

July 16, 1957

H. E. B. SCOTT

2,799,208

VORTEX TYPE SEPARATORS

Filed April 29, 1955

3 Sheets-Sheet 1

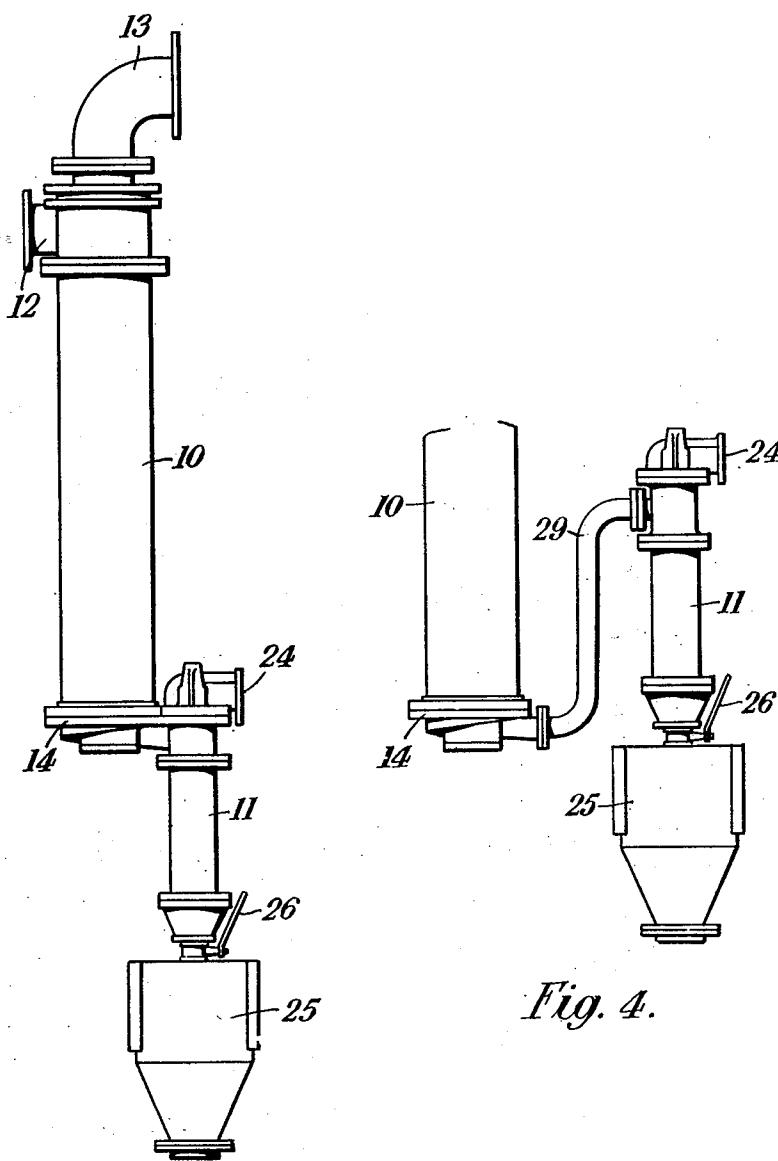


Fig. 1.

HAROLD ERIC BALIOL SCOTT,
INVENTOR.

By: Ross Churay
ATTY

July 16, 1957

H. E. B. SCOTT

2,799,208

VORTEX TYPE SEPARATORS

Filed April 29, 1955

3 Sheets-Sheet 2

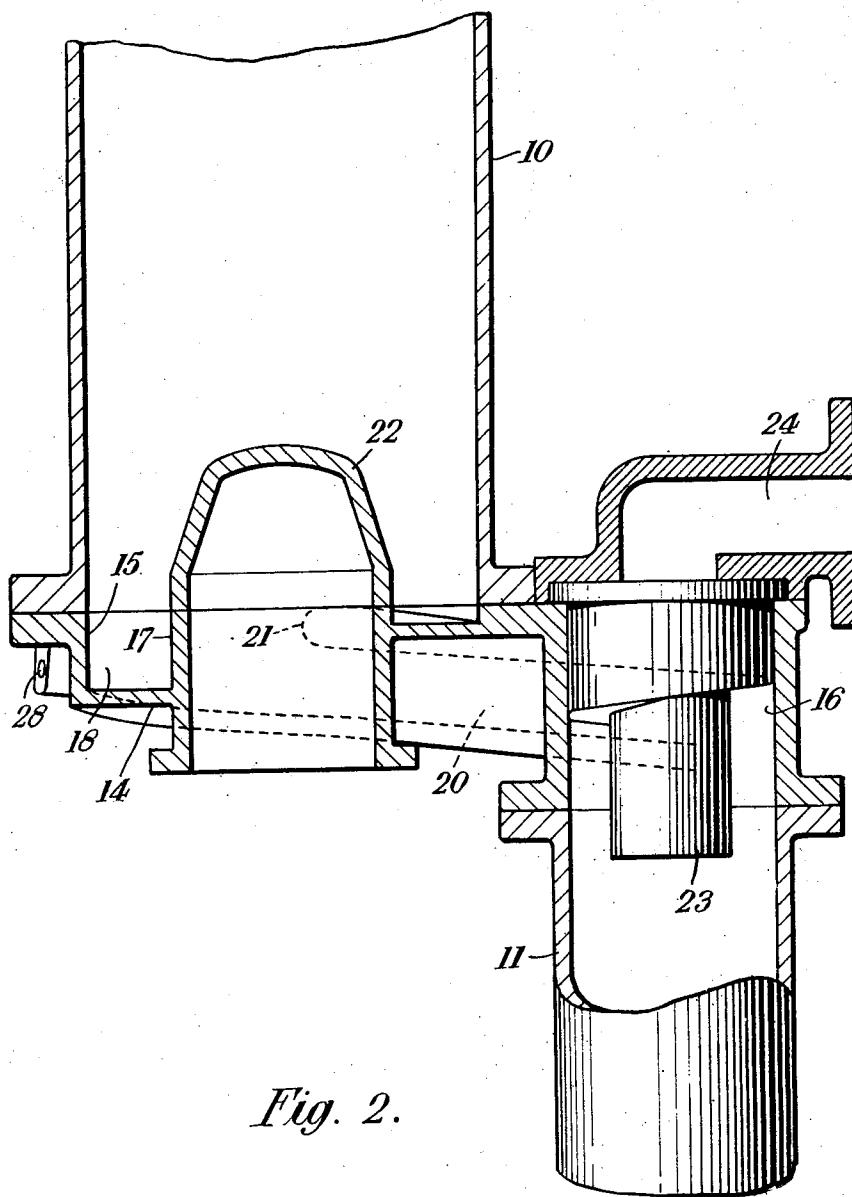


Fig. 2.

HAROLD ERIC BALIOL SCOTT
INVENTOR

By: Rosa C. Hurrey
ATTY

July 16, 1957

H. E. B. SCOTT

2,799,208

VORTEX TYPE SEPARATORS

Filed April 29, 1955

3 Sheets-Sheet 3

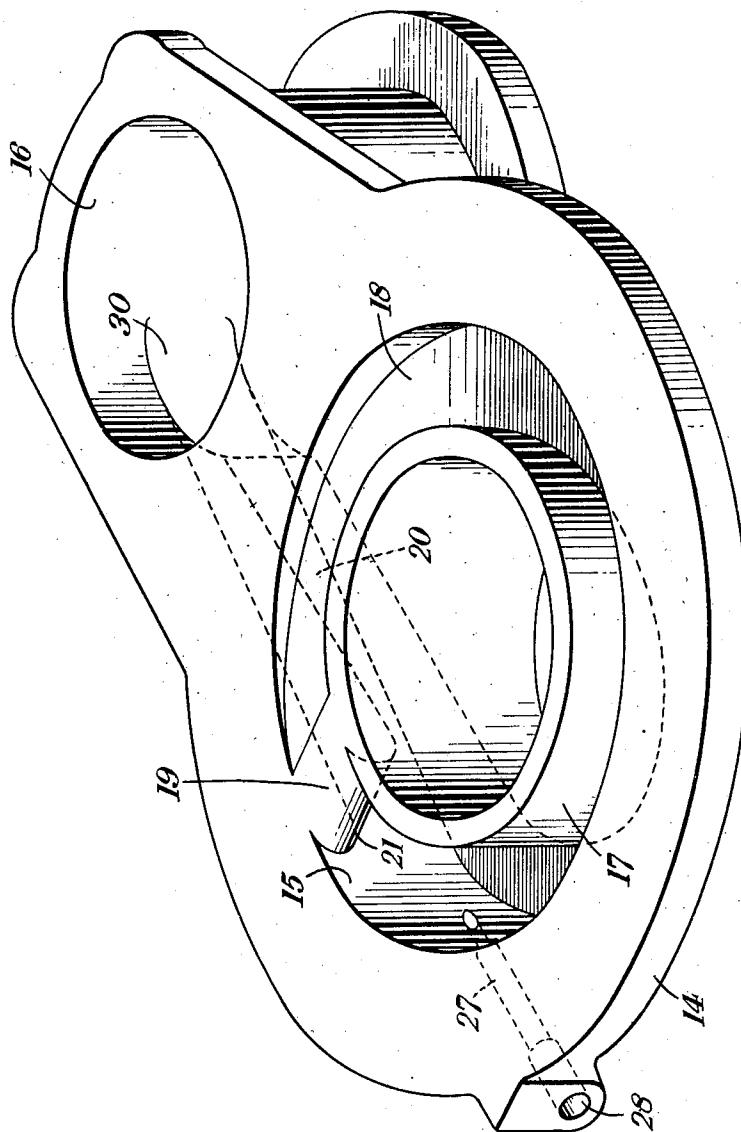


Fig. 3.

HAROLD ERIC BALIOL SCOTT,
INVENTOR

By: Ross C. Murray
ATTY.

United States Patent Office

2,799,208
Patented July 16, 1957

1

2,799,208

VORTEX TYPE SEPARATORS

Harold Eric Baliol Scott, The Heath, Weybridge, England

Application April 29, 1955, Serial No. 504,999

14 Claims. (Cl. 92—28)

This invention relates to vortex type separators for cleaning paper pulp. Such machines comprise an upright vortex chamber of circular section, having at its upper end a tangential pulp inlet and a central pulp outlet for withdrawing purified stock upwardly from the vortex chamber. The impurities in the stock, herein termed "dirt," are thrown outwardly by centrifugal force towards the inner wall of the vortex chamber and are removed at the bottom of the vortex chamber. Vortex type separators are also known comprising a main vortex chamber of this kind and a secondary vortex chamber, the dirt and some good stock being discharged through a tangential outlet at the base of the main vortex chamber to the tangential inlet of the secondary vortex chamber for further purification and purified stock leaving the secondary vortex chamber through a central outlet at its upper end.

Experience has shown, however, that when a tangential outlet for the dirt is provided at the base of the main vortex chamber, some of the dirt fails to pass through the outlet and tends to accumulate in the base of the chamber and to swirl round causing wear by abrasion.

With a view to avoiding this disadvantage, the base of the main vortex chamber is provided according to the invention with a circumferential helicoidal groove of progressively increasing depth, constituting the outlet for the dirt and leading, without change of direction, into a transfer passage communicating with the secondary vortex chamber. Consequently, as the dirt, travelling in a helical path down the inner wall of the vortex chamber, reaches the bottom thereof it continues to travel downwards in a helical path along the inclined undersurface of the groove and so into the transfer passage. The dirt accordingly travels in a smooth manner and without change of direction until it has entered the transfer passage and is therefore prevented from remaining in and swirling round in the base of the main vortex chamber.

The subsidiary vortex chamber may be located remotely from the main vortex chamber and connected thereto by a pipe connecting the transfer passage and the inlet to the secondary chamber. Preferably, however, a common member, conveniently a casting, constitutes the base of the main chamber and the upper portion of the secondary chamber.

Two embodiments of vortex type separator according to the invention will now be described in more detail, by way of example, with reference to the accompanying drawings, in which:

Fig. 1 is a side elevation of the first embodiment of separator,

Fig. 2 is a vertical section on a larger scale through the base of the main vortex chamber and the upper portion of the secondary vortex chamber.

Fig. 3 is a perspective view, on a still larger scale, through the member, common to the two vortex chambers, through which dirt is discharged from the main to the secondary vortex chamber and

2

Fig. 4 is a side elevation of the second embodiment of separator.

Like reference numerals indicate like parts throughout the figures.

5 The separator shown in Figs. 1-3 comprises a main cylindrical vortex chamber 10 and a secondary cylindrical vortex chamber 11. At the upper end of the main vortex chamber are provided the usual tangential inlet 12 for the pulp to be treated and central outlet 13 for upward withdrawal of purified pulp. The two vortex chambers are connected by a common casting 14 which, as shown most clearly in Fig. 3, is formed with a large hole 15 of the same diameter as the internal diameter of the main vortex chamber 10 and a laterally offset smaller hole 16 of the same diameter as the internal diameter of the secondary vortex chamber 11. In the large hole 15 is an annular wall 17, spaced inwardly from the wall of the hole 15 and defining with it a helicoidal circumferential groove 18. The two walls are jointed by a radial member 19 flush with their upper ends and the groove 18 increases gradually in depth, starting at the right hand side of the member 19 (as seen in Fig. 3) and passing below the member, where it leads into a transfer passage 20 communicating with the smaller hole 16. The member 19 thus constitutes the upper end of the inlet to the transfer passage 20. As shown it has a rounded nose 21 presenting a convex surface towards the circumferential groove 18. This is of value where the separator has to deal with long fibres.

20

25

30

35

40

As shown in Fig. 2, a central upstanding baffle 22 is provided at the base of the main vortex chamber in order to cause the vortex to terminate at a level above the base and so provide tranquil conditions at the entrance to the transfer passage 20. The baffle 22, which is fitted to the top of the annular wall 17, may be of any known shape e. g. mushroom shape, and in the case of coarse paper or board stock it is conveniently, as shown, in the form of a truncated cone. The upper end of the baffle 22 is preferably of wear resistant material, as the vortex terminates on the upper end of the baffle.

45

50

55

60

65

70

75

80

85

90

95

100

105

110

115

120

125

130

135

140

145

150

155

160

165

170

175

180

185

190

195

200

205

210

215

220

225

230

235

240

245

250

255

260

265

270

275

280

285

290

295

300

305

310

315

320

325

330

335

340

345

350

355

360

365

370

375

380

385

390

395

400

405

410

415

420

425

430

435

440

445

450

455

460

465

470

475

480

485

490

495

500

505

510

515

520

525

530

535

540

545

550

555

560

565

570

575

580

585

590

595

600

605

610

615

620

625

630

635

640

645

650

655

660

665

670

675

680

685

690

695

700

705

710

715

720

725

730

735

740

745

750

755

760

765

770

775

780

785

790

795

800

805

810

815

820

825

830

835

840

845

850

855

860

865

870

875

880

885

890

895

900

905

910

915

920

925

930

935

940

945

950

955

960

965

970

975

980

985

990

995

1000

1005

1010

1015

1020

1025

1030

1035

1040

1045

1050

1055

1060

1065

1070

1075

1080

1085

1090

1095

1100

1105

1110

1115

1120

1125

1130

1135

1140

1145

1150

1155

1160

1165

1170

1175

1180

1185

1190

1195

1200

1205

1210

1215

1220

1225

1230

1235

1240

1245

1250

1255

1260

1265

1270

1275

1280

1285

1290

1295

1300

1305

1310

1315

1320

1325

1330

1335

1340

1345

1350

1355

1360

1365

1370

1375

1380

1385

1390

1395

1400

1405

1410

1415

1420

1425

1430

1435

1440

1445

1450

1455

1460

1465

1470

1475

1480

1485

1490

1495

1500

1505

1510

1515

1520

1525

1530

1535

1540

1545

1550

1555

1560

1565

1570

1575

1580

1585

1590

1595

1600

1605

1610

1615

1620

1625

1630

1635

1640

1645

1650

1655

1660

1665

1670

1675

1680

1685

1690

1695

1700

1705

1710

1715

1720

1725

1730

1735

1740

1745

1750

1755

1760

1765

1770

1775

1780

1785

1790

1795

1800

1805

1810

1815

1820

1825

1830

1835

1840

1845

1850

1855

1860

1865

1870

1875

1880

1885

1890

1895

1900

1905

1910

1915

1920

1925

1930

1935

1940

1945

1950

1955

1960

1965

1970

1975

1980

1985

1990

1995

2000

2005

2010

2015

2020

2025

2030

2035

2040

2045

2050

2055

2060

2065

2070

2075

2080

2085

2090

2095

2100

2105

2110

2115

2120

2125

2130

2135

2140

2145

2150

2155

2160

2165

2170

2175

2180

2185

2190

2195

2200

2205

2210

2215

2220

2225

2230

2235

2240

2245

2250

2255

2260

2265

2270

2275

2280

2285

2290

2295

2300

2305

2310

2315

2320

2325

2330

2335

2340

2345

2350

2355

2360

2365

2370

2375

2380

2385

2390

2395

2400

2405

2410

2415

2420

2425

2430

2435

2440

2445

2450

2455

2460

2465

2470

2475

2480

2485

2490

2495

2500

2505

2510

2515

2520

2525

2530

2535

2540

2545

2550

2555

2560

2565

2570

2575

2580

2585

2590

2595

2600

2605

2610

2615

2620

2625

2630

2635

2640

2645

2650

2655

2660

2665

2670

2675

2680

2685

2690

2695

2700

2705

2710

2715

2720

2725

2730

2735

2740

2745

2750

2755

2760

2765

2770

2775

2780

2785

2790

2795

2800

2805

2810

2815

2820

2825

2830

2835

2840

2845

2850

2855

2860

2865

2870

2875

2880

2885

2890

2895

2900

2905

2910

2915

2920

2925

2930

2935

2940

2945

2950

2955

2960

2965

2970

2975

2980

2985

2990

2995

3000

3005

3010

3015

3020

3025

3030

3035

3040

3045

3050

3055

3060

3065

3070

3075

3080

3085

3090

3095

3100

3105

3110

3115

3120

3125

3130

3135

3140

3145

3150

3155

3160

3165

3170

3175

3180

3185

3190

3195

3200

3205

3210

3215

3220

3225

3230

3235

3240

3245

3250

3255

3260

3265

3270

3275

3280

3285

3290

3295

3300

3305

3310

3315

3320

3325

3330

3335

3340

3345

3350

3355

3360

3365

3370

3375

3380

3385

3390

3395

3400

3405

3410

3415

3420

3425

3430

3435

3440

3445

3450

3455

3460

3465

3470

3475

3480

3485

3490

3495

3500

3505

3510

3515

3520

3525

3530

3535

3540

3545

3550

3555

3560

3565

3570

3575

3580

3585

3590

3595

3600

3605

3610

3615

3620

3625

3630

3635

3640

3645

3650

3655

3660

3665

3670

3675

3680

3685

3690

3695

3700

3705

3710

3715

3720

3725

3730

3735

3740

3745

3750

3755

3760

3765

3770

3775

3780

3785

3790

3795

3800

3805

3810

3815

3820

3825

3830

3835

3840

3845

3850

3855

3860

3865

3870

3875

3880

3885

3890

3895

3900

3905

3910

3915

3920

3925

3930

3935

3940

3945

3950

3955

3960

3965

3970

3975

3980

3985

3990

3995

4000

4005

4010

4015

4020

4025

4030

4035

4040

4045

4050

4055

4060

4065

4070

4075

4080

4085

4090

4095

4100

4105

4110

4115

4120

4125

4130

4135

4140

4145

4150

4155

4160

4165

4170

4175

4180

4185

4190

4195

4200

4205

4210

4215

4220

4225

4230

4235

4240

4245

4250

4255

4260

4265

4270

4275

4280

4285

4290

4295

4300

4305

4310

4315

4320

4325

4330

4335

4340

4345

4350

4355

4360

4365

4370

4375

4380

4385

4390

4395

4400

4405

4410

4415

4420

4425

4430

4435

4440

4445

4450

4455

4460

4465

4470

4475

4480

4485

4490

4495

4500

4505

4510

4515

4520

4525

4530

4535

4540

4545

4550

4555

4560

4565

4570

4575

4580

4585

4590

4595

4600

4605

4610

4615

4620

4625

4630

4635

4640

4645

4650

4655

4660

4665

4670

4675

4680

4685

4690

4695

4700

4705

4710

4715

4720

4725

4730

4735

4740

4745

4750

4755

4760

4765

4770

4775

4780

4785

4790

4795

4800

4805

4810

4815

4820

4825

4830

4835

4840

4845

4850

4855

4860

4865

4870

4875

4880

4885

4890

4895

4900

4905

4910

4915

4920

4925

4930

4935

4940

4945

4950

4955

4960

4965

4970

4975

4980

4985

4990

4995

5000

5005

5010

5015

5020

5025

5030

5035

5040

5045

5050

5055

5060

5065

5070

5075

5080

5085

5090

5095

5100

5105

5110

5115

5120

5125

5130

5135

5140

5145

5150

5155

5160

5165

5170

5175

5180

5185

5190

5195

5200

5205

5210

5215

5220

5225

5230

5235

5240

5245

5250

5255

5260

5265

5270

5275

5280

5285

5290

5295

5300

5305

5310

5315

5320

5325

5330

5335

5340

5345

5350

5355

5360

5365

5370

5375

5380

5385

5390

5395

5400

5405

5410

5415

5420

5425

5430

5435

5440

5445

5450

5455

5460

5465

5470

5475

5480

5485

5490

5495

5500

5505

5510

5515

5520

5525

5530

5535

5540

5545

5550

5555

5560</p

by using a higher water pressure, an ejector action is obtained which increases the rate of flow along the transfer passage 20 and also the velocity of the stock into the secondary vortex chamber 11. The higher velocity into the secondary vortex chamber 11 increases the centrifugal force which gives a better separation of the dirt.

The separator shown in Fig. 4 differs from that so far described in one respect only. The secondary vortex chamber 11 is disposed remotely from the main vortex chamber 10 and the dirt flows from the transfer passage 10 to the inlet of the secondary vortex chamber through a pipe 29 connecting the two vortex chambers.

I claim:

1. A vortex type separator for paper pulp comprising: a main vortex chamber; a secondary vortex chamber having a tangential inlet; a transfer passage by which the lower end of said main vortex chamber communicates with the inlet of said secondary vortex chamber, said transfer passage being tangential with respect to said main vortex chamber, the base of said main vortex chamber having a circumferential, helicoidal groove of progressively increasing depth constituting an outlet for dirt and communicating with said transfer passage, the pitch of said groove being such that the bottom of the groove comes flush with the bottom of the transfer passage in substantially one turn of the groove around the main vortex chamber.

2. A vortex type separator according to claim 1, in which the secondary vortex chamber is remote from the main vortex chamber and the transfer passage communicates by means of a pipe with the inlet to the secondary vortex chamber.

3. A vortex type separator according to claim 1 in which the upper surface of the inlet end of said transfer passage is rounded to present a convex surface toward said groove.

4. A vortex type separator according to claim 1 including a central, upstanding baffle at the base of said main vortex chamber.

5. A vortex type separator according to claim 1 including a nozzle mounted in the base of said main vortex chamber for injecting dilution fluid into said circumferential groove.

6. A vortex type separator according to claim 1 including a nozzle mounted in the base of said main vortex chamber for injecting dilution fluid into said transfer passage beyond the inlet thereof.

7. A vortex type separator for paper pulp comprising: a main vortex chamber; a secondary vortex chamber having a tangential inlet; a transfer passage by which the lower end of said main vortex chamber communicates with

the inlet of said secondary vortex chamber, said transfer passage being tangential with respect to said main vortex chamber, the base of said main vortex chamber having a circumferential, helicoidal groove of progressively increasing depth constituting an outlet for dirt and communicating with said transfer passage, said helicoidal groove and transfer passage being provided in a common member, constituting the base of the main vortex chamber and the upper portion of the secondary vortex chamber.

8. A vortex type separator according to claim 7 in which the upper surface of the inlet end of said transfer passage is rounded to present a convex surface toward said groove.

9. A vortex type separator according to claim 7 including a central, upstanding baffle at the base of said main vortex chamber.

10. A vortex type separator according to claim 7 including a nozzle mounted in the base of said main vortex chamber for injecting dilution fluid into said circumferential groove.

11. A vortex type separator according to claim 7 including a nozzle mounted in the base of said main vortex chamber for injecting dilution fluid into said transfer passage beyond the inlet thereof.

12. A vortex type separator for paper pulp comprising: an upright cylindrical vortex vessel, having at its upper end a tangential pulp inlet and a central pulp outlet for withdrawing purified pulp in an upward direction and having in its base a circumferential helicoidal groove of progressively increasing depth leading, without change of direction, into a tangential passage for discharging dirt, the pitch of said groove being such that the bottom of the groove comes flush with the bottom of said tangential passage in substantially one turn of the groove around said vortex vessel.

13. A vortex type separator according to claim 12 in which the upper surface of the inlet end of said transfer passage is rounded to present a convex surface toward said groove.

14. A vortex type separator according to claim 12 including a central, upstanding baffle at the base of said main vortex chamber.

References Cited in the file of this patent

UNITED STATES PATENTS

2,521,103 Vickery ----- Sept. 5, 1950

FOREIGN PATENTS

1,008,940 France ----- May 23, 1952

1,083,274 France ----- Jan. 6, 1955