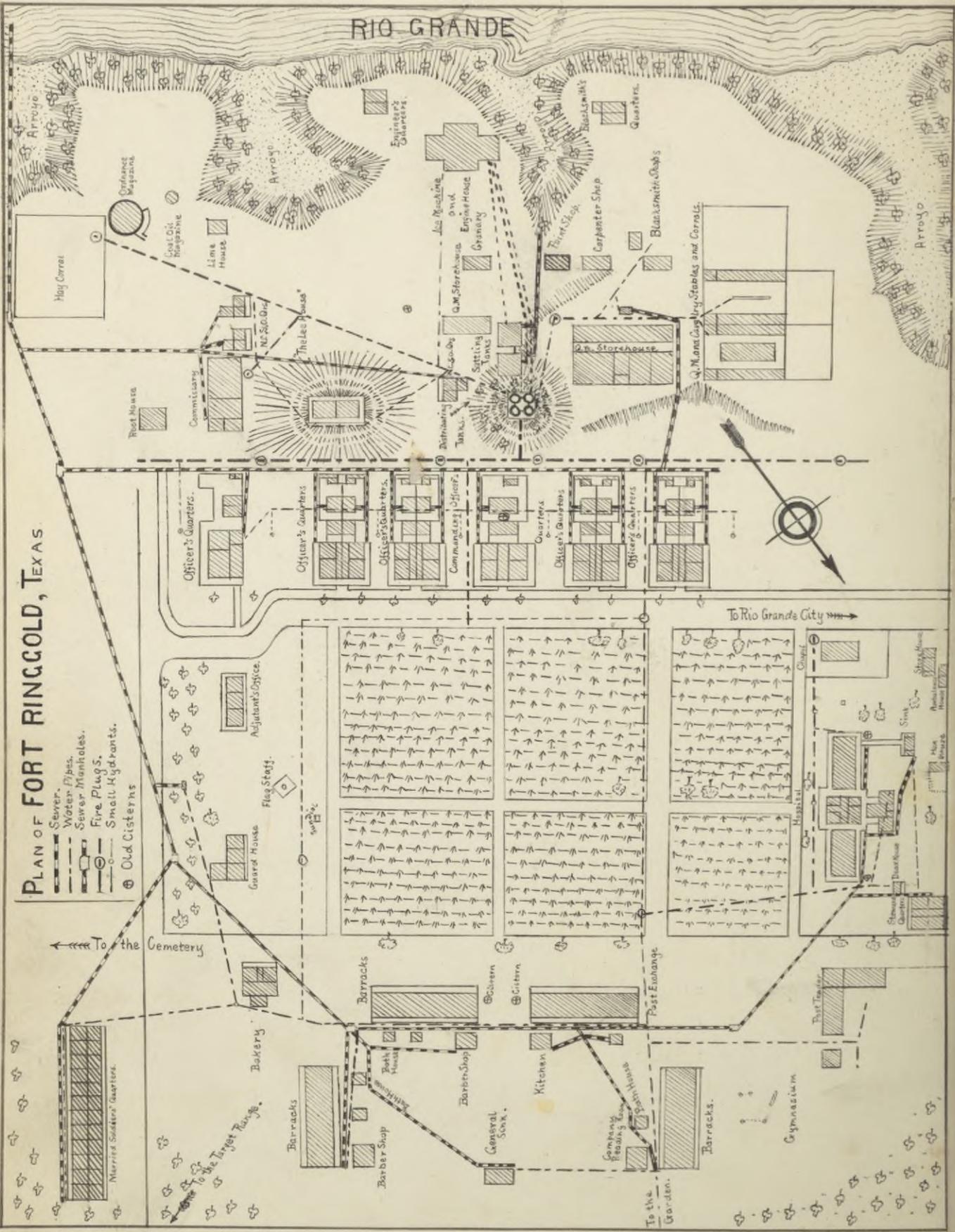


U.S.  
# 4564r  
1893

RIO GRANDE

PLAN OF FORT RINGGOLD, TEXAS.

- Sewer.
- Water Pipes.
- Sewer Manholes.
- Fire Plugs.
- Small Hydrants.
- ⊙ Old Cisterns



Hay Corral

Engraver's Quarters

Coal Oil Magazine

Lime House

Blacksmith Shop

Wagon Storehouse

Q.M. Storehouse

Grainery

Engine House

Blacksmith Shop

Post House

Commissary

The Lee House

Blacksmith Shop

Officer's Quarters

Adjutant's Office

Flag Staff

Guard House

Blacksmith Shop

Officer's Quarters

UNITED STATES ARMY HOSPITAL,

FORT RINGGOLD,

Rio Grande City, Texas,

June 30th, 1893.

The Surgeon General,

U.S. Army,

Washington, D.C.,

Sir:

I have the honor to submit herewith, in obedience to General Orders No. 5, A.G.O., 1893, the following report giving a description of this Post and of the conditisms present affecting the health of the troops.

Location.-- Fort Ringgold is situated on the left bank of the Rio Grande in latitude  $26^{\circ}23'N$  and longitude  $21^{\circ}50'W$  from Washington --  $98^{\circ}47'W$  from Greenwich.

Relations.-- It lies on the southern boundary of Starr County, Texas, one half mile southeast of the county seat, Rio Grande City, a village with a population, mainly Mexican, of about 2000 souls. This village also contains the post office, receiving a daily mail by stage, a distance of 72 miles from Peña Station on the Texas Mexican Division of the Nacional Mexicano Railway. Upon the right bank of the

Rio Grande and about five miles distant is situated Camargo, a Mexican city of two or three thousand inhabitants. The historic city of Mier is located upon the Mexican bank of the river, about fifty miles above, and the battlefields of Resaca de la Palma and Palo Alto lie respectively upon the right and left banks of the Rio Grande, about 120 miles below. The Post is connected by military telegraph with Fort Brown, 117 miles to the southeast, and a line is under construction to Laredo, 141 miles to the northwest, the general telegraphic system of the country being accessible in either direction.

Means of Access.-- It is ordinarily reached by the mail route mentioned above, but is also accessible by a route consisting of the Morgan Steamship Line from Galveston to Brownsville, Transfer to Matamoras, Mexico, railway to San Miguel, Stage 23 miles to Camargo, and transfer and ferry five miles to Fort Ringgold. A third but much less comfortable way consists in an all rail route to Monterey, Mexico, stage to Camargo, 150 miles, and transfer to the Post.

Fort Ringgold is also the head of navigation on the Rio Grande and during the greater portion of the year is reached once or twice a month by a flat-bottomed stern-wheeled steamer, which brings from Brownsville a large part of the supplies; this vessel makes the trip

up the river in from one to three weeks and down in from two days to a week. The remainder of the supplies are brought in by two-wheeled Mexican carts hauled by bulls or mules.

History.-- After the close of the Mexican War, it became desirable to guard the newly-defined boundary by a cordon of military posts. A small settle-

ment, known to Americans as Davis's Landing and to Mexicans as Rancho Debis, was evidently a



FIG. 2. RIO GRANDE STEAMER AND MEXICAN BULL-CART.

suitable point, because of its adaptability for the surveillance of the neighboring Mexican territory through its proximity to Camargo -- a city of great importance in early days -- and because of the convenience with which it could be supplied by reason of its position at the head of steam navigation. Accordingly, on October 26, 1848, Captain J.H. La

Motte, commanding Companies C and G, 1st U.S. Infantry, established a cantonment there, called Camp Ringgold in honor of the gallant Brevet Major Samuel Ringgold, Captain of the Light Battery (C) of the 3rd Artillery, who had recently fallen in action while working his battery at Palo Alto. Its official designation was changed to Ringgold Barracks by General Orders No. 8, Headquarters of the Army, July 16, 1849, and in 1850 the erection of permanent quarters was begun on the present site. On March 3, 1859, the troops were withdrawn, but it was re-garrisoned by a small detachment on December 29 of the same year, to protect the country from the ravages of the bandit chief, Juan N. Cortina, afterward a general in the Mexican Army. During the War of the Rebellion, from March 7, 1861 to June, 1865, it was again unoccupied, but since that time it has been continuously garrisoned by a force varying from a small detachment to eight companies and headquarters with band. Under the provisions of General Orders NO. 79, Headquarters of the Army, November 8, 1878 the designation of the Post was finally fixed as Fort Ringgold. The present garrison consists of two troops of the 5th Cavalry, a Company of the 18th Infantry, the Company of Seminole Negro-Indian Scouts and a detachment of the Hospital Corps.

Altitude.-- The altitude of the surface of the Rio Grande bordering Fort Ringgold, is at low water 127 feet above the level of the sea. The parade ground is 30 feet higher, giving the Post an altitude of (57) 147 feet.

Geological Formation.-- This portion of the Rio Grande valley is of aqueous formation and referable mainly to the Cainozoic period. A plain, broken by occasional dry water-courses and slight elevations, extends back from the river nearly a hundred miles. Much of the surface is covered by extensive deposits of sand, largely of wind formation and constantly shifting to a certain extent; the grains of sand by attrition during this movement have lost their angles and become so rounded as to render it useless for plaster. Considerable deposits of gravel, the stones of which present the same feature, are found throughout the country. Numerous modifications of quartz, such as agate, jasper, flint, carnelian and opal are found in these gravel beds; and deposits of colloid quartz are found in narrow fissures in the clayey sandstone composing the bed of the Rio Grande. The low hills and bluffs are founded mainly upon calcic carbonate, and sodic chloride is a frequent constituent of the soil. "Water-holes" containing a strong saline solution are not infrequent, while the Sal del Rey, a small lake some

fifty miles from the Post, has been the source from which the natives have drawn their supplies of salt from time immemorial.

Soil.-- While the vegetation is sparse and dwarfed, this condition is due not to the infertility of the soil but rather to the lack of rain or irrigation. Where the water supply is sufficient, the productive capacity of the land is practically unlimited. This is particularly true of the river bottoms, where a rich alluvial deposit renders the ground practically inexhaustible.

Climate.-- The Post is only a hundred and eighty miles north of the Tropic of Cancer and, while its climate must probably be classed as subtropical, its temperature record during much of the year would fairly entitle it to be considered tropical. The following table shows precisely the thermometric indications for eight average years:

Month.	1875-76.						Rainfall in Inches	1876-77.						Rainfall in Inches
	TEMPERATURE							TEMPERATURE						
	Monthly			Average				Monthly			Average.			
	Max	Min	Mean	Max	Min.			Max	Min	Mean	Max.	Min.		
July	105	70	86.25	98.16	74.09	.37	107	59	82.50	100.90	63.20	.73		
Aug.	104	70	85.65	97.11	74.20	1.15	110	60	83.67	103.87	63.48	.35		
Sept.	100	54	78.07	89.06	67.08	.30	103	50	78.71	98.10	59.30	3.34		
Oct.	103	44	74.50	88.24	59.29	.52	96	47	76.28	89.45	63.12	.94		
Nov.	105	22	70.66	83.23	55.04	.33	95	40	64.22	79.33	49.23	1.13		
Dec.	93	22	63.65	83.19	44.12	.25	95	36	53.57	63.70	43.45	1.54		
Jan.	95	41	63.33	75.21	52.06	.30	81	10	54.74	67.00	42.48	.53		
Feb.	94	29	64.16	81.25	47.08	.25	83	43	59.65	68.50	50.90	.74		
Mar.	103	23	68.10	86.10	50.10	.45	93	41	69.61	82.00	57.13	1.04		
Apr.	109	33	72.66	93.66	51.66	..	108	43	76.16	89.76	62.56	..		
May	112	39	76.15	93.00	54.30	.52	111	56	84.56	97.61	71.55	.83		
June	110	49	81.53	99.76	62.53	.62	111	61	89.70	103.86	75.54	.63		
	112	22	73.75	89.67	57.63	12.76	111	10	72.79	87.01	53.49	13.92		

Month.	1877-78					Rainfall in inches	1878-79					Rainfall in inches
	TEMPERATURE						TEMPERATURE					
	Monthly			Average			Monthly			Average		
	Max	Min	Mean	Max.	Min.		Max	Min	Mean	Max.	Min.	
July	109	69	86.49	102.16	72.60	.51	107	70	87.86	100.71	73.86	5.27
Aug.	108	70	90.81	103.95	71.70	2.40	109	65	85.09	101.91	69.20	2.30
Sept.	106	55	81.90	101.11	70.90	...	107	55	82.19	97.26	63.34	.48
Oct.	107	40	70.95	99.55	62.00	.21	105	63	75.88	93.20	62.11	1.25
Nov.	104	33	63.90	85.00	50.30	.07	93	33	67.21	83.43	53.75	2.00
Dec.	87	23	60.50	72.58	45.37	3.54	90	23	58.93	69.19	40.19	.45
Jany.	88	23	56.45	73.65	43.48	...	93	24	53.97	75.55	38.43	...
Feb'y.	95	35	62.30	84.04	52.30	.25	103	23	39.13	73.10	43.37	1.90
March	103	37	70.93	99.38	54.71	4.75	106	39	74.57	93.37	55.48	...
April	106	43	76.70	97.73	63.50	...	103	41	79.01	93.50	57.58	.40
May	108	62	85.65	99.23	71.33	4.75	123	60	86.59	103.35	66.24	.90
June	112	62	82.00	103.03	73.10	.05	112	60	87.73	105.04	70.43	.25
	112	28	74.52	92.81	60.95	13.53	123	24	74.73	91.50	58.29	15.10
			1888-89						1889-90			
July	104	69	87.30	101.30	73.40	.23	110	70	83.39	103.73	73.03	.48
Aug.	110	63	87.90	103.20	72.90	1.48	109	65	84.53	99.19	62.93	3.00
Sept.	99	53	79.60	91.30	67.43	5.71	99	49	77.20	90.40	64.00	2.52
Oct.	99	49	76.55	89.27	64.22	1.54	99	42	74.17	89.90	58.55	1.97
Nov.	92	30	63.90	74.00	53.73	.92	91	30	60.33	73.33	44.73	.04
Dec.	87	30	60.50	75.32	45.37	.53	80	43	70.33	85.06	52.70	...
Jany.	92	32	57.50	69.52	45.43	2.04	97	29	65.90	79.45	52.35	.78
Feb'y.	95	33	61.50	70.14	52.33	2.32	99	32	63.35	73.10	54.30	.94
March	98	33	64.35	72.35	51.32	2.03	105	20	67.93	84.29	51.37	.50
April	101	51	76.70	99.60	63.30	3.52	101	39	74.33	90.53	58.20	1.25
May	100	55	79.45	91.29	66.34	.04	103	62	80.35	93.54	63.13	.07
June	109	62	85.45	99.50	73.33	5.46	104	60	83.91	96.70	71.13	1.73
	110	30	73.48	88.07	60.79	24.25	110	20	74.60	88.95	60.28	13.13
			1890-91						1891-92			
July	107	67	86.32	100.93	71.37	1.13	107	65	86.49	102.22	72.77	...
Aug.	105	70	86.23	101.29	71.13	.38	107	53	85.91	101.25	70.32	...
Sept.	103	43	81.33	97.23	68.00	...	103	53	81.43	93.23	63.60	4.72
Oct.	100	43	75.02	90.03	60.09	3.77	93	39	70.32	85.48	55.13	1.38
Nov.	93	33	64.53	79.40	49.73	.09	91	31	64.53	80.93	43.20	...
Dec.	82	23	60.75	72.39	42.22	.19	80	24	58.01	72.80	45.22	...
Jany.	90	25	59.31	75.90	43.42	3.03	90	22	52.72	69.93	37.51	.75
Feb'y.	99	30	65.22	82.04	43.40	...	93	50	62.19	82.17	53.21	.15
Mar.	97	39	64.50	81.32	47.70	.59	95	31	66.30	80.06	52.55	1.30
April	95	43	72.23	87.33	57.20	.91	103	43	78.91	92.53	65.23	.50
May	100	52	76.92	90.30	63.42	3.13	109	55	84.01	97.31	70.42	1.15
June	105	63	85.54	101.33	69.73	.92	103	64	85.32	92.63	72.14	.75
	107	28	73.22	88.97	57.57	19.07	109	22	73.61	88.33	59.37	10.70

It will be seen that the extremes are 10° and 123° Fahrenheit. There is practically no cold season, for even in the winter the maximum thermometer ranges above 80°. The hot season consumes eight out of the twelve months, the temperature habitually rising to the neighborhood of 100° in March and October. As a rule, the month of May sees the hottest

days of the year. During the summer, the daily maximum frequently remains above 100° for months at a time. The heat of the direct rays of the sun is far greater, exposure of the thermometer to them carrying the mercury up to 150°, while the meteorological records show an elevation of 173°. The reflected rays of the sun increase the heat almost everywhere, so that the recorded maximum, taken in a sheltered latticed case, well elevated above the ground and standing over grass kept green by constant sprinkling, is really lower than the degree of heat actually experienced in the vicinity. Nightfall eliminates this source of heat but the temperature still remains so high that the effect of a burning lamp in a room is to render it so hot as to be almost uninhabitable. It is recommended that the incandescent electric light be introduced into the Post; this would render the occupation of lighted rooms possible at night, giving the garrison evening privileges somewhat resembling those enjoyed at more favorable stations.

The value of temperatures of the sick taken with the clinical thermometer when the atmospheric heat on the medical officer's desk exceeds 100° is problematical. The reflection of the sun's rays from the ground is extremely trying to the eyes, and inflammatory affections of those organs are a frequent result. The debilitating action of the long-continued

extreme heat has a depressing effect upon the health, spirits and dispositions of both officers and men.

The temperature is very subject to sudden variations, a range of 40° in the twenty four hours being frequent, while the records show that variations of 50° to 60° are not unknown. These sudden changes are prolific in catarrhal affections, especially involving the respiratory tract.

The abrupt and extreme variations in temperature are usually due to changes in the direction of the wind. The prevailing wind is from the southeast and at times it pours through the Post like a breath from the nether regions, although it is usually cooler at night. If the wind comes from the south or southwest, it is like a sirocco, parching the entire country in its course and carrying clouds of dust in its train. In the winter months, north winds, with or without rain, known as "wet or dry northers", arise suddenly and reduce the temperature for two or three days at a time. Any breeze stronger than a zephyr, carries more or less dust with it and the deposits thus formed render cleanliness of habitation or person difficult to preserve.

Fogs are very rare, snow is unknown, and the rainfall -- as seen by the Table -- is very light, so that agriculture without irrigation is practically unknown. The air is usually devoid of moisture, so that

desiccation rapidly takes place. The Mexican preserves his meat for an indefinite period by simply drying it in the open air under the sun's rays.

Topography.-- The reservation of Fort Ringgold consists of 350 acres

The space occupied by the Post is an irregular pentagon,

enclosed by wire fence on four sides and by the

Rio Grande on the fifth. The river front is 1200 feet

long, the northwest side is 1500 feet long, the north

and east sides 800 feet each, and the southeast side

is 2150 feet long. The Post gardens and a portion of

the target range are situated in the triangular north

eastern portion, which is not shown in the Plan of the Post, (Fig.1). In

the Plan, however, the general arrangement of the rooms on the ground

floor of the buildings is shown, as well as their location and relations.

The parade ground is the conventional parallelogram, 850 feet long and 400

feet wide, with the Hospital at one end and the Guard House and the Adjutant's Office at the other. On one side is the officers' line while the

Bakery and two sets of Barracks front on the other, the remaining barracks

standing in the rear and at right angles with the first. In the rear of

each set of Barracks are several small buildings used variously for bath-

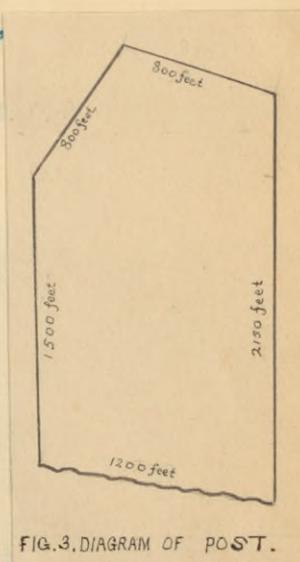


FIG. 3. DIAGRAM OF POST.

houses, reading-rooms, barber-shops and kitchens, while in the extreme rear is the General Sink. Just southeast of the fence, with its southwest extremity about on a line with the barracks, is situated a block containing the Married Soldiers' Quarters. In the rear of the officers' line are situated the Commissary Storehouses, the Non-Commissioned Staff Officers' Quarters, the Magazines, the Water-works, the various Quartermaster's buildings and the Stables. An irregular ridge runs



FIG. 4. THE PARADE GROUND AT FORT RINGGOLD.

back of the officers' line, presenting two curious spurs, on the higher of which are situated the Water Tanks, and on the lower one an old house, formerly the commanding officer's quarters and known as the "Lee House",

owing to the fact that it was occupied by the late General Robert E. Lee, C.S.A., when an officer of the United States Army. From the river bank, four large arroyos have eaten their way into the Post. These arroyos vary in depth from two to thirty feet and are bordered with copious growths of mesquite brush. About half a mile southeast of the Post is



FIG. 5. THE CEMETERY.

situated the Cemetery, an enclosure 180 feet square, surrounded by a strong brick wall six feet high, and closed by iron gates. There have been 101 interments in this cemetery

The Post is situated on a rolling plain with no hills or considerable

elevations within a radius of several miles. There are in the vicinity no marshy grounds, pools of stagnant water, nor other natural topographical causes affecting health. The neighboring town of Rio Grande City, which immediately abuts on the reservation, however, is a most favorable soil for the development of epidemic disease. Not only is it an active nidus of venereal maladies, as will be stated hereafter, but small pox is almost endemic and the filthy surroundings, improper food, insufficient clothing and total absence of hygienic conditions among its population, render it a constant menace to the health of the Post. Immediate contact with the town is obviated by the existence of a strip a quarter of a mile wide between the fence of the Post and the town limits; but considerable care needs to be taken lest the Mexicans neutralize even this provision by using the strip as a dumping ground for offal and refuse.

Water Supply.-- The water for the use of the Post is obtained from the Rio Grande and is supplied in two forms: (1) distilled water for drinking and cooking, and (2) river water, clarified by precipitation of silt, for all other purposes. The distilled water is almost absolutely pure. The river water contains more or less septic germs due to the constant presence in the stream of decaying animal and vegetable matter; it also con-

tains a small percentage of alkali, a considerable quantity of sodium chloride -- readily appreciable to the taste when the river is low -- and other inorganic matter, which contribute to render it less potable.

The capacity of the water works is from a quarter to a half a million gallons of clarified water per day, the less amount being produced when the river is very turbid; but even in this case, the full capacity of the pumps is available in case of fire. The capacity of the distilled water apparatus is two thousand gallons per day. The full capacity of the water system has never been reached, and it is entirely sufficient to meet all requirements; in rare cases, when the demand for water is very great and the river very turbid, the water has to be used before it is fully clarified, but there is always enough.

It is hardly possible for any source of contamination to reach the distilled water, provided that proper precautions are taken to secure cleanliness. The water of the river, however, in addition to a large amount of suspended silt which is extracted in the water works, and a constant taint from decaying animal and vegetable matter, derives more or less contamination from the presence of the village of Rio Grande City on the river bank just above the Post; but as this water

never enters into the nutriment of the garrison, these facts may be ignored as not affecting the health of the Post.

The water is obtained from the Rio Grande by a pumping apparatus consisting of two boilers -- one of thirty five and one of fifty horse power -- two engines, two settling tanks and four distributing tanks, together with their connecting pipes and water mains, as seen in the Plan of the Post.

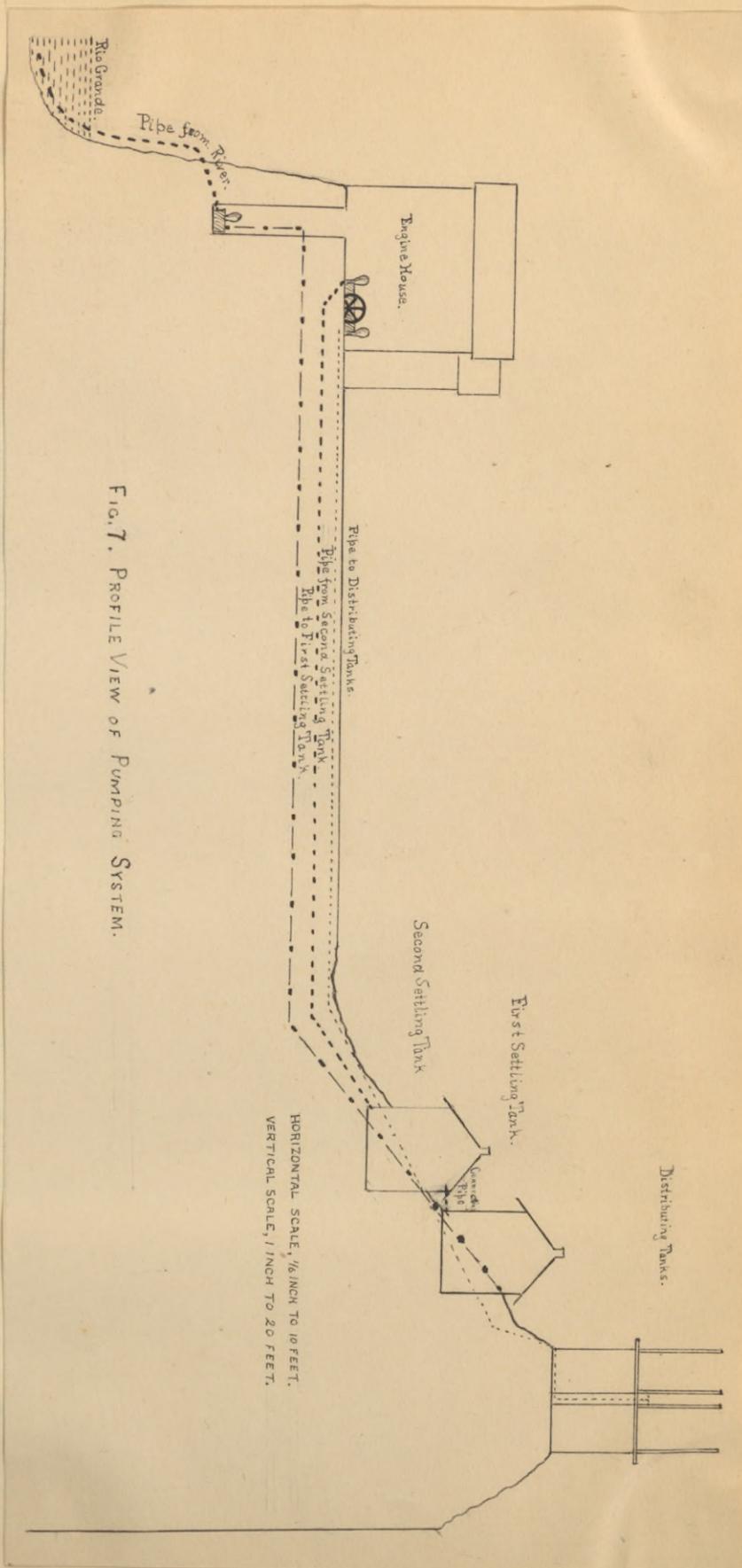


FIG. 6. THE ICE MACHINE AND ENGINE HOUSE.

The engine house is situated upon the bank of the river.. The engine drawing the water from the river is a Dean pump with double plunger, of fifteen horse power and a capacity of 18 000 gallons an hour.

It is located in a well, sixteen feet deep and eleven by sixteen feet at the bottom, which is thirteen feet above the level of low water. In this well is located also a Blake pump of twelve horse power, as a reserve in case of breakage.

The turbidity of the river water, due to the suspension of a large amount of inorganic matter, is extreme at times, so that it can hardly be used in its natural condition. In order to permit the subsidence of



the suspended matter, two settling tanks have been provided. These are situated upon the side of a small hill, respectively eighteen and twenty seven

feet above the level of the Dean pump, and respectively 410

and 368



FIG. 8. THE SETTLING TANKS.

feet from it . The Settling tanks are built of brick with walls twelve inches thick and well braced by strong brick abutments; they are lined with Portland cement and are thirty five feet square and nine feet deep, affording a capacity of 83 560 gallons. The bottom of each tank inclines fifteen inches from the northeast to the southwest corner, where is located an eight-inch locomotive valve connecting with a pipe of the same caliber opening into an eight inch brick drain which empties into the nearest arroyo. Each tank is covered with a well-ventilated shingled roof. The water from the river is pumped directly into the upper settling tank

through a 3-inch pipe. After the suspended matter has subsided, a process requiring from a half to eight hours, the clarified water is decanted through two 4-inch pipes into the lower settling tank, where such further subsidence as may be necessary occurs, the water remaining here until needed in the Distributing Tanks. The mud remaining in the bottom of the tanks is drawn off whenever desired by opening the locomotive valve at its lowest point, when the semi-liquid sediment passes off into the brick drain; the process of removal is assisted by flushing and sweeping as required.



FIG. 9. THE DISTRIBUTING TANKS

The distributing machinery consists of (1) a Worthington duplex pump of twenty four horse power, with a capacity of 20 000 gallons an

hour, and (2) four Distributing Tanks at a sufficient height to deliver the water by simple gravity. The clarified water gravitates through a 4-inch pipe from the lower settling tank to the Worthington pump, which stands on the floor of the engine house, and is forced through a 3-inch pipe into the distributing tanks. These tanks are tub shaped, with staves of Louisiana cypress, strongly banded by wrought iron hoops, and each is mounted upon a pier of solid masonry; they are sixteen feet in diameter, twelve feet high, and have a capacity of 16 000 gallons each; a circulation throughout the four tanks is obtained by connecting pipes of 3- or 6-inch caliber, rendering them equivalent then to a single tank of 64 000 gallons capacity. The hill upon the summit of which the distributing tanks are located, is twenty five feet above the level of the parade ground, and they are further elevated by the masonry piers to a height of thirty five feet above the mean level of the garrison. At this mean level, the water pressure obtained is forty-five pounds per square inch.

The water is carried, as shown in the Plan of the Post, from the distributing tanks by one 6-inch and two 2-inch iron mains. The 6-inch main passes from the northeast side of the tanks down the hill 250 feet on a line perpendicular to that of the officers' quarters, to a point thirty

feet in the rear of the quarters, where it meets a line of 6-inch pipe 1000 feet long, running parallel to the officers' line. Upon this main are situated five fire-plugs from which any of the officers' quarters, the hospital, the chapel, and the quartermaster and commissary storehouses may be reached by a moderate length of hose. From this main pass off two 2-inch iron pipes from which 1-inch iron pipes pass to small hydrants between the officers' quarters, supplying water for the grass and trees, and to each set of officers' quarters, feeding faucets in the kitchen and urinal on the first floor and the bathroom on the second floor. These 2-inch pipes connect with another set of the same caliber, which completely encircle the parade ground and send off a branch to the hospital. Upon this circle are situated three fire-plugs for the protection of the barracks, guard house and bakery, and the officers' quarters. The circle gives off in 1-inch pipes the water supply of the hospital, the barrack and company bath houses, the general sink, the bakery and guard house, the married soldiers' quarters, and contributes a small fire plug to the chapel and two hydrants to the post gardens.

A 2-inch main, passing from the southeast side of the distributing tanks, goes to the hay corral and to the commissary storehouse, sup-

plying a fire-plug to each, and to the engine house, supplying the boilers and the water condenser. It also gives off a 1-inch pipe for the supply of the "Lee House" and the non-commissioned staff officers' quarters.

A 2-inch main, passing off from the northwest side of the distributing tanks, goes to the quartermasters' and troop corrals, supplying fire-plugs there and at the quartermasters' storehouse. By 1-inch pipes, it supplies the blacksmith shops and the water troughs of the stables.

There is at the Post a Hyatt patent water filter with a capacity of about 15 000 gallons per day. This apparatus has never been set up, the settling tanks supplying the clear water necessary for the ordinary needs of the garrison. But in the summer when the needs are greater and when the river is rendered exceptionally turbid by the freshets from the mountain streams, it is not always possible to supply clear water from the tanks. To meet this emergency, the medical officer has recommended that the filter in question be put in serviceable condition.

All of the pipes used in distributing water are of iron, some of them plain and others galvanized, the character varying apparently according to the fancy of the purchasing officer

This Post was formerly a hotbed of typhoid and malarial disease

and diarrhoeal and dysenteric complaints. Now these cases are unusual and due to causes external to the Post, such as exposure in the field. This change is due to the introduction of distilled water for drinking and culinary purposes. The value of the use of distilled water as a prophylactic against malarial and diarrhoeal affections was first observed in connection with the employment of the condensed water used in the manufacture of artificial ice at the Post. When the fact was recognized, a large condenser was obtained, by the use of which two thousand gallons of distilled water are obtained per day. This water is



FIG. 10. THE TANK CART FOR DELIVERY OF CONDENSED WATER.

hauled to the quarters in a tank-cart, and kept for use in twenty-five

gallon galvanized iron cans.

The neutralization of diseases due to the use of impure water can hardly be obtained in a Post more economically than by the provision of distilled water. The apparatus in use at Fort Ringgold, as shown in Fig. 11, is simple and inexpensive, while its operation is practically without cost. It consists of four parts: (1) a condensing can, (2) a set of condensing coils, (3) a set of filtering and aerating boxes, and (4) a storage tank.

The condensing can, made of galvanized iron, is twenty inches in diameter and three feet high: twelve inches from the bottom is a diaphragm connected by a 3-inch flange union (D) with a 3-inch pipe (E), which passes out through the apex of the can; the bottom is perforated by a 3-inch pipe (A) fixed by a flange union (B). At the side are fixed two 1-inch nipples with lock nuts (N, V) and an opening for a 2-inch pipe (L). A 2-inch escape pipe (W) is soldered in the top and a 1-inch drip pipe (X) is fastened with lock nuts in the bottom.

The condensing coils consist of fifteen pieces of 1½-inch iron pipe nine feet long, arranged in three superposed interconnected rows (H, H, H) all opening into two 3-inch pipes (G, J) running across the ends of the lower row. Over each vertical row of pipes runs a ½-inch pipe (I) perfor-

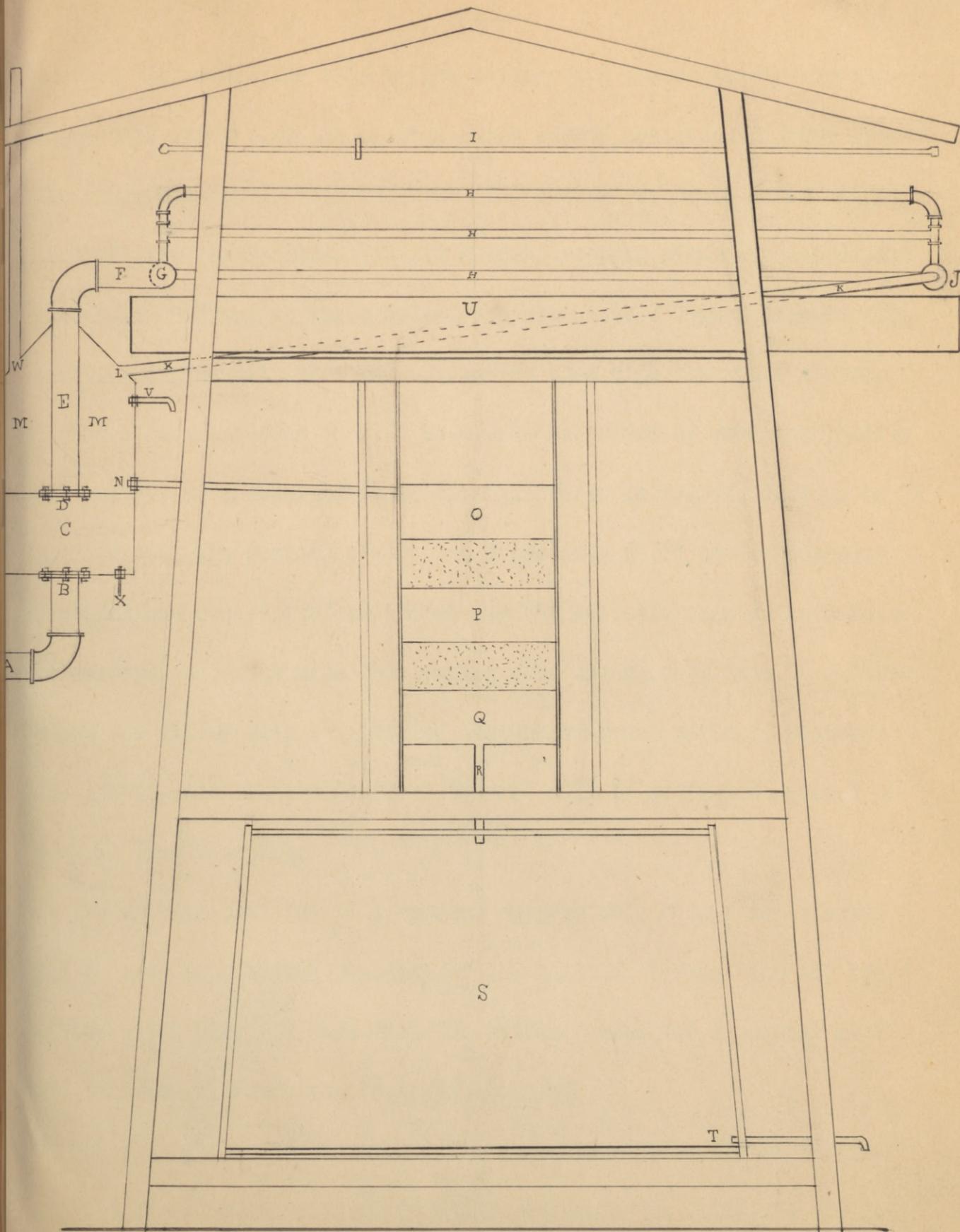


FIG. II. DIAGRAM OF CONDENSING APPARATUS.

ated on its under side with  $\frac{1}{2}$ -inch holes, five inches apart, through which cool water from the general water supply continually drips upon the condensing coils into the tank (U), whence, to avoid waste, it is carried into the boilers. The six  $\frac{1}{2}$ -inch dripping pipes are capped at the distal end and at the proximal end open into a 1-inch pipe running at right angles with them and connecting them with the water system.

The filtering boxes (O,P,Q) have ends and sides of wood and linings and bottoms of galvanized iron; they are three in number, each 20 by 20 by 8 inches, the bottoms of the two upper ones (O,P) having numerous perforations and that of the lower one (Q) a single opening into which is soldered a 1-inch pipe (R) leading into the storage tank. These boxes are filled with a filtering mixture of equal parts of charcoal and gravel, the charcoal on top, covered only by sufficient gravel to keep it from floating.

The storage tank (S) is a covered cypress tub, 6 feet in diameter and 4 feet high, with a capacity of 550 gallons. Through the top passes the inlet pipe (R), and from the bottom passes the discharge pipe (T) by means of which the water is drawn off

The pipe A then is connected with the exhaust pipe of the engine and the steam passes through B into C, a chamber in which the oil ta-

ken up by the steam, settles to the bottom and is drawn off by means of the drip pipe X; the steam then passes through the opening D into the pipe E, F, which connects with the pipe G of the condensing coils H, H, H, into which it spreads being condensed by the coolneiss maintained by the cold water continually dripping upon them from the sprinkling coils I; the water now condensed, passes down into the pipe J, and thence into K and through L into the condensing can M, M, where it accumulates (and uncondensed steam, that may have passed through the coils, escaping through W) and flows off through the pipe N into the upper fil-

The parts required for the construction of the condensing apparatus are as follows:

- |  |  |
|--|--|
| [1] A condensing can constructed as stated in the text.  | Two pieces of pine, 1 by 3 inches by 3 feet, with $\frac{1}{2}$ inch holes as above; these to hold pipes in place over condensing coils  |
| [2] Condensing coils constructed as in the text, of the following parts:   | [4] Drip tank constructed of the following materials:<br>Nine pieces plank, 2 by 8 inches by 12 feet.<br>Two pieces plank, 2 by 8 inches by 4 $\frac{1}{2}$ feet.  |
| Two pieces 3-inch pipe, 3 feet long, bored and tapped for $1\frac{1}{2}$ inch pipe, five holes, 6 inches from center to center.<br>Two caps for 3-inch pipe.<br>One 3-inch union for G.<br>One reducer from 3-inch to 2-inch for J.<br>Fifteen pieces $1\frac{1}{4}$ -inch pipe, 9 feet long.<br>Fifteen pieces $1\frac{1}{4}$ -inch pipe, 1 foot long.<br>Fifteen $1\frac{1}{4}$ -inch unions.<br>Twenty $1\frac{1}{4}$ -inch nipples, 4 $\frac{1}{2}$ inches long.<br>Ten $1\frac{1}{4}$ -inch elbows.<br>Ten $1\frac{1}{4}$ -inch tees.<br>Two 3-inch elbows.<br>Enough 3-inch pipe to connect with exhaust pipe of engine and with coils at G.<br>Enough 2-inch pipe to connect the condensing coils at J with the condensing can L. | [5] Three filter boxes constructed of the following materials:<br>Six pieces pine, 1 by 8 by 20 inches.<br>Six pieces pine, 1 by 8 by 22 inches.<br>Sixteen feet galvanized iron, 24 inches wide<br>One piece 1-inch iron pipe, 12 inches long<br>Four pairs of blinds with stationary slats, 28 by 60 inches            |
| [3] Sprinkling coils constructed of the following parts:   | [6] One storage tank:<br>One cypress tub, with top and bottom, 3 feet in diameter and 4 feet high.   |
| Five pieces of $\frac{1}{2}$ -inch pipe, nine feet long, with caps for one end of each piece, and $\frac{1}{4}$ -inch holes drilled in a line on one side, and 5 inches apart from center to center.<br>One piece of 1-inch pipe 3 feet long, with cap on one end and five holes drilled in a line on one side and tapped for $\frac{1}{2}$ -inch pipe, holes 3 inches from center to center.  | [7] One tower, constructed of the following materials:<br>Four pieces, 3 by 6 inches by 24 feet.<br>Sixteen pieces, 6 by 6 inches by 8 feet<br>Eight pieces 2 by 6 inches by 18 feet.<br>Eight pieces 2 by 4 inches by 8 feet<br>150 feet 1 by 3 inch pine sheathing<br>250 shingles<br>Spikes, nails, etc. as required. |

ter box O, through which it percolates, dropping into the second filter box, P, from which it drops onto the third filter box, Q, being twice aerated as it drops from O to P and from P to Q. From the filter box, Q, it passes through the pipe, R, into the storage tank, S, from which it is drawn as needed through the pipe, T.

As already stated, the intense heat, which prevails during the greater part of the year, is not only the source of great discomfort but the cause of much illness at this Post. Heat exhaustion and headache from excessive heat are the most frequent complaints here although this fact does not appear in the medical statistics of the Post, since subjects of these disorders usually receive treatment without being excused from duty. However, these cases are much less numerous than formerly, an improvement due to the product of the Ice Machine, one of the most important features of the Post. The machine is a Schuehle engine of eight horse power operating two freezing tanks producing about eighty bars of ice per day, amounting to more than a million pounds a year. The machine is run in connection with the boiler for the water supply of the Post, careful experiment having shown that the power required to operate it may be obtained without a material increase in the amount of fuel over that required to furnish the water supply. The machine is self-supporting, suf-

ficient income to meet all expenses being derived from the sale of ice at prices ordinarily varying from a third of a cent to a cent a pound



FIG. 12. INTERIOR VIEW OF THE ICE MACHINE.

There are still at the Post six cisterns of a capacity varying from 30 000 to 100 000 gallons each. These were used for the storage of rain water at a period prior to the introduction of the settling tanks when the turbid river water was the only other source of drinking water.

These cisterns are now useless and the Post Surgeon, recognizing in their stagnant contents the seeds of future infection, has recommended that they be emptied, their bottoms knocked out and their concavities

filled with earth. They are located one at each end of the hospital, one at each side of the space between the two barracks fronting on the parade ground, one in the rear of the commanding officer's quarters and one at the end of the old Quartermaster's storehouse.

The cost of the pipes and fittings contained in the water system was approximately \$2780.00. The expense of maintaining it it is about \$170.00 a month.

Drainage.-- The subsoil water, where it exists at all, lies so deep that it may practically be ignored in relation to the health of the Post. Never nearer the surface than twelve or fifteen feet, it usually lies at a much greater depth and in many localities in this vicinity, none whatever can be found. These facts are gained from various excavations which have been observed throughout the country, no systematic series of borings having ever been made. The rainfall is so light that the water is quickly absorbed by the parched earth. What is not taken up by the soil and its products, is carried off all too quickly by evaporation and natural surface drainage. The disposal of subsoil water and of adventitious superficial fluid waste then may be regarded in this locality as silent factors not to be considered. Most of the roofs are provided with gutters but, with the exception of the buildings in

the vicinity of the old cisterns, the rain leaders empty upon the surface, and this will be universal when the cisterns are destroyed.

The liquid refuse of the garrison is carried off by a system of pipes opening into the Rio Grande at a point just above low water mark and two hundred yards below the water pipes. The sewers thus formed are composed of cylindrical salt-glazed vitrified earthenware tiles with socket and spigot ends. All connections are made by angular junctions to facilitate the passage of sewage. The joints are tightly calked with oakum and sealed with Portland cement.

The system, shown in the Plan of the Post, consists of a main sewer, composed of 6-inch tiles, and two principal and several minor branches, composed of 4-inch tiles. The longer branch begins at the hospital and passes behind the barracks, which front on the parade ground, receiving branches from the other barracks and the general sink, and ends at a manhole in the rear of the guard house, where it is joined by a branch from the married soldiers' quarters. The second principal branch begins at a urinal in the rear of the large quartermasters' storehouse, whence it goes to join the pipe running in the rear of the officers' quarters, emptying into the main sewer at a manhole situated on a line with the rear of the officers' quarters. A third branch begins at the quarters

of the quartermaster sergeant near the distributing tanks and runs thence parallel with the preceding branch, connecting with the other non-commissioned officers' quarters and the commissary storehouse. These branches contain 6197 feet of 4-inch pipe.

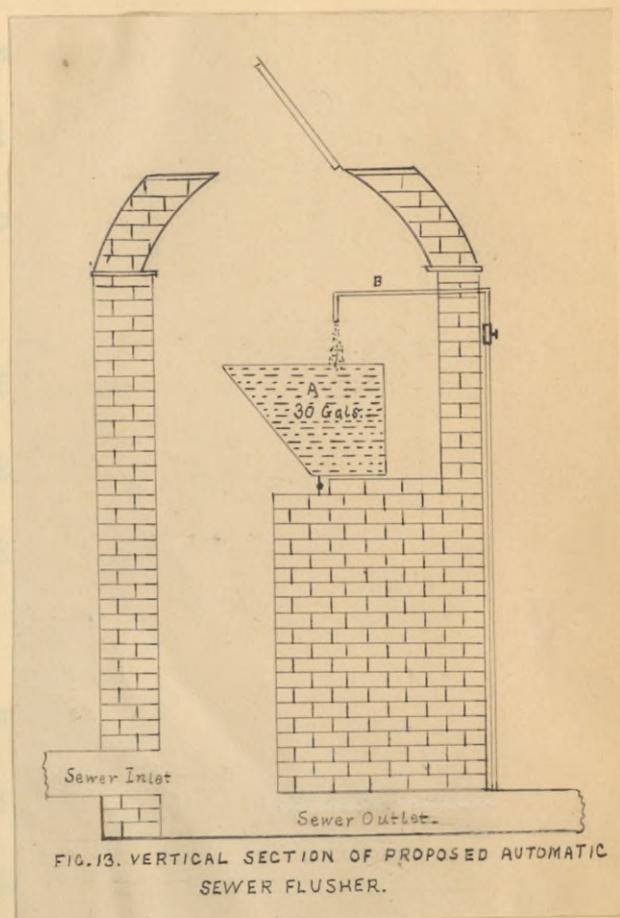
The main sewer runs at an angle of  $70^{\circ}$  to the officers' line, from the manhole in the rear of the guard house to a manhole near the rear of the hay corral, whence it passes into the river in a direct line. The main sewer consists of 1594 feet of 6-inch pipe.

The fall of the sewer is six inches to every fifty feet.

There are five manholes in the system, each three by four feet and of a depth varying according to the depth of the sewer at that point. They are located (1) at a point halfway between the hospital and the barracks, (2) at the southeast end of the barracks, (3) in the rear of the guard-house, (4) fifty yards beyond the southeast end of the officers' line and (5) near the eastern corner of the hay corral. They are simple rectangular pits with brick walls faced with Portland cement, with which they are also floored. The sewer pipes open into them at the level of the floor. They are covered with heavy iron gratings so that, with the exception of the second one which is covered by a plank platform, they also act as ventilators.

The entire system of pipes is flushed weekly by plugging the ingress pipe in each manhole in succession and playing into the manhole with a 2-inch hose. The flushing thus obtained is very inefficient and the introduction of a tumbler automatic flushing tank into each

manhole has been recommended by the medical officer. The arrangement proposed, as shown in Fig. 13, is simple and inexpensive. The tank, A, is so balanced that when filled it will automatically empty itself into the sewer, returning to its original position to be filled again. By varying the amount of the flow from the water pipe, B, the time required for filling the tank, A, can be regulat-



ed to occur at any desired interval, each discharge throwing thirty gallons of water into the manhole, completely filling and scouring out the pipe emerging from it.

At the hospital, besides the kitchen sinks, the bathroom and lavatories, one urinal empties into the sewer. At each set of barracks it

receives the waste from the kitchen sinks and the bath houses. At the enlisted men's general sink, it receives the contents of six urinals. At the guard house it receives the waste of the bath room, and a little farther on the guard house urinal. Each set of officers' quarters discharges into the sewer three pipes, one each from the bath room, the kitchen sink and the urinal. At the non-commissioned staff officers' quarters, the sewer receives the waste from the kitchen sinks and the bathrooms.

The urinals in the closets of the officers, and the hospital are the Demarest Patent Porcelain Flat Back, Lipped Urinals with non-automatic flushers. In the general sink the old pattern, Mott Flat Back Lipped Enamelled Iron Urinals are used. Most of the sewer connections are made by means of 1½-inch iron pipes intercepted by simple traps; but in a number of instances latterly, a 3-inch lead pipe suitably trapped, has been used for this purpose. There are no grease traps.

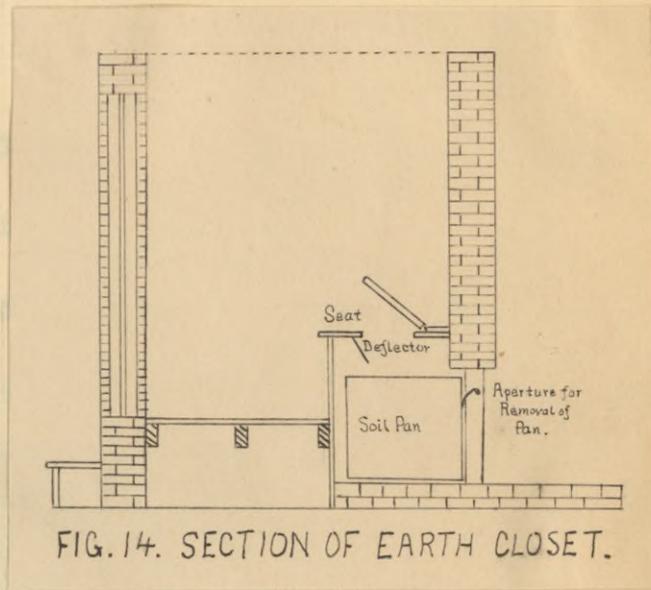
The waste of the settling tanks is disposed of through a special drain as already stated, and that of the engine house is discharged by its own pipes into the river.

The cost of the material and labor, required for the construction

of the system of fluid sewerage, was approximately \$3275 00.

The earth closet method is employed for the disposal of night soil. Each set of officers' quarters is provided with one or two earth closets, the hospital has two and the large general sink contains twelve. Under each seat stands a galvanized iron pan, 18 by 24 by 16 inches,

as seen in Fig. 14, into which the dejections fall. Boxes of dry earth with scoops are provided in the closets and the excrement is kept covered and practically in-odorous. No urine separator is employed, sufficient earth being



used to take up the fluid. Under the aperture in each seat is fixed a tin deflector which turns the urine back into each pan. These receptacles are washed, deodorized and disinfected at frequent intervals as required. A civilian scavenger removes their contents nightly and carts them to a pit about a mile from the Post, where he dumps them. When one pit is filled a new one is excavated

Disposal of Garbage.-- Back of each set of officer's quarters and the barracks has been constructed for solid refuse a brick receptacle, four

feet square and two feet deep, with a galvanized iron door at the top to permit dumping, and another at the front to facilitate removal of the waste which includes garbage and ashes. This is carted away daily to a point near the night soil pit, where the garbage soon becomes desiccated by the sun.

The stable refuse is carted to the same point as the garbage. The piles of manure are allowed to dry here until they are readily inflammable, when they are ignited and reduced to ashes.

Description of Buildings.-- Fort Ringgold is an exceptionally well-built post, all the buildings, with the exception of the chapel, the



FIG. 15. THE POST HOSPITAL. FRONT VIEW.

hospital stewards quarters and two relics of the old Ringgold Barracks -- the "Lee House" and the old quartermasters' storehouse.-- being con-

structed of brick manufactured in the vicinity. Galleries supported by Moorish arches lend a most picturesque effect to many of them. To afford relief from the reflected sunlight and heat, they are lime-washed a neutral gray. None of them except the hospital-, commissary-, and quartermasters'-storehouses have cellars or basements and for climatic rea-

sons no parts of them are affected with dampness. In the plan of the Post is indicated in



FIG. 16. INTERIOR OF NORTHEAST WARD OF POST HOSPITAL.

a general way the ground plan of all the buildings.

The Hospital, with its accessory buildings, is one of the most complete in the service. Built, with some deviations, upon the approved plans for the accommodation of twenty four beds, the hospital proper

consists of four distinct buildings connected by galleries twelve feet wide supported by Moorish arches. The one story wards, 44 by 26 by 14



FIG. 17. THE POST HOSPITAL. REAR VIEW.

feet, having at their outer ends a lavatory and an isolation room, each 10 by 8½ feet, flank the two story administration building, 35 by 35 feet, which contains on the first floor an office, a dispensary and a storeroom each 14 by 14, a storeroom, 20 by 14, and two halls respectively 15 by 5 and 35 by 5½ feet,

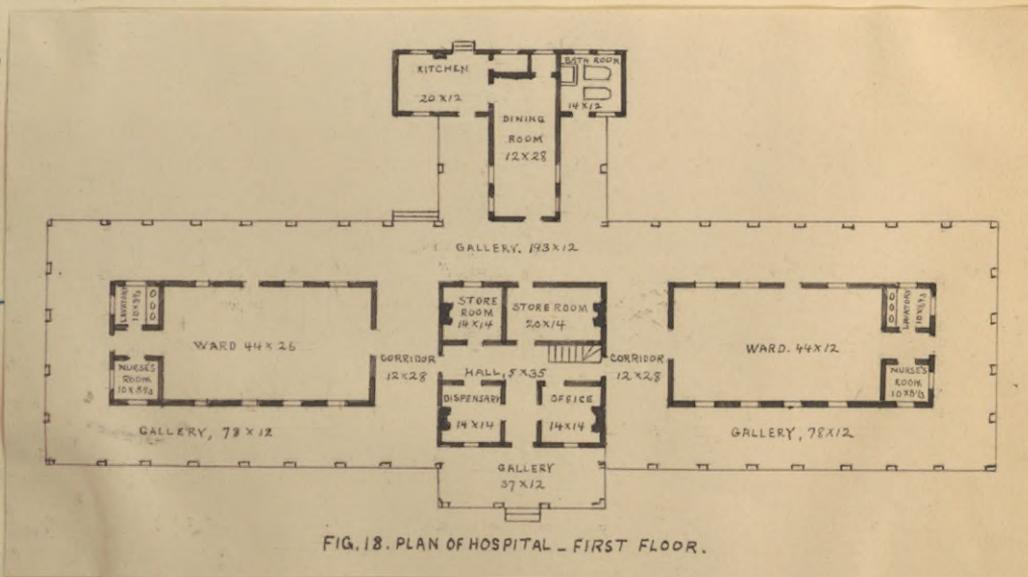


FIG. 18. PLAN OF HOSPITAL - FIRST FLOOR.

all 11 feet high; on the second floor are rooms and halls identical

with those on the first floor, while an attic covering the whole second story is floored and shelved for storage. In the rear is the Mess Building containing a dining room, 28 by 12, a kitchen, 20 by 12, two

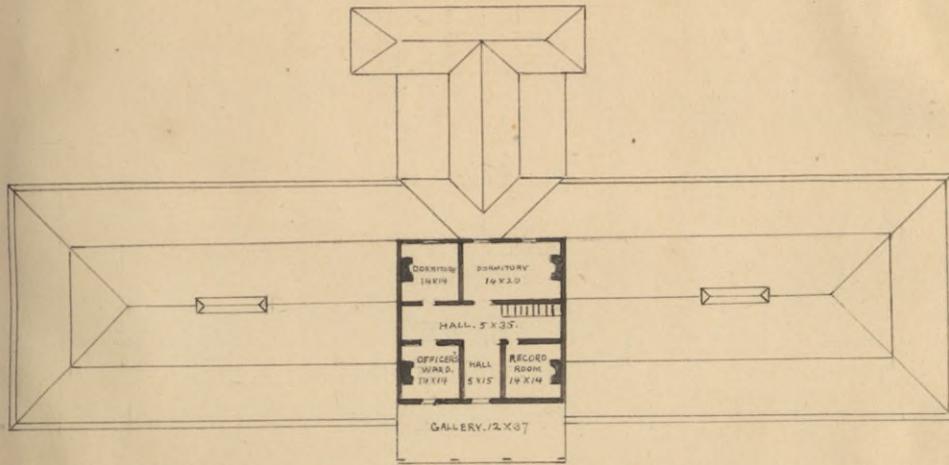


FIG. 19. PLAN OF HOSPITAL - SECOND FLOOR.

pantries, 6 by 6, and 6 by 5½, and a bathroom, 14 by 12 feet, all 11 feet high. The

lavatories, the rooms of the administration building, the bathroom and the kitchen are connected with the water and sewerage systems, the latter by simple S-traps. In this place, where life in the open air is possible all

sible all

the year

around, the

questions



FIG. 20. PLAN OF HOSPITAL - LATERAL SECTION.

of ventilation and heating cut a very insignificant figure. Ridge ventilation is supplied in each ward by an air shaft 13 by 3½ feet, extending 7 feet up to the ridge, where ten small windows permit the

passage of air. The windows of the ward, numerous and very large, are open the entire year and afford unlimited perflation. The amount of fresh air thus supplied to patients is entirely ample, the perfect ventilation of the structure being shown by the entire absence of the "hospital odor". Heat is supplied on the rare occasions when it is needed, by a large box stove in the center of



FIG. 21. THE DEADHOUSE.

the ward, the pipe opening into a round galvanized iron chimney passing up through the center of the air shaft. Each of the rooms in the

administration building is provided with a small fireplace.

The hospital is enclosed by a picket fence 300 by 380 feet, the following buildings being included in the enclosure: the sink, the dead house,



FIG. 22. THE HOSPITAL STOREHOUSE.

the storehouse, the stable and hen house, the hospital steward's quarters and the post chapel.

The Sink is a brick building, 22 by 12, containing at each end an

earth closet, 4 by 10, and in the middle a urinal, 12 by 10 feet. It is 96 feet from the hospital and plans and estimates have been submitted for connecting the buildings by a latticed corridor

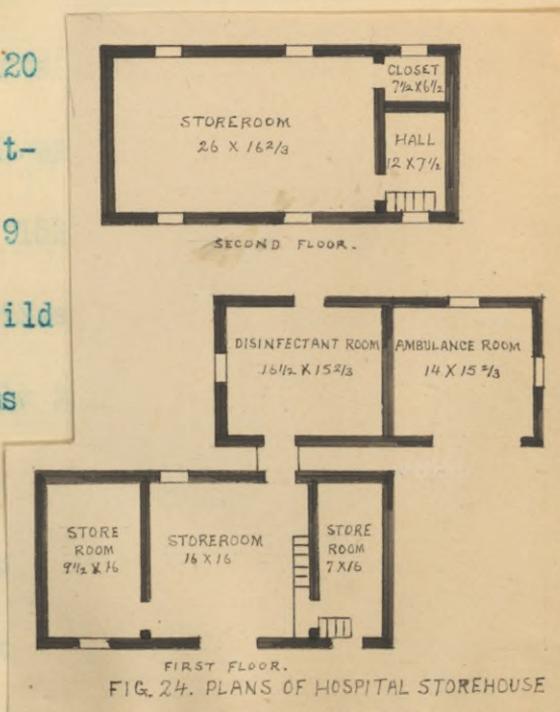


FIG. 23. THE HOSPITAL STOREHOUSE WITH AMBULANCE ROOM.

ing the buildings by a latticed corridor

The Dead House is a brick building, 20 by 16 by 9½ feet with a brick floor. Attached to it is a frame lean-to 20 by 9 feet. Estimates for connecting this building with the water and sewerage systems and for flooring it with impervious cement have been forwarded.

The Storehouse really consists of two adjacent detached brick buildings.

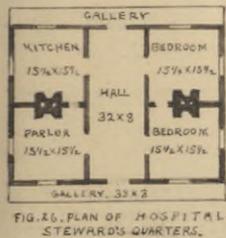


The storehouse proper has two stories, the lower  $10\frac{1}{2}$  and the upper  $11\frac{1}{2}$  feet high; on the first floor are three rooms, 16 by 7, 16 by 16, and 16 by  $9\frac{1}{2}$  feet, the latter covering an unused cellar 8 feet deep; the second story has three rooms, 26 by  $16\frac{1}{2}$ ,  $6\frac{1}{2}$  by  $7\frac{1}{2}$  and 12 by  $7\frac{1}{2}$  feet. In the rear and northeast of this building is a one story structure, containing a disinfectant storeroom,  $15\frac{1}{2}$  by  $16\frac{1}{2}$  and an ambulance room, 14 by  $15\frac{1}{2}$ , feet, both  $9\frac{1}{2}$  feet high.



FIG. 25. HOSPITAL STEWARD'S QUARTERS.

The Stable and Hen House is a rude frame structure 12 by 41 feet.



The Hospital Steward's Quarters consist of a one story frame building, 33 by 32 feet, containing a hall 32 by 8 and four rooms,  $15\frac{1}{2}$  by  $15\frac{1}{2}$  feet, all 12 feet high.

Galleries 8 feet deep run across the entire front and rear.

The Chapel is a frame structure 50 by 24 feet, 11 feet high at the eaves. It is a mere shell and during the greater part of the year is consequently so hot as to be uninhabitable. It is used also as a schoolhouse but is so illy adapted to both purposes that it should be torn down and replaced by a suitable brick edifice with a tiled roof.

The old Post Trader's Building does not belong to the government,

but it should be purchased for the use of the Post Exchange, which is now located in



FIG. 27. THE POST CHAPEL.

quarters so inadequate as to be an actual encouragement to mismanagement.

The building has one story, is L-shaped and of brick, the longer branch



FIG. 28. THE POST TRADER'S STORE.

116 by 18 feet, facing the barracks and the shorter, 87 by 15 feet facing the hospital. It contains twelve rooms averaging 15 feet square and is constructed very conscientiously with a view to the very purposes



FIG. 29. THE BARRACKS.

for which the Post Exchange is designed.

The Barracks are handsome two story brick buildings with two story galleries in front and behind, the lower gallery faced with Moorish

arches. They are 136 by 35 feet

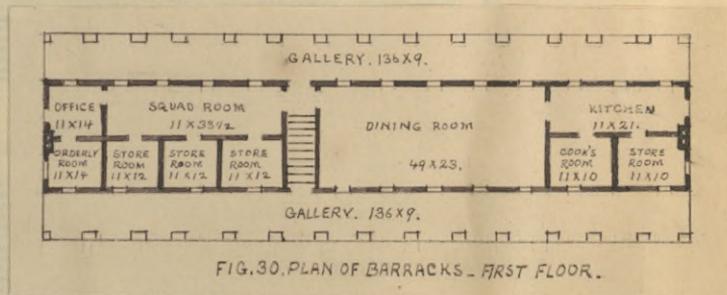
increased on each side by the galleries, 9 feet wide. The

first floor contains an office

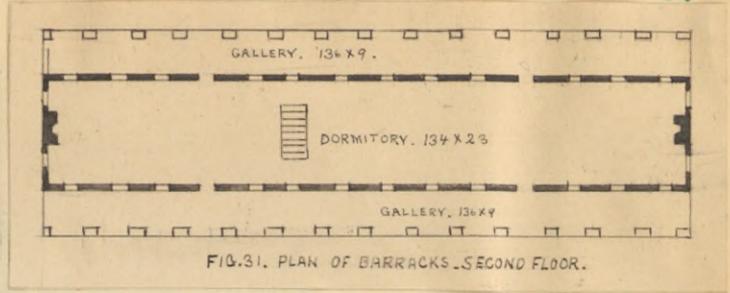
and a dormitory each 11 by 14 feet, a squadroom 11 by 38½ feet, three

storerooms each 11 by 12 feet, a stairway 5½ feet wide passing up the

middle, a dining room, 49 by 23 feet, a kitchen, 11 by 21 feet and two

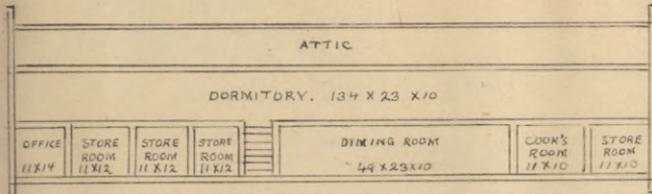


storerooms each 11 by 10 feet. The second story comprises the dormitory, 134 by 23. Each story is 10 feet high.



Of the accessory buildings in

the rear of each set of barracks the larger, built originally for a kit-



chen, is 24 by 35 feet. The bath house is 15 by 21 feet and a third building, used for vari-

ous purposes, is of the same size.



FIG. 33. INTERIOR OF THE POST EXCHANGE.

Three of the four barracks are occupied by two troops of cavalry and a company of infantry. The first floor of the fourth is occupied by



FIG. 34. THE GENERAL SINK.

the tele-  
graph of-  
fice, the  
Post Ex-  
change and  
the Post  
Library,  
none of

which are properly accommodated. The second floor and the accessory build-  
ings are occupied by the Seminole Negro-Indian Scouts.

The General Sink for enlisted  
men is a one story brick building,  
45 by 22 feet, with doorways, 6  
feet wide at either end, protected

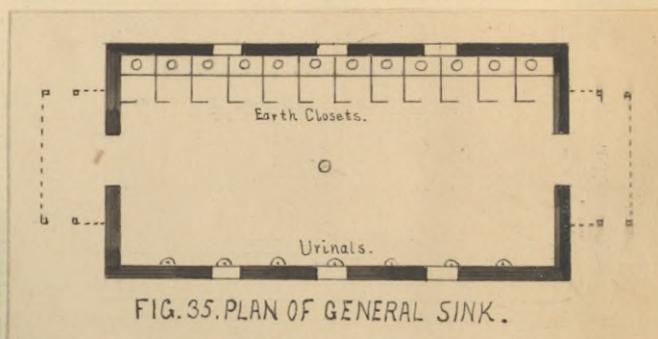


FIG. 35. PLAN OF GENERAL SINK.

by lattice work, three windows  $1\frac{1}{2}$  by  $3\frac{1}{2}$  feet, five feet from the floor on  
either side, and ample ridge ventilation above. It accommodates twelve  
earth closets on one side and six urinals on the other. It is floored  
with impervious Portland cement. There being no absorptive material

in its construction, it can be kept perfectly clean, and is at all times almost entirely free from odor of any kind.

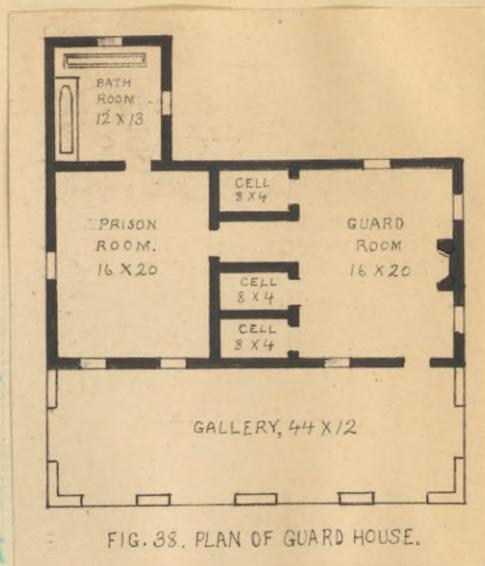


FIG. 36. THE BAKERY.



FIG. 37. THE GUARDHOUSE.

The Bakery is a one story building, 36 by 30 feet, containing a bakeroom, 34 by 16 feet with two ovens having a capacity of 150 rations each, an issue room and a baker's room each  $13\frac{1}{2}$  by 16 feet, and a hall 6 by 16 feet, all 10 feet high. A gallery, 9 feet wide, with Moorish arches extends across the front



The Guard House is a one story brick building, 44 by 22 feet, and contains a guard room and a prison room each 16 by 20 feet and three cells, 8 by 4 feet; it has a prisoner's bathroom, 12 by 13 feet in the rear, and a 12-foot wide gallery with Moorish arches in front.

The Adjutant's Office is a one-story brick building, 54 by 20 feet



FIG. 39. THE ADJUTANT'S OFFICE.

divided into three rooms 17 by 18 feet and surrounded by a wooden gallery 8 feet wide.



FIG. 40. FRONT VIEW OF OFFICERS' QUARTERS.

The Officers' Quarters are, with two exceptions one-and-a-half story brick buildings, 54 by 39 feet, with a wooden gallery, 12 feet wide run-



FIG. 41. REAR VIEW OF OFFICERS' QUARTERS.

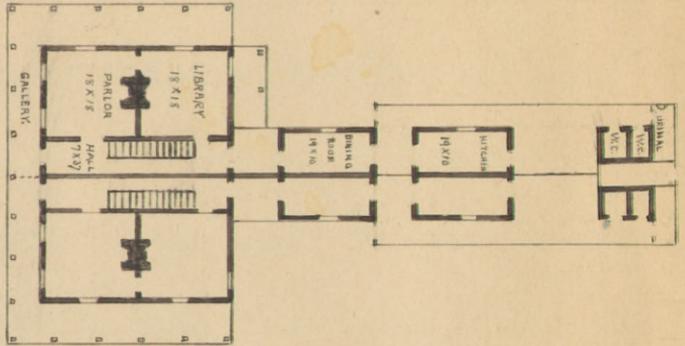


FIG. 42. FIRST FLOOR.

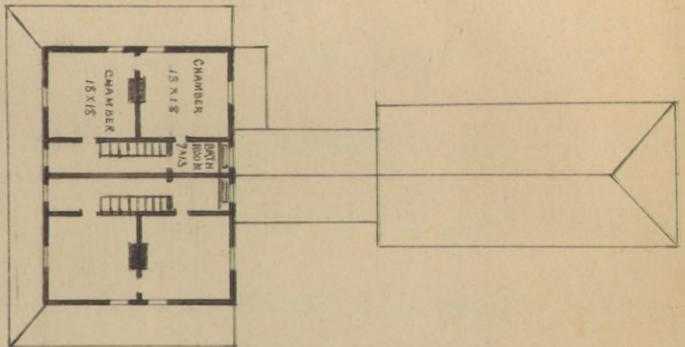


FIG. 43. SECOND FLOOR.

PLANS OF OFFICERS' QUARTERS.

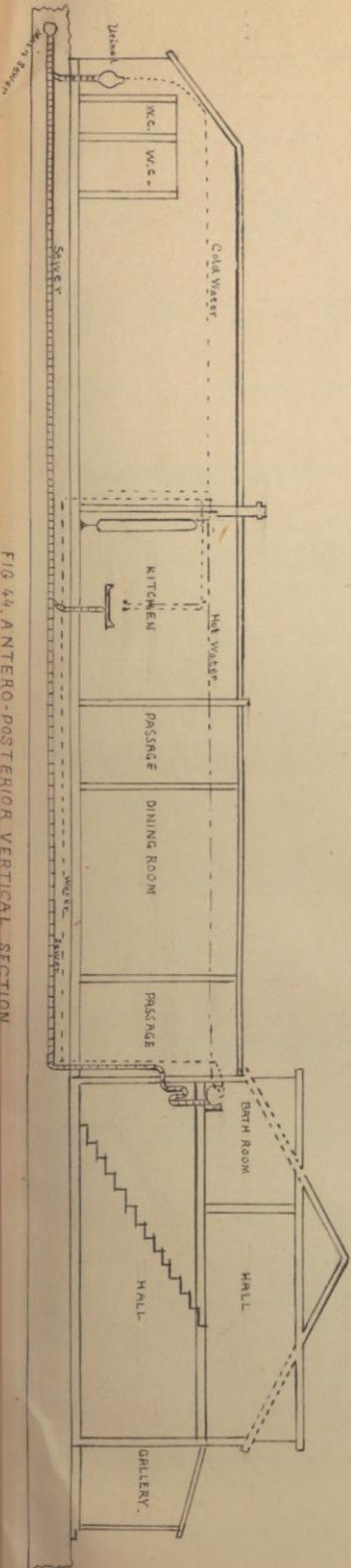


FIG. 44. ANTERO-POSTERIOR VERTICAL SECTION.

ning around three sides, the structure being divided into two equal sets, each containing on the first floor two rooms, 18 by 18 and a hall 7 by 37 feet, all 12 feet high; on the second floor are two rooms 18 by 18, a bathroom 7 by 13, and a hall 7 by 26 feet, all 10 feet high under the ridge and sloping to  $3\frac{1}{2}$  feet at the front and rear. From the rear runs an extension 100 feet long and 30 feet wide enclosed in lattice work and suitably roofed; under this roof, on each side, is a dining room and a kitchen, each 19 by 10 feet, two earth closets and a urinal, two passage ways and a free space corresponding to the ordinary backyard. The half story is so low as to be almost uninhabitable during the greater part of the year. Upon the recommendation of the medical officer, estimates have been submitted for elevating the quarters to two full stories. And on account of being entirely cut off from the prevailing wind, which blows from the southeast and brings the only relief from the torrid heat of eight months of the year, the northwest side of each double set of quarters is practically uninhabitable for the greater part of the year. The uselessness of these northwest quarters is an emphatic evidence of the futility of building double sets of quarters in the southern posts.

Of the other two sets of quarters, the Commanding Officer's Quarters

are practically the same as two sets of ordinary quarters with a single central hall of 10 feet in width instead of two halls.



FIG. 45. THE COMMANDING OFFICER'S QUARTERS.

Recently a New Set of Officers' Quarters has been constructed, consisting of two distinct two story buildings connected by a latticed passage and surrounded on **three** sides by a two story gallery. The front building contains on the first floor two rooms 18 by 18 feet, a hall 22 by 10 feet and a "den" 10 by 11 feet all 13 feet high; on the second floor are two rooms 18 by 16½ feet, each with a closet 2 by 4 feet, a bathroom, 10 by 11, a dressing room 10 by 10 and a hall 10 by 11 feet, all 10 feet high. In the rear building is a kitchen and laundry, each 16 by 16 and on the second floor two bedrooms respectively 16 by 13½

and 16 by 10½ feet. There is also a roofed and latticed extension in which are the earth closets and the urinal.



FIG. 46. THE NEW TWO-STORY QUARTERS.

The Commissary Storehouse is an exceptionally well constructed brick



FIG. 47. THE COMMISSARY STOREHOUSE.  
AND ROOT HOUSE.

building, 128 by 35 feet, containing two offices, 16 by 16, an issue-

room, 42 by 32, a storeroom, 67 by 32, and a cemented cellar, 48 by 32 feet. The roof of the building is covered by clay tiles, over which lies a superficial layer of roofing tin, rendering it almost impervious to heat. The Commissary Root House is a brick building



FIG. 48. INTERIOR OF COMMISSARY STOREHOUSE.

34 by 20 feet, with two stories respectively 6 and 8 feet high, for the storage of onions and potatoes.

The Quartermasters' Storehouse is a two story brick building, 20 by 20 feet with two one story wings each 80 by 20, and with a wooden back gallery, 180 by 12 feet. Back of this is a covered platform,

180 by 15 feet for temporary storage, a roadway 15½ feet wide running



FIG. 49. QUARTERMASTERS' STOREHOUSE.



FIG. 50. INTERIOR OF QUARTERMASTERS' STOREHOUSE.

between it and the storehouse proper. A smaller frame storehouse is 100 by 30, twenty feet in one end being cut off for a plumber's shop.



FIG. 51. QUARTERMASTERS' GRANARY AND SHOPS.

The Blacksmith, Carpenter and Paint Shops are finely constructed one story brick buildings each 50 by 22 feet. The Granary is a similar building, 40 by 35 feet, and estimates have been submitted for doubling its length.



FIG. 52. THE STABLES.

The Stables are two brick-walled enclosures, 134 by 225 feet. Along either side are stalls roofed over but open at the rear and sides, They

will accommodate 160 horses. In the center of the quartermasters' enclosure stands a wagon shed, 100 by 20 feet, roofed with galvanized iron and open on one end and both sides.

The Engine House (Fig. 6) in which the ice machine is also located, is a handsome cruciform brick building, the branches being 60 by 20 feet each with a gallery supported by Moorish arches in



front. The boilers are situated in the northwest branch, the Dean pump for river water in the southwest branch the ice machine in the southeast branch, the Worthington

FIG. 53. THE ORDNANCE STOREHOUSE.



FIG. 54. NON-COMMISSIONED STAFF OFFICERS' QUARTERS.

pump for clarified water in the center, and the wood-sawing apparatus in the northeast branch and the front gallery

The Ordnance Magazine is a round brick building, 31 feet in diame-

ter with a height at the eaves of 12 feet, four feet of which are sunken below the level of the ground, the whole structure being surrounded by a high earthen embankment, 15 feet thick; the entrance, made through an angular passage way, 4 feet wide, is covered by the embankment.

The Non-Commissioned Staff Officers' Quarters are of brick and consist of a main portion, 50 by 18 feet, containing three rooms 16½ by 16½, with a leanto in the rear, 12 by 16 feet.



FIG. 55. THE MARRIED SOLDIERS' QUARTERS

The Married Soldiers' Quarters are situated in a one story brick block, 205 by 36 feet, divided into twelve sets of two rooms, each 16 by 16 feet. They are paved with brick and have a porch 6 feet wide in the front and rear. To afford ample facilities for laundry work, a hydrant and a sewer opening is located between each two sets of quarters.

The "Lee House", 50 by 18 feet, with two rooms 18 by 20 and a hall, 18 by 10 feet, is little more than a ruin and will probably fall to



FIG. 56. THE "LEE HOUSE".

pieces before many years. Two small frame structures on the river bank are occupied respectively by the engineer and the blacksmith.

Food of the Troops.-- The garrison is well fed. The ration, with the additional articles purchased by ample company funds, and the produce of the post gardens, furnishes the men with an entirely satisfactory dietary. When in any instance an organization has been found to be illy fed, investigation has invariably shown gross neglect on the part of the responsible officers. The quantity has been ample, the quality satisfactory and the mode of preparation excellent. The following bill of fare shows the diet of the garrison for ten days, selected at random, and is a fair example of the average food of the soldier here.

Wednesday, May 3, 1893.

Breakfast: Oatmeal Mush with Milk and Sugar. Irish Stew. Fried Fish. Stewed Tomatoes. Pancakes with Syrup. Bread and Coffee.

Dinner: Vegetable Soup. Roast Beef. Gravy. Mashed Potatoes. Baked Bacon and Beans. Stewed Corn. Lettuce. Mince Pie. Bread and Coffee.

Supper: Fried Beef. Meat Stew. Hamburg Steak. Fried Liver. Baked Macaroni with Cheese. Apple Sauce. Bread, Coffee and Tea.

Thursday, May 4, 1893.

Breakfast: Oatmeal Mush with Milk and Sugar. Boiled Mackerel. Gravy. Boiled Eggs. Fried Onions. Bread and Coffee.

Dinner: Roast Beef. Dried Beef. Baked Potatoes. Fried Potatoes. Cabbage. Baked Macaroni and Cheese. Pickled Beets. Stewed Corn. Radishes. Bread and Coffee.

Supper: Beef Hash. Boiled Bacon. Fried Potatoes. Boiled Potatoes. Pickled Beets. Bread and Coffee.

Friday, May 5, 1893

Breakfast: Oatmeal Mush with Milk and Sugar. Irish Stew. Beef Hash. Chile con Carne. Bread and Coffee.

Dinner: Vermicelli Soup. Roast Beef. Gravy, Baked Potatoes. Mashed Potatoes. Stewed Tomatoes. Bread and Coffee.

Supper: Irish Stew. Codfish Balls. Biscuit. Syrup. Rice Pudding. Bread and Coffee.

Saturday, May 6, 1893.

Breakfast: Oatmeal Mush with Milk and Sugar. Beef Hash. Dried Beef. Fried Eggs. Stewed Tomatoes. Bread and Coffee.

Dinner: Vegetable Soup. Roast Beef. Boiled Bacon. Scrambled Eggs. Fried Potatoes. Young Onions. Peach Pie. Bread and Coffee.

Supper. Liver and Bacon. Beef Hash. Raw Tomatoes. Peach Sauce. Bread, Coffee and Tea.

Sunday, May 7, 1893.

Breakfast: Oatmeal Mush with Milk and Sugar. Beef Steak. Meat Stew. Gravy. Fried Potatoes. Bread and Coffee.

Dinner: Baked Bacon and Beans. Roast Beef. Gravy. Baked Potatoes Plum Pudding. Ice Cream. Bread and Coffee.

Supper: Fried Beef. Cold Roast Beef. Gravy. Fried Potatoes. Baked Macaroni with Cheese. Apple Pie. Bread and Coffee.

Monday, May 8, 1893.

Breakfast: Oatmeal Mush with Milk and Sugar. Fresh Pork, Fried. Beef-Hash. Bread and Coffee.

Dinner: Roast Beef. Baked Fresh Pork. Gravy. Baked Potatoes. Cabbage. Macaroni with Cheese. Radishes. Bread and Coffee.

Supper: Boiled Salt Mackerel . Cold Baked Pork. Irish Stew. Bread, Coffee and Tea.

Tuesday, May 9, 1893.

Breakfast: Oatmeal Mush with Milk and Sugar. Fried Catfish. Meat and Potato Stew. Beef Hash. Bread and Coffee.

Dinner: Vegetable Soup. Roast Beef. Gravy. Boiled Potatoes. Boiled Macaroni. Lettuce. Radishes. Tapioca Pudding. Bread and Coffee.

Supper: Fried Beef. Gravy. Fried Potatoes. Bread. Maple Syrup and Coffee.

Wednesday, May 10, 1893.

Breakfast: Oatmeal Mush with Milk and Sugar. Beef Hash. Gravy. Sauer Kraut. Bread and Coffee.

Dinner: Pea Soup. Boiled Beef. Bacon and Beans. Gravy. Baked Potatoes. Baked Macaroni with Cheese. Cornstarch Pudding. Bread and Coffee.

Supper: Beef Steak. Irish Stew. Beef Hash. Fried Potatoes. Macaroni. Mixed Pickles, Radishes. Bread, Coffee and T<sup>e</sup>a.

Thursday, May 11, 1893.

Breakfast: Oatmeal Mush with Milk and Sugar. Meat Stew. Beef and Potato Hash. Scrambled Eggs. Stewed Corn. Bread and Coffee.

Dinner: Vegetable Soup. Fried Beef. Boiled Bacon, Boiled Potatoes. Cabbage. Boiled Macaroni. Pickled Beets. Lettuce. Bread and Coffee.

Supper: Roast Beef. Gravy. Fried Mutton. Baked Potatoes. Fried Potatoes. Bread and Coffee.

Friday, May 12, 1893.

Breakfast. Oatmeal Mush with Milk and Sugar. Beef Hash. Codfish Hash. Bread and Coffee.

Dinner: Bean Soup: Roast Beef. Gravy. Boiled Potatoes. Young onions. Lettuce. Bread and Coffee.

Supper. Liver and Bacon. Boiled Hominy. Fried Potatoes. Corn Bread. Syrup, Bread and Coffee.

The Gardens produce two crops a year and yield almost every veg-

etable, except potatoes which can not be raised here. From time to time, deficiencies have occurred in the commissary supplies, as has been noticed in the monthly sanitary reports, but it is believed that timely requisitions upon the Subsistence Department will obviate such troubles in future. The so-called List B of articles which the Subsistence Department will purchase for organizations upon the officers' certificate that they will pay for the goods when received, regardless of their condition or quality, would be a most valuable adjunct to our sources of supply; but the agreement to pay for the articles regardless of their condition permits the delivery of damaged or unsuitable goods without redress. These articles are not likely to become spoiled in the short time intervening between their purchase and their delivery, and it should be possible to return them to the seller, unless they can be shown to have become spoiled en route.

The organizations at Fort Ringgold have fair cooks and the meals are well served, a good average being preserved through frequent inspections by the company and medical officers. No diseases attributable to the food have appeared.

The resources of the company kitchen are supplemented at the will of the soldier by purchases from the Post Exchange, which is largely

patronized and keeps, in addition to beer and tobacco, a stock of nuts and confectionary, cheese and bologna sausage, sandwiches and pies, pigs feet, pretzels and occasional other delicacies not furnished at the company messes. Light drinks, such as cider, ginger ale and soda water are also obtainable.

Arrangements for Securing Personal Cleanliness.-- Each company is provided with a rather rudely fitted bath house, 15 by 21 feet, containing a zinc lined trough about 12 by 6 inches by 10 feet, a shower bath and two porcelain-lined bath tubs. Sixty gallon boilers, attached to the kitchen ranges have been connected with the bath houses during the past year, but the amount of hot water thus supplied, while ample during the hot season, is insufficient during the cool months. Recommendations have been made for the consolidation of the three bath houses into a single one with abundant boiler connections, which would remedy this defect. There should not be more than one or two tubs in the new bath house, but the number of shower baths should be increased to six or eight. The advantages of the shower bath are very striking: its economy is shown by the facts that the expense of tubs is avoided, less space is demanded, less water is required, no time is needed to prepare it and but little labor to clean it. Its greater efficiency is shown

by the facts that both the mechanical effect of the descending stream and the contact with none but clean water aid in the removal of the unclean particles, the immediate removal of the unclean matter vastly diminishes the danger of communicating disease, and the tonic effect -- especially if cold water be used at the end of the bath -- is notably greater than that of a tub bath.

The guard house has, during the present year been supplied with a bath room, 12 by 13 feet, containing a zinc-lined tub. The substitution of a shower bath for the tub is urged for the reasons adduced above, which are particularly weighty in this case.

The hospital is fitted with an exceptionally satisfactory bath room, containing two porcelain lined bath tubs with hot and cold water connections, and a shower bath which will leave nothing to be desired when the repairs for which estimates have been submitted, are completed. A lavatory at the outer end of each ward contains three porcelain lined washbowls with proper connections. The hot water boiler has 60 gallons capacity.

Each set of officer's quarters has at the rear end of the second story hall a bath room, supplied with a zinc-lined bath tub with hot and cold water connections, the boiler in these cases having a capacity of

30 gallons.

The laundry work is done by soldiers' wives , living in the Post, and by Mexican women living in the adjoining town. The prices are moderate and the work is well done.

Clothing of the Troops -- At this Post, The clothing of the soldier is no inconsiderable item, an extra uniform being demanded by the hot

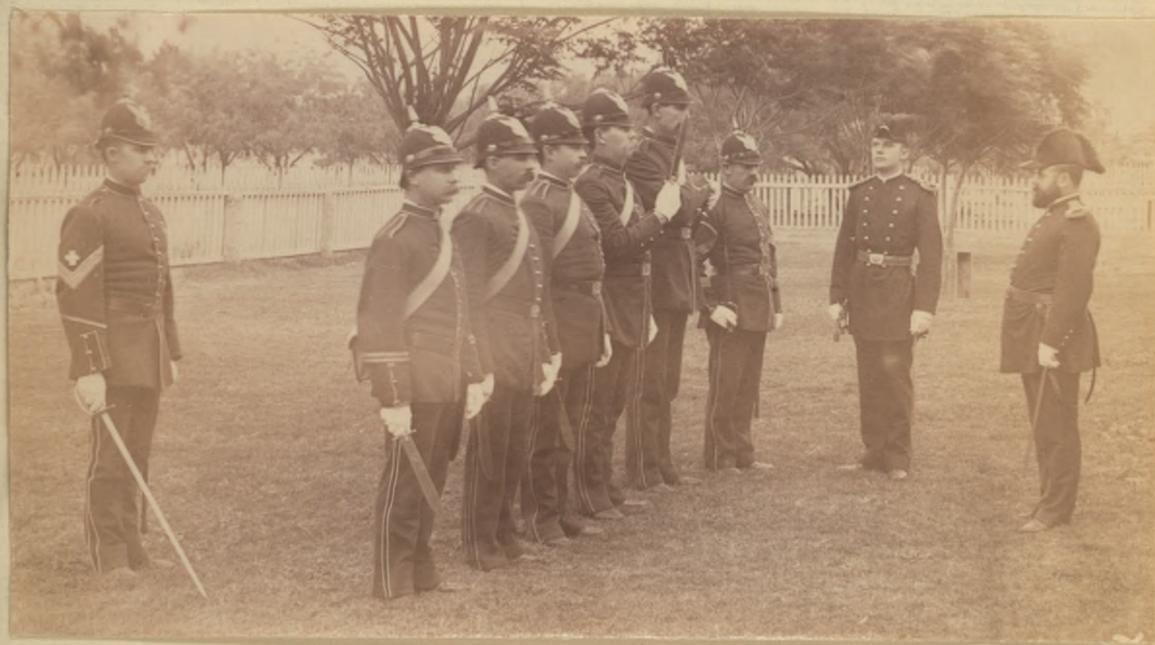


FIG. 57. THE HOSPITAL CORPS AT MONTHLY INSPECTION, SHOWING THE FULL DRESS UNIFORM FROM THE FRONT.

climate. In addition to the Dress and Fatigue Uniforms worn in more temperate localities, the light white duck Summer Uniform is absolutely essential. So many articles of apparel are required that it is often difficult for the soldier to find storage room for them all. Nevertheless, since the issue of the summer uniform, but little complaint of the clo-

thing has been heard; it is now worn during the greater portion of the year

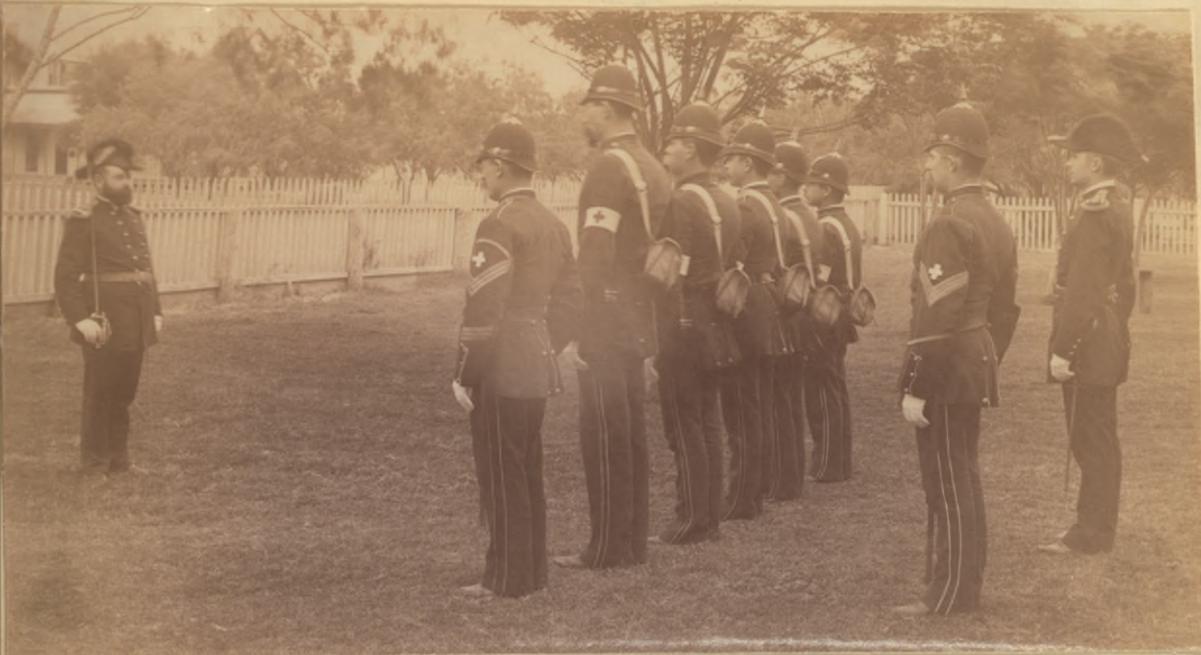


FIG. 58. THE HOSPITAL CORPS AT MONTHLY INSPECTION, SHOWING THE FULL DRESS UNIFORM FROM THE REAR



FIG. 59. THE HOSPITAL CORPS AT MONTHLY INSPECTION, SHOWING THE WHITE SUMMER UNIFORM FROM THE FRONT.

The head covering is the only portion of the attire to which exception is taken. The white helmet is too heavy for comfort during the



FIG. 60. THE HOSPITAL CORPS AT MONTHLY INSPECTION, SHOWING THE WHITE SUMMER UNIFORM FROM THE REAR.



FIG. 61. THE HOSPITAL CORPS AT MONTHLY INSPECTION, SHOWING THE HEAVY MARCHING ORDER.

very hot weather and the ordinary straw hat, obtainable in town, is not properly ventilated. The light chip helmet covered with a thin white fabric, known as the "Leavenworth Helmet", seems to be a complete solution of the problem of summer headgear. This hat is permitted to be worn in the Post and is kept on sale at the Post Exchange. Its issue by the quartermasters' department is recommended.

Preventable Causes of Disease.-- Frequent cases of small pox occur among the Mexicans of the country surrounding the Post. But the efficient vaccination of the garrison has prevented its introduction among the troops. The contagion of a mild form of gonorrhoea, however, is not so easily avoided. This disease is extremely prevalent among the enlisted men, although the cases rarely come under the observation of the medical officer, unless some of the sequelae develop; bubo is the most common complication and is a frequent entry upon the sick-report. The number of loose women in the town is about equal to the strength of the garrison and the social evil is proportionately rampant. Many of the men go through a form of marriage with the wretched creatures and assume positions at the head of families varying in size from one to a dozen.

With regard to the use of intoxicants, this command apparently

maintains about the same average as others. While perhaps the amount of actual inebriety is not greater than it was prior to the establishment of the Post Exchange, careful and unprejudiced observation has enforced the conviction that the facilities afforded by that institution are a direct encouragement to tippling and extravagance. It is a simple law of ethics that temptation is the stronger in the presence of the coveted object. When an officer assumes charge of the Post Exchange here it has been observed that his Exchange bill is habitually more than doubled.. The enlisted men now make few deposits with the paymaster. The conspicuous existence of the Post Exchange with its alluring opportunities for exhilaration, is a constant temptation to the soldier, drawing largely both upon his leisure and his purse. The main occupation there is beer drinking and even when other amusements are in the lead, that beverage is invariably an important accessory. Steady drinking without much extreme intoxication is the rule. Most of the drunkenness occurs in "chronics", who are weeded out as rapidly as legal measures will permit.

Drill and other forms of Post duty have a favorable effect upon the health of the garrison. Field duty in a number of instances has been productive of sickness directly due to impure water, exposure or over-

exertion. In the summer months, any kind of labor during the heated portion of the day, affects the troops deleteriously, and for that reason it has been customary to suspend all duty except the necessary guard in the middle of the day and in the early afternoon; in this case, however, it would be rather the climate than the duty that would be responsible for the unfavorable effect upon the health of the command.

Post Gymnasium.-- There is no gymnasium properly speaking. In the chaparral between the post trader's store and the barracks, some crude gymnastic apparatus has been erected, consisting of a leaping rope, a vertical pole, a horizontal beam, a horizontal bar, parallel bars, a trapeze, a pair of rings, etc. They are not very popular with the men, who require encouragement and tuition in order to develop an interest in athletics. A course of instruction in physical training had been arranged for the last two winters, but on each occasion, the prolonged absence of most of the garrison in the field has rendered the plan inoperative. It is believed that the introduction and extension of systematic physical training will be of incalculable benefit to both officers and men. In December, 1892, a special report by the writer to the Surgeon General on the Building of the Soldier, contained a detail-

ed consideration of the advantages of military physical training epitomizing the results as follows: "The influence of the enlargement of the chest alone can not be computed; the greater expansion permitted to the lungs, the greater play allowed the heart, the greater amount of oxygen introduced into the system, the greater excretion of effete matter



FIG. 62. THE POST GYMNASIUM.

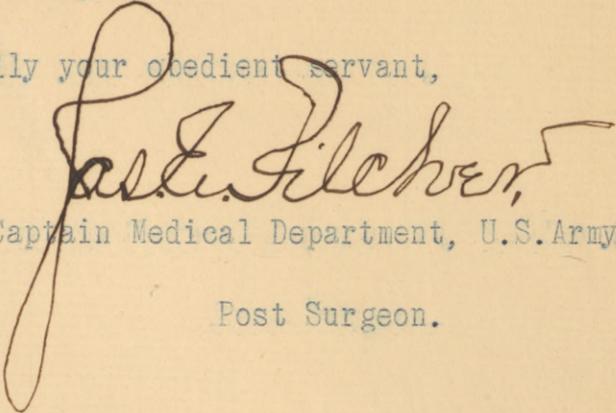
from the blood, with their secondary effect upon every cell and organ of the body can not be expressed. The increased girth of the extremities is not the only factor in their added strength, for it does not take into account the firmness and contractile power gained even before the growth began. The quickened sympathy between the brain and the muscles can not

be shown by any test. The suppleness, the agility, the self-confidence, that have developed, can not be expressed by any figures. The added keenness of perception, the comfort, joy, delight, which existence itself gives, can not be estimated, much less represented". Physical training might with advantage be substituted for much of the drill, which the soldier now goes through with in a merely perfunctory manner. With the accentuated mental activity and increased physical self-control obtained from the previous bodily culture, a far greater efficiency in drill could be obtained in a much less time than is now required, leaving the remaining and larger portion for the development of a well-balanced and complete manhood.

**Conclusion.**-- From the foregoing consideration, it will be seen that Fort Ringgold is situated in an arid country with an exasperating climate, some compensation for which is present in a Post of exceptionally complete construction and unusually thorough equipment. But neither convenience of construction nor perfection of equipment can make Fort Ringgold an agreeable station; they can only mitigate a condition of discomfort. Its inaccessibility, its ever-present drouth, its never-absent dust, its blazing heat for eight months, and its rapid thermometrical variations for four are all elements in a most trying whole. The Medical

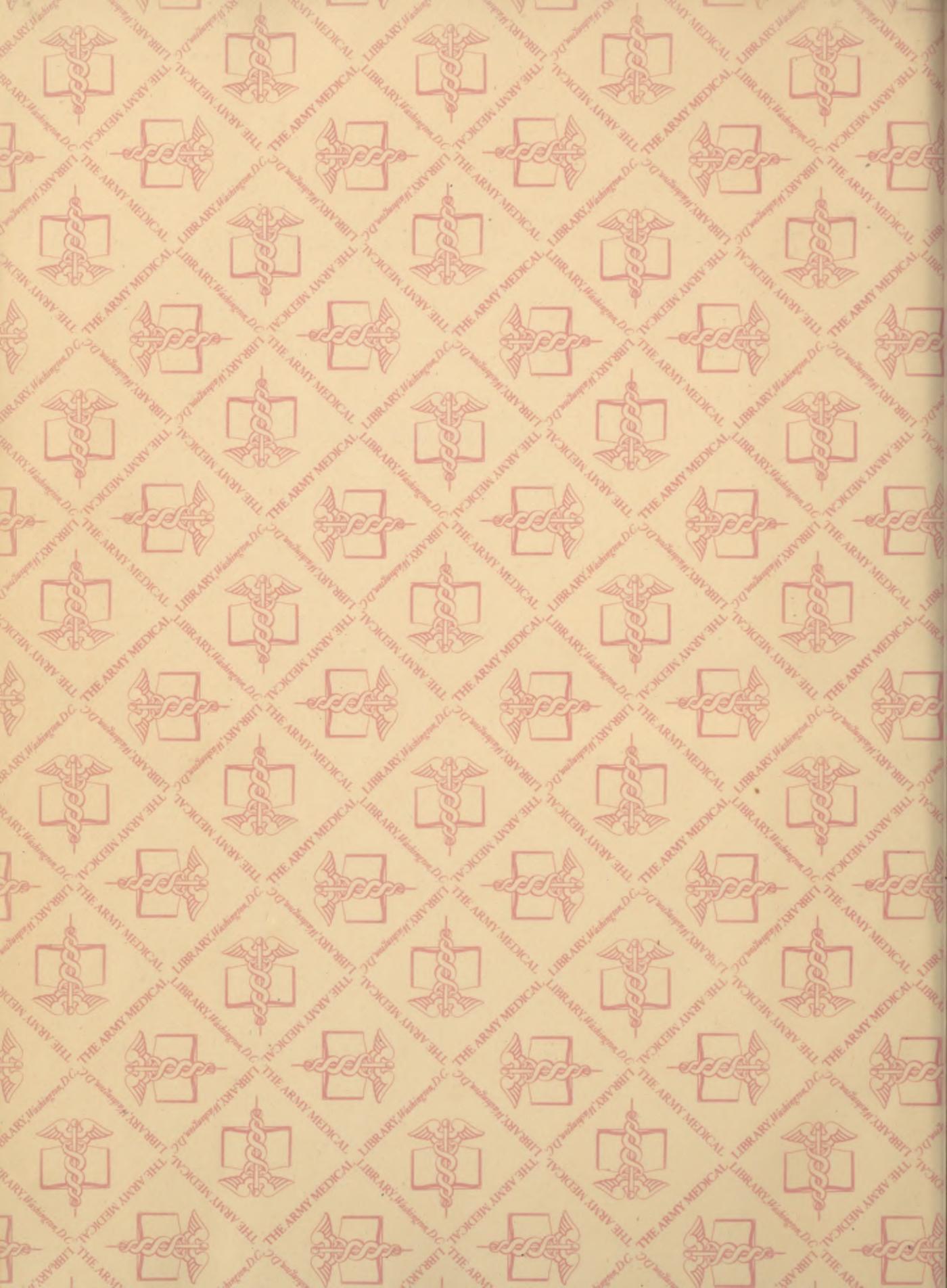
Director has recommended that no troops be retained at this Post for a longer period than two years, and the mental debility, moral alienation, and physical degeneracy, habitually resulting from a prolonged residence here, confirm the wisdom of his opinion.

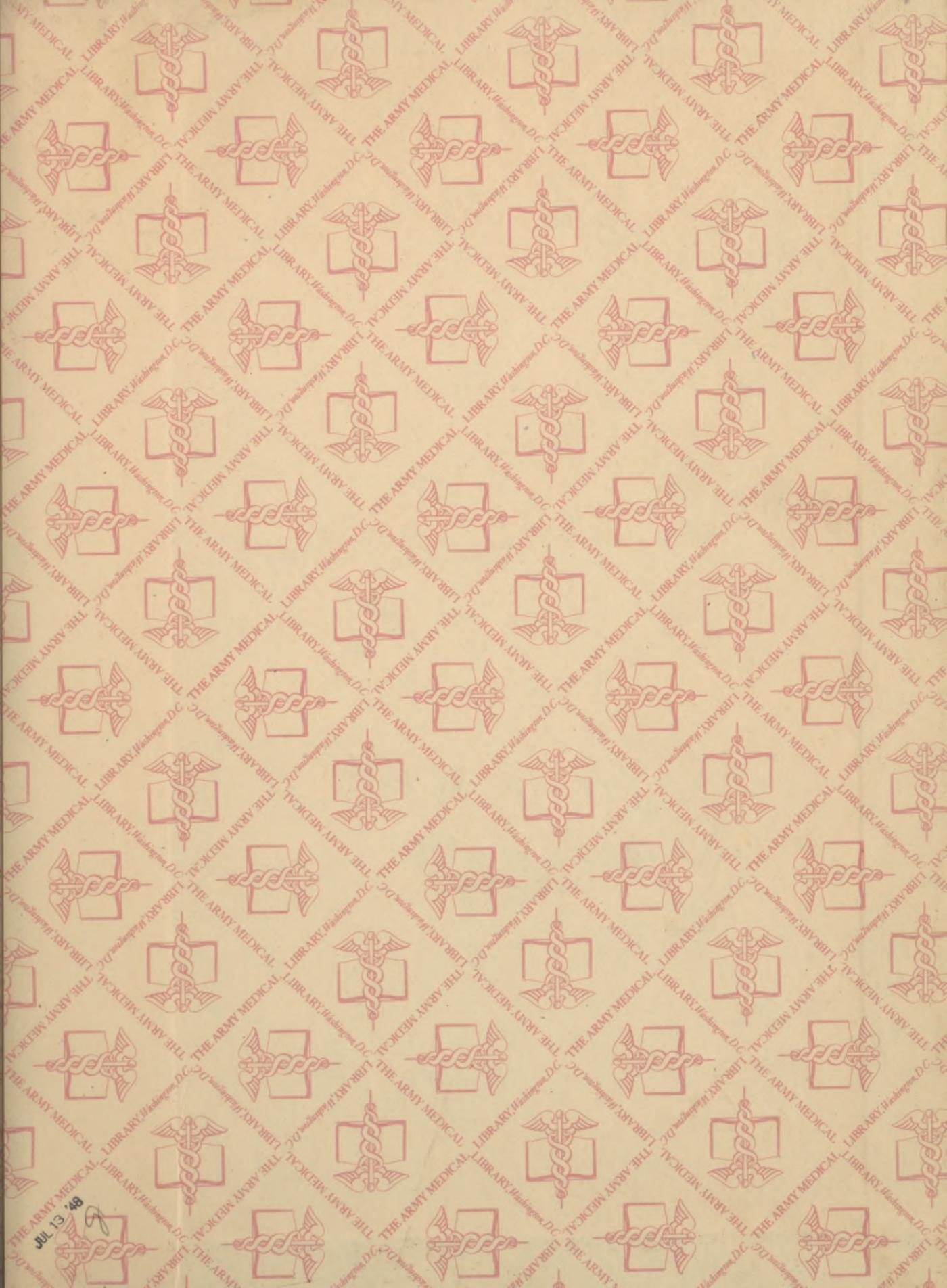
I am, Sir, very respectfully your obedient servant,

  
Captain Medical Department, U.S. Army,

Post Surgeon.







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